

February 2016/\$10

Journal of the Air Force Association

AIR FORCE

MAGAZINE

AFA's 70th Birthday

SEE MORE ON PAGE 71

Fixing the RPA Force

SEE MORE ON PAGE 18

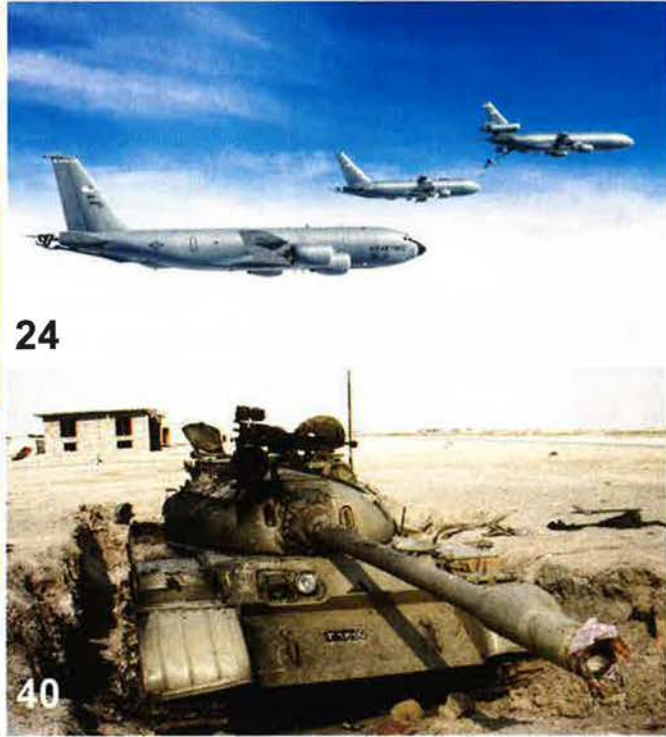
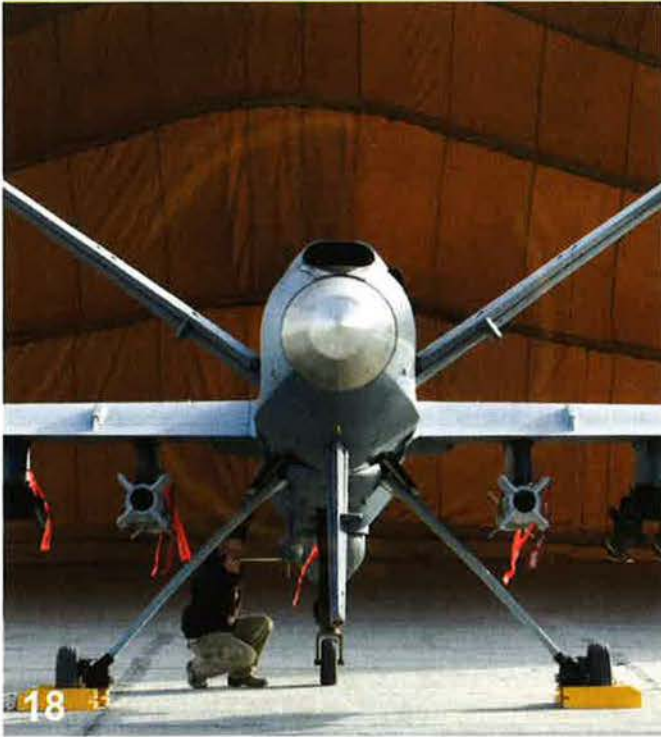




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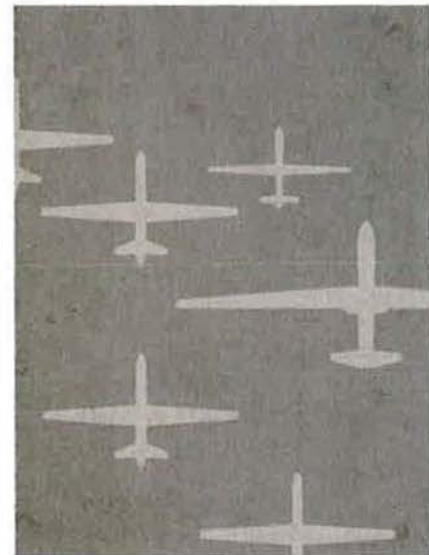




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Six Airmen in a Forgotten War

JUST over a year ago, the US supposedly ended its combat mission in Afghanistan and replaced it with noncombat successor operations. The NATO advise-and-assist mission meant to build up indigenous Afghan military forces is now known as Operation Resolute Support. The US component of this is Operation Freedom's Sentinel.

The US is not just developing the Afghan National Defense and Security Forces (ANDSF), however. Freedom's Sentinel includes an explicit mission to destroy al Qaeda terrorists in Afghanistan. Much of what the US forces have been doing over the past year has been combat under another name.

It is beyond the scope of this magazine to explain the intricate history and levels of trouble in Afghanistan. Books will continue to be written on these topics. But suffice to say, the last year was not peaceful or secure in Afghanistan.

"In the second half of 2015, the overall security situation in Afghanistan deteriorated with an increase in effective insurgent attacks," read a December 2015 DOD report on security and stability in Afghanistan. "Insurgents are improving in their ability to find and exploit ANDSF vulnerabilities."

How bad is it? With nearly 10,000 US forces and additional NATO troops backing up the ANDSF, the Taliban still launched roughly 1,000 successful attacks every month in 2015, with "successful" being defined by DOD as an attack that caused friendly casualties. Last summer, the number of enemy-initiated attacks hovered around 1,100 per month—more than 35 effective attacks per day.

The war in Afghanistan has consistently been in the background of the American public's consciousness since the invasion of Iraq in 2003. Even after Operation Iraqi Freedom ended, Afghanistan was frequently overshadowed by newer battles in Libya and against ISIS in Iraq and Syria. And as the DOD report noted, "Very few ... attacks involved coalition or US forces."

But the war is not without US cost. That fact was tragically driven home four days before Christmas, when a Taliban terrorist drove an explosive-laden motorcycle into a group of airmen on patrol near Bagram Air Base. Six airmen died in the blast, while two others and an interpreter were injured.

Dec. 21 was "the deadliest day in our command's history," said Brig. Gen. Keith M. Givens, Air Force Office of Special Investigations commander. "We lost four brave special agents and two patriotic security forces on a joint patrol outside of Bagram."

The group performing a routine counterterrorism investigation on foot was as diverse as America.

Maj. Adrianna M. Vorderbruggen, of Plymouth, Minn., was an OSI agent deployed from Eglin AFB, Fla. Previously an outspoken critic of DOD's old "Don't Ask-Don't Tell" policy banning homosexuals from openly serving in the military, she was one of the first service members to marry her partner

when the policy was lifted. She is survived by her wife, Heather Lamb, and their young son, Jacob.

TSgt. Joseph G. Lemm, of Bronx, New York, was an Air National Guard security forces airman and was deployed from Stewart Air National Guard Base north of New York City. In civilian life, Lemm was a police detective with 15 years' experience with the NYPD. He had deployed twice to Afghanistan and once to Iraq. He is survived by his wife, Christine, teenage daughter Brooke, and a four-year-old son, Ryan.

SSgt. Louis M. Bonacasa, of Coram on Long Island, N.Y., was also a security forces airman from Stewart. According to New York's *Newsday*, Bonacasa enlisted in the Air Force two days after graduating from high school and met his future wife, Deborah, at basic training. The two were later stationed together at Hill AFB, Utah. He is survived by Deborah and a five-year-old daughter, Lilianna.

SSgt. Michael A. Cinco, of Mercedes, Texas, near Brownsville, was an OSI agent from JBASA-Randolph. At a memorial service at Bagram, OSI Special Agent Heather Garver described Cinco as a "California guy" at heart. *Stars and Stripes* reported that "his laid-back nature belied a sharp intelligence that always kept him 'one step ahead,'" in Garver's words. Cinco is survived by his wife, Veronica.

SSgt. Chester J. McBride, of Statesboro, Ga., was an OSI agent out of Maxwell AFB, Ala. McBride physically shielded the Afghan linguist accompanying the patrol "when the bomb went off, saving the linguist's life," the *Statesboro Herald* reported. McBride earned a master's degree from Valdosta State University just last year and was to begin training at the FBI Academy this summer.

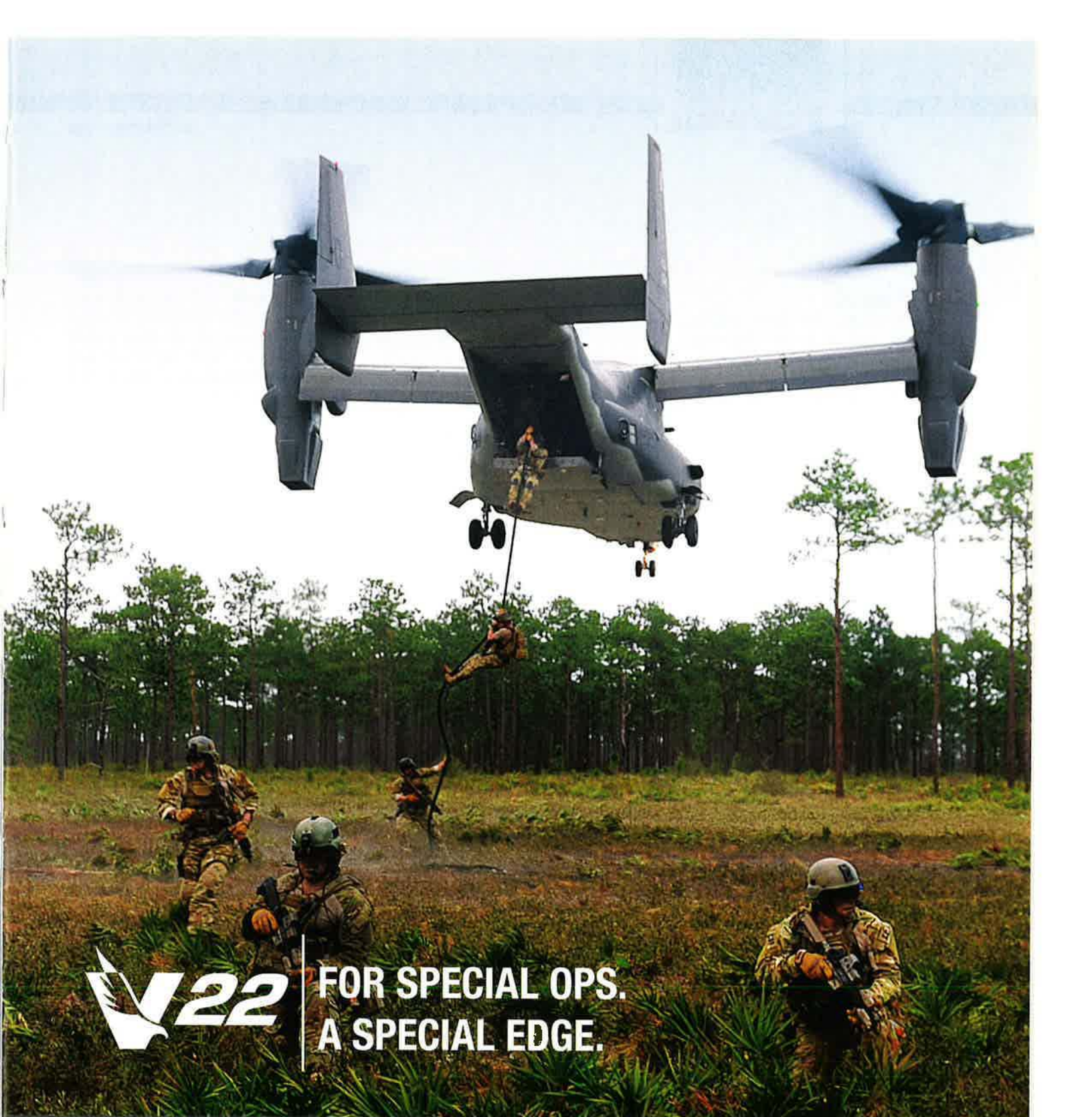
SSgt. Peter W. Taub, of Philadelphia, an OSI agent from Ellsworth AFB, S.D., "had an uncanny ability to make even the toughest situations tolerable" with humor, said OSI's Garver. Taub "recently mused about how to sneak a live sheep onto base to prepare for Thanksgiving dinner," *Stripes* reported. He is survived by his wife, Christina, pregnant at the time of his death, and three-year-old daughter Penelope.

"How do we honor these six heroes?" asked Lt. Col. David Kelly, the 455th Air Expeditionary Wing chaplain, at the Dec. 23 Bagram memorial service where the six airmen's rifles, boots, and helmets were placed in the traditional battlefield cross arrangement. "We honor them by pressing on with the mission. The same mission they were willing to give their lives for."

The timing of the attack meant the news was somewhat lost in the end-of-year shuffle, while most peoples' attention was elsewhere, but the families of these six airmen just went through what may be the worst imaginable holiday season.

Let us then take this opportunity to honor the memory of the six airmen who died that day, as a way to remember the 9,800 US troops that are still fighting to bring peace and stability to Afghanistan. ✪

A smaller role in Afghanistan does not mean all is well.



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BOEING

Airpower Classics

Whenever I get a new issue, I always check the back page for "Airpower Classics" to see what the subject is. The December issue arrived today with the F-15 featured [p. 76]. The Eagle certainly has had its share of fame and accomplishments in the hands of several pilots from different countries. I'd like to add something to the "Israeli Notables" section: The world's only F-15 ace is an Israeli.

Avner Naveh has 6.5 kills in the F-15—the first five, which of course would have given him ace status, came while he was flying with No. 133 Squadron, the last while he was commanding officer of the "Spearhead Squadron," No. 106.

Apparently he got all his kills in only three engagements: Sept. 24, 1979 (two), June 19, 1982 (three), and the final 1.5 on Nov. 19, 1985. Writing aviation history is a fluid exercise. There's always someone coming out to make changes.

Thanks for an always enjoyable magazine.

Cmdr. Peter B. Mersky,
USNR (Ret.)
Alexandria, Va.

Have been a member for some time now and enjoy the magazine immensely.

I have a question about your highlighted aircraft, the F-15, on the last

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page of the December issue [*"Airpower Classics"*].

In the "Interesting Facts" section of the article, it is stated that it was the first US fighter to accelerate vertically.

Some years ago I was reading an article on the F-4, and it stated that the F-4 could accelerate vertically.

Also a person I work with said the same thing about an F-4, and there was a picture with the F-4 vertical.

Could you clear this up for us?

Emerson L. Spivey
Greensboro, N.C.

■ *There are lots of images of lots of aircraft appearing to ascend vertically. Almost all of them are actually photos of a jet in the middle of performing a loop.*

The F-15 was the first aircraft with a thrust-to-weight ratio of more than one-to-one: It could actually accelerate while flying at a 90 degree angle from the ground. The "Streak Eagle" tests in January 1975 were intended to set absolute records for time-to-climb in the F-15. Among the records set by this aircraft was reaching 25,000 meters (about 82,000 feet) in two minutes, 41 seconds, which required vertical acceleration.—THE EDITORS

Back in 1974 I was assigned to Headquarters USAFE as a part of a team evaluating our hardened aircraft shelters at Ramstein AB, Germany. Your article "The New Limits to Hardening" caught my attention [December, p. 28]. Back then we did not have the Patriot missile, however, so I do have a minor correction to make to your article. The picture on p. 32 makes reference to "four Patriot air-to-surface missiles." I do believe those are surface-to-air missiles. A minor error in an outstanding article.

Maj. Walter W. Czerwinski,
USAF (Ret.)
Colorado Springs, Colo.

We Agree, It's Disappointing

How disappointing that there wasn't a single picture or reference to Restore Hope or Continue Hope operations in

Somalia [*"USAF: 25 Years at War," January, p. 20*]. Particularly so since the Black Hawk Down time period was one of the more significant and memorable of military events in the late 20th century.

Capt. Bill Sims,
USAF (Ret.)
San Antonio

Great job, AFA.

You have managed to NOT mention anything about the mobility forces of the Air Force in the 25 years of war article. I will point out that for the last 25 years, mobility airmen have not taken a single day off from combat—even when there wasn't "combat" as defined by your article. The mobility forces of the US are the single most important part of our nation's strength. The fact the US can put troops and aircraft anywhere in the world in 24 hours is the backbone of our nation's strength.

Once again, thank you for forgetting about us.

George Meyers
Haymarket, Va.

I enjoyed looking over the article; however the lack of pictures of strategic/intratheater airlift and air refueling assets leaves an incomplete story.

I served in C-130s during Southern Watch, and we had eight airframes deployed and we were flying resupply runs called Morning Star and Evening Star seven days a week. These missions were not long in flight duration but very demanding as we hopped from operating location to operating

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

location. These missions often required multiple aircraft reconfigurations. We would start out slick floor, hauling cargo and go to troop seats to aeromedical, etc. These were done as a team with MX and the whole aircrew pitching in to get them done in oppressive heat. The strategic lift guys brought in parts and supplies that kept the operation going and helped rotate personnel in and out of the theater. The refuels kept the folks who put warheads on foreheads in the air to do the mission.

I know the bombers and fighters are sexy, but the others I mention, plus all the support personnel, enable our Air Force to execute its mission.

I have an affinity for bombers, tankers, and cargo aircraft since I worked all three during my USAF time.

CMSgt. George Gilbert,
USAF (Ret.)
Winder, Ga.

Just received my January issue and enjoyed the "USAF: 25 Years at War" feature. Very good coverage of these past 25 years.

Just a short observation: [There were] stories or pictures of 12 F-16s, five A-10s, five F-15s and F-117s, two F-111s and U-2s, and one B-1, F-22, KC-135, and KC-10. The workhorse of airlift, the C-130? Only an honorable mention in three stories.

MSgt. Jerry Reichenbach,
USAF (Ret.)
Little Rock, Ark.

■ *The photos and stories in the "USAF: 25 Years at War" feature came directly from reader submissions solicited by ads in the September and October issues of Air Force Magazine and other outreach methods. No mission, aircraft, or operation was left out for any reason other than the fact that*

we did not receive a submission on it.—THE EDITORS

The caption on the Desert Storm Black Hole photo is [incorrect]. The caption says 15th Air Division. It should be 65th Air Division. 65 AD was USAF's Electronic Warfare AD and a lot of us were TDY working in the Black Hole for Brigadier General Proffitt.

Those pictures bring back a lot of memories. Thanks!

Michael J. Kemerer
Hurlburt Field, Fla.

You Never Know

I don't see how the sarcasm in the title serves any benefit [*Verbatim: General Trump Checks In, December p. 21*]. It only gives the appearance that the magazine is ridiculing Mr. Trump for not being an "insider" in the know.

Perhaps a wiser choice would have been to realize that Mr. Trump is a civilian outsider addressing the concerns of many Americans who only get what knowledge [is] allowed them through the media.

Most everyone who gets to see *Air Force Magazine* is prior military that understands the workings and complexities of aircraft purchasing and testing. Perhaps AFA's resources would be better used by educating civilians so that they have more input than just media critics.

It is just possible that a "civilian," once educated in the stages of expected testing performance, could, as President, be a far better ally to the military than a President elected from the ranks of the professional politicians whose only goal in life is to buy enough votes for the next election.

MSgt. Gary R. Lighton,
USAF (Ret.)
Titusville, Fla.

Senior Staff Changes

RETIREMENT: Brig. Gen. Mark K. Wells.

CONFIRMATIONS: To Be Brigadier General: Mark A. Baird. To be ANG Lieutenant General: Robert S. Williams. To be ANG Brigadier General: Paige P. Hunter, Thomas J. Owens II. To be AFRC Major General: James R. Barkley, Kimberly A. Crider, David B. O'Brien, Eric S. Overturf, Walter J. Sams, John P. Stokes, Curtis L. Williams, Edward P. Yarish.

CHANGES: Brig. Gen. Tony D. Bauernfeind, from Dep. Cmdr., Spec. Ops. Jt. Task Force-Afghanistan, US Forces-Afghanistan, CENTCOM, Kabul, Afghanistan, to Commanding General, SOCOM, Korea, US Forces Korea, Yongsan Garrison, Korea ... Brig. Gen. Vincent K. Becklund, from Mil. Asst. to the Cmdr., NATO Spec. Ops., Hq., SHAPE, Belgium, to Dep. Dir., Ops., Office of Security Cooperation-Iraq, CENTCOM, Southwest Asia ... Maj. Gen. Mark W. Westergren, from Dep. Cmdr., Jt. Functional Component Command for ISR, STRATCOM, JB Anacostia-Bolling, D.C., to Dep. Chief, Central Security Service, NSA, Fort George G. Meade, Md.



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AFA's Mission

Our mission is to promote a dominant United States Air Force and a strong national defense and to honor airmen and our Air Force heritage. To accomplish this, we:

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.

Support the Total Air Force family and promote aerospace education.

Bow wave coming; Four budget options; Make more munitions; Russia's fantasy fight; High Kalibr action

REMOVE FROM CART?

The Air Force's nine biggest airplane acquisition programs represent a bill that will largely come due all at once, in the early-to-mid 2020s. Even with some relief from budget caps, however, this bow wave of demands on USAF's budget will likely compel the service to rearrange the rate or number of aircraft it buys—or drop some programs altogether.

That's the assessment from the Congressional Research Service, outlined in a December report titled, "The Air Force Aviation Investment Challenge," prepared by Jeremiah Gertler. The effort to take on such a large number of all-new aircraft programs "simultaneously" probably isn't going to work without either a budget increase or the Air Force accepting a slower pace of modernization, he asserted. Other options to keep the plan intact are ones the service or the Defense Department leadership have said they must avoid: reducing research and development or pulling funds from readiness or personnel accounts.

The major aircraft in USAF's shopping cart include the F-35A strike fighter; the KC-46 aerial tanker; the Long-Range Strike Bomber; a replacement for the E-8 JSTARS battlefield radar, command and control jet; the T-X trainer; the HH-60H Combat Rescue Helicopter; the MQ-9 Reaper; the C-130J-30 extended-range tactical transport; and a new Air Force One presidential transport.

Gertler noted that the bulk of the new programs seems to be timed so that the big increases—shifting from R&D to production, or from low-rate production to higher rates—come after the expected end of budget caps imposed by the Balanced Budget Act of 2013.

"Whether this is a deliberate strategy on the part of the Air Force or a coincidence of timing is unclear," Gertler said, "but it appears that the Air Force is gambling that the budget caps will not be extended or replaced." Still, with the DOD-wide \$17 billion shortfall in Fiscal 2016 expected to reverberate for years to come, it's unlikely there won't be some puts and takes.

The CRS report offered a series of options by which the Air Force could keep its shopping list intact.

One would be if the defense budget is increased, and the Air Force's with it. This would require, though, that any increase be dedicated to aviation and not spread evenly over competing needs, such as training or compensation.

Another would be to reduce annual buys of the F-35A, which alone accounts for 42 percent of the aviation account over the Future Years Defense Program. Slowing the F-35A, though, would require more investment in upgrading older jets to fill the gap. Reducing the F-35 buy from 60 to 48 a year would free up \$1 billion a year "for other priorities," Gertler wrote.

A third option would be to slow down the various programs in the portfolio collectively, staggering them so that the bow wave is reduced. Again, though, this would mean more investment in

and life extension of the systems they're supposed to replace, or acceptance of an even deeper capability gap.

Yet another option would be to delay buying the KC-Y, a follow-on to the KC-46. If the KC-46 is particularly successful, the CRS contends, this might be an option, but the KC-Y doesn't even get started until 2027, several years into the bow wave.

A novel option might be to create a separate funding account for the LRS-B, similar to the Navy's creation of the National Sea-Based Deterrence Fund, to separate nuclear ballistic submarine funding from the rest of Navy shipbuilding. Air Force Secretary Deborah Lee James floated such an idea more than a year ago, but Defense Secretary Ashton B. Carter subsequently remarked that money can't be created magically by "relabeling it."

Gertler suggested that one reason the USAF bow wave doesn't look like a bow wave is because it largely rises up outside the FYDP. He suggested that a 10-year budget plan would "more tangibly illustrate the resource decisions required today to avoid budgetary 'train wrecks' in the future."

BOMBED-OUT SHELL

Seventeen months of bombing ISIS targets in Iraq and Syria have taken a toll on the Air Force's stock of munitions, and the service is now facing weapons shortfalls across the board, USAF officials acknowledged in December. It will take years to reload.

Welsh told reporters in mid-December that USAF is "expending munitions faster than we can replenish them."

A service spokeswoman expanded on Welsh's remarks, saying that while "we are currently able to manage munitions inventories to sustain operations" against ISIS, "we need funding in place and the ability to forecast" future funding in order to better manage weapons levels.

The Fiscal Year 2016 National Defense Authorization Act provided an uptick in munitions spending, but it takes time for dollars to translate into weapons. The spokeswoman noted that replenishment monies in the overseas contingency operations account—which funds the air war against ISIS, among other operations such as in Afghanistan—are subject to rules and a process, "which includes large delays, up to four years, in recovering the munitions inventory expended in combat." The monies from last year "will not replenish our inventories until three years from now," she said.

Due to operational security, the Air Force can't discuss the number of munitions it has on hand. However, the service did say that the shortfalls affect a wide spectrum of munitions, including "smart, gravity, ... [and] small- and large-diameter munitions," and "air-to-air, direct attack, [and] standoff" weapons types.

Welsh told the reporters USAF has released more than 20,000 weapons of all types since Operation Inherent Resolve

began in 2014. The spokeswoman said that Hellfire missile deliveries have been reprioritized from the Army, which uses them on attack helicopters, to the Air Force, which launches them from Predator and Reaper killer-scout drones. The Air Force has also economized on aircrew training to come up with more money for weapons and is "working on a procurement plan to increase production to reconstitute munitions stocks as quickly as possible," she said.

US Central Command spokesman Col. Steve Warren said in mid-December that there's no reason to worry about running out of bombs.

"We have no concern whatsoever about the stockpile of munitions. We have enough munitions to conduct all the [operations] we need to conduct," with enough left over for "a contingency."

THE BIG CHILL

The Cold War is apparently on again, based on two strategy reports—one from Russia and one from the US Navy—released in December.

The Russian document, published on Dec. 31 and carrying the signature of President Vladimir Putin, named both the US and NATO as "threats" to Russia's security, something that the previous version of the annual posture statement, published in 2009, did not do. With chicken-and-egg logic, Putin said Russia's "independent" foreign policy and strengthening military have prompted the US and NATO to build up new forces in Europe and expand NATO to include new members, thus making the alliance more dangerous to Russia, thereby causing Russia to modernize and expand its military forces.

NATO's military "buildup" as well as its involvement in conflicts technically outside its treaty region—what Putin called "global functions"—constitutes a breach of the "norms" of international law, he said. The nudging of NATO boundaries ever closer to the Russian heartland creates "a threat to national security," he added. Without directly referencing Russia's invasions of Georgia or Ukraine, or its air campaign in Syria outside of the US-led coalition, Putin said NATO and the US seek to "maintain [their] domination in world affairs."

It would be hard to make a convincing case that NATO is embarked on a military buildup. The last few NATO ministerial meetings have seen the US urging its partners to meet the alliance minimum goal of spending two percent of their individual gross domestic products on defense—a goal against which most members chronically fall short. NATO countries are still struggling to restock their munitions inventories four years after the

2011 operations in Libya that toppled Muammar Qaddafi from power. As for the US, the Obama Administration has in recent years steadily diminished its European footprint.

Only after Russia's annexation of eastern Ukraine, its shoot-down of a civilian airliner, and the mounting of a proxy war in western Ukraine did NATO react with additional rotational deployments to its eastern frontier states, such as Poland and the Baltic nations of Estonia, Latvia and Lithuania.

Russian lawmakers in recent months have questioned whether the Baltic states' independence from Russia is "legal," and Putin has framed his actions in Ukraine as a "rescue" of ethnic Russians unfairly estranged from their native land by the chaotic breakup of the Soviet Union.

Reacting to the Russian posture statement, a Pentagon spokesman told reporters in early January, "We are not looking for a conflict with Russia," and "they have no reason to consider us a threat."

However, Marine Corps Gen. Joseph F. Dunford Jr., head of the Joint Chiefs of Staff, said last year that Russia poses an "existential threat" to the US, by virtue of its large—and modernizing—nuclear forces. He also called Russia's actions in Ukraine "alarming" and worthy of continuing reassessment of US forces in the region.

US military and policy leaders have resolutely declined to label the developing situation as a renewed Cold War, although USAF Chief of Staff Gen. Mark A. Welsh III has said that Russia's aggressive actions make the situation "look like" one.

BEAR ARMS

The Office of Naval Intelligence chimed in on the Cold War theme with its own December report about Russia's strengthening strategic capabilities. Titled, "The Russian Navy: A Historic Transition," it's the first such assessment cleared for public consumption since 1991, when the Cold War ended.

The ONI described a long list of Russian naval enhancements in the last decade-and-a-half, to include new strategic submarines, new sea-launched ballistic missiles, and especially new cruise missiles and air defense systems, along with plans for new aircraft carriers (up to six by 2030) with air wings of 80 to 90 aircraft, potentially having fifth generation stealth capabilities. There is in place an aggressive Russian warship-building program, even as Russia updates its existing vessels with new weapons, such as the Kalibr cruise missiles demonstrated recently in strikes on Syria.

The Kalibrs, which are being mounted on nearly all types of Russian surface vessels, have demonstrated a range in excess of 900 miles. They can be fired from shallow or blue-water vessels, and present a "complex" defense problem for any targeted area, the ONI observed.

Russia "is giving priority of effort and funding to recapitalizing its navy, which is going through a major transition from the legacy Soviet navy to a Russian navy that should reflect the latest achievements of Russian advances in science and technology," the ONI reported. The new Russian navy won't necessarily be more numerous than the existing fleet of about 187 vessels, but will be more capable "on a unit-by-unit basis" and will offer a credible, though "limited," power projection capability.

Russian carriers will be equipped with navalized MiG-29K Fulcrum multirole fighters and may also boast a contingent of navalized T-50 "PAK FA" stealth fighters.



Is Russia planning to build a "doomsday" torpedo?

An OK Deal On the Budget

Although a two-year bipartisan budget deal hatched late last year allowed the military to fund most of its top programs for this year, officials in the Air Force and other military services worry that spending levels for Fiscal 2017 remain too low.

But in an era of fiscal belt-tightening, the deal lifts spending caps set in a 2011 law and is certainly better than nothing.

During a trip to Turkey in December, Defense Secretary Ashton B. Carter said the agreement was a sign of a fractious Washington finally coming together, even if it meant the military would continue to have to strike a balance among its many funding priorities.

"Obviously you'd always like to have more money, but we try to make the best use of every dollar the taxpayer gives us, whether that is money for enduring facilities, or whether it's for a surge for a war," Carter said during a town hall at Incirlik Air Base.

The agreement spans Fiscals 2016 and 2017, giving service leaders billions more to proceed with expensive procurement programs like the F-35 strike fighter, the KC-46 tanker, and the next generation bomber while also continuing funds flowing to military personnel and day-to-day operations and maintenance.

For this fiscal year, the Pentagon is receiving \$522 billion for its base budget—\$33 billion above the spending caps outlined in the 2011 Budget Control Act. That plus-up narrows the once-expansive gap between the department's requested spending levels and the budget limit to just \$5 billion, or less than one percent of the Defense Department's base budget.

Thanks to that agreement, massive, high-priority procurement programs such as the Air Force's F-35 variant and the tanker remain virtually untouched from the Pentagon's original request for Fiscal 2016, delivered on Capitol Hill a year ago.

But the gulf between hopes and reality is wider for Fiscal 2017, causing some consternation among top military officials in the weeks leading up to the release of next year's budget request.

Under the spending limits outlined in the agreement, the Pentagon would receive \$525 billion for its base budget next year, or roughly \$17 billion less than officials had originally planned. (Congress has set aside another \$59 billion for overseas contingencies, matching this year's levels).

As the appropriations package for 2016 was being finalized, Air Force Secretary Deborah Lee James said officials within the department were grateful to have a two-year roadmap.

"Having stability and knowing what we're planning and executing toward is going to be way, way better than what we have had in the recent past," she said at the National Press Club Dec. 2. "That's the good news."

James nonetheless raised concerns about the overall spending figure for next year; the proposal is due to Congress this month.



Secretary Deborah Lee James: Certainty is better than nothing.

She stood by the Air Force's top three procurement programs—the F-35, tanker, and bomber—and also stressed during her remarks the need to continue adequate funds flowing to readiness and personnel accounts. But she also acknowledged that defense officials would have to find places in the budget to trim that \$17 billion.

"So it's difficult, it's tough, there's no free lunch, but these are important programs" and the Air Force needs to modernize, she said.

Meanwhile, the agreement—like similar deals before it—provides the Defense Department with only temporary relief from the more stringent caps through 2021. While the department has its much-needed certainty through 2017, the fiscal landscape beyond that remains an open question.

Indeed, in two years, the same political scenario will play out once again.

The next Congress and the next Administration will again have to battle over fiscal priorities and decide whether to provide the Defense Department and other government agencies with relief from those caps. If lawmakers and the next President cannot reach another agreement by late 2017, DOD would once again face the threat of lower spending levels.

"You can make assumptions about whether this is a good sign or a bad sign, but we'll have new players in town," Pentagon comptroller Mike McCord said Nov. 30 at the Center for Strategic and International Studies. "And there's no guarantee about what the future holds."

But McCord stressed that the deal in place now—particularly the higher spending levels—gives the Defense Department a stronger negotiating hand going into the next fiscal debate.

"I think it sets us up fairly well for the future, given all factors considered," McCord said. "I think this is not a bad place to be." ✪

Megan Scully is a reporter for CQ Roll Call.

Gulfstream

SPECIAL MISSIONS



THE PLATFORM MATTERS

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01.10.2016

A B-52, flanked by an F-15 and an F-16, flies near Osan Air Base, south of Seoul, South Korea, on a show-of-force mission in response to North Korean nuclear provocations. On the ramp is a USAF F-16 and a Republic of Korea Air Force F-15K.



USAF Must Get Bigger, Not Smaller

The Air Force must stop downsizing and instead “modestly upsize” across the Total Force, Secretary of the Air Force Deborah Lee James told airmen Dec. 8. “Enough is enough,” she said. “We have got to stop the downsizing.” James said she has seen undermanning “everywhere I have traveled,” citing specific holes in the maintenance, nuclear, remotely piloted aircraft, and cyber forces.

Additionally, James noted that the two-year bipartisan budget deal is good news, despite the fact that the deal provides the Defense Department \$15 billion less than the Pentagon asked for in Fiscal 2017. The Air Force must invest in readiness, she said, because about half the combat air forces are not ready for a high-end fight. “We’ve got to do better,” James said.

SpaceX Successfully Lands Booster

SpaceX on Dec. 21 made history in space travel, successfully landing a reusable Falcon 9 booster rocket for the first time after a launch at Cape Canaveral AFS, Fla. The company, led by PayPal co-founder Elon Musk, has

been vying for Air Force contracts and NASA resupply missions, with cost efficiency a large selling point for government work.

The reusable booster is a major push by the company to lower the overall cost of space travel by refurbishing rockets for successive missions as opposed to manufacturing a new rocket for each launch.

At 8:29 p.m., a SpaceX Falcon 9 carrying a commercial payload lifted off from Cape Canaveral. Following separation, the Falcon 9 rocket landed back at the station about 10 minutes after launch, according to a 45th Space Wing news release. The successful launch and landing followed failed attempts to land a Falcon 9 on ships at sea and the disintegration of a Falcon 9 during a NASA resupply mission in June. The Air Force in May certified the Falcon 9 for national security space launches.

LRS-B Protest Continues

Boeing has filed a 133-page brief with the Government Accountability Office detailing the company’s grievances regarding the Air Force’s selection of Northrop Grumman



USAF photo by SSgt. Benjamin Sutton

ANG photo by S/A. Shane Karp



for the Long-Range Strike Bomber contract. The Air Force filed its report with the GAO on Dec. 6, responding to Boeing's complaint. Unsatisfied by USAF's responses, Boeing's Dec. 17 GAO brief represents the next step in the protest sequence.

In a joint press statement, the Boeing and Lockheed Martin team said the Air Force's "selection process was irreparably flawed" and said it was continuing the protest process. Boeing's complaint is that the Air Force didn't take full account of the potential cost savings and allegedly lower risk of its approach to the program.

Under the statutory rules about protests, the GAO must render a ruling on the merits of Boeing's protest by about Feb. 15.

In its own press statement, Northrop Grumman said it had "filed comments with the GAO" in support of USAF's award to that company and said that Boeing's move is a "routine step" and "not in any way indicative of a meritorious protest." Northrop Grumman "remains confident" that it offered "an inherently more affordable solution" for the LRS-B program and looks forward to "getting back to work" on it once the protest is resolved.

Pentagon Approves JSTARS Recap

The Defense Department has given the Air Force the OK to move forward on recapitalizing the E-8C JSTARS fleet.

Frank Kendall, the Pentagon's undersecretary for acquisition, signed a memorandum approving Milestone A review of the program. This lets the contractor teams conduct system functional reviews, preliminary design reviews, and subsystem prototype demonstrations, Air Force spokesman

Right in the Snout: SrA. Rebecca Roberts wears an M50 gas mask during decontamination training at Atlantic City ANGB, N.J., on Jan. 9. Twenty members of a contamination control team played out various scenarios to ensure airmen on the base can successfully operate a decontamination line should they be exposed to hazardous chemicals.

Maj. Robert Leese said in a statement. The service also will begin steps to award "up to two radar risk reduction contracts and is on track to release a draft request for proposal for the engineering and manufacturing development phase in early 2016," said Leese.

The Air Force plans to award the contract for the next generation aircraft in 2017. So far, three teams have announced efforts to win the contract: a team of Gulfstream and Northrop Grumman, a joint effort by Bombardier and Lockheed Martin, and Boeing.

"JSTARS remains one of the highest priority warfighting capabilities for the combatant commanders, and the JSTARS recapitalization program will ensure the Air Force continues to support their critical need at an affordable cost," said USAF Secretary Deborah Lee James in a statement. "We are committed to a JSTARS replacement as soon as realistically possible."

Top Jets From US, UK, and France Train Together

The premier aircraft from the US, UK, and France trained together in the skies over Virginia in December in what officials said is the first high-level exercise involving the three countries and the fighter jets.

The trilateral exercise began in early December at JB Langley-Eustis, Va., with F-22s, Eurofighter Typhoons, and

The War on Terrorism

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

Casualties

As of Jan. 15, 21 Americans had died in Operation Freedom's Sentinel in Afghanistan and 11 Americans had died in Operation Inherent Resolve in Iraq and Syria.

The total includes 31 troops and one Department of Defense civilian. Of these deaths, 12 were killed in action with the enemy while 20 died in noncombat incidents.

There have been 80 troops wounded in action during OFS and five in OIR.

Six Airmen Killed by Suicide Bomber

The Defense Department on Dec. 22 identified six airmen—four Air Force Office of Special Investigations agents and two security forces members—who were killed by a suicide bomber driving a motorcycle near Bagram AB, Afghanistan.

They were: Maj. Adrianna M. Vorderbruggen, 36, with the 9th Field Investigations Squadron at Eglin AFB, Fla.; SSgt. Michael A. Cinco, 28, with the 11th Field Investigations Squadron at JBSA-Randolph, Texas; SSgt. Peter W. Taub, 30, with AFOSI Det. 816 at Ellsworth AFB, S.D.; SSgt. Chester J. McBride, 30, with AFOSI Det. 405 at Maxwell AFB, Ala.; TSgt. Joseph G. Lemm, 45, with the Air National Guard's 105th Security Forces Squadron at Stewart ANGB, N.Y.; and SSgt. Louis M. Bonacasa, 31, who also was assigned to the 105th SFS.

OSI Commander Brig. Gen. Keith M. Givens said in a Dec. 29 news release, "The OSI family will undoubtedly rise to the occasion yet again and honor these great Americans, but for now, I ask for your thoughts and prayers to go out to the families and loved ones of the fallen."

See "Editorial: Six Airmen in a Forgotten War," p. 4.

Afghan Pilots Graduate at Moody

The first class of A-29 Super Tucano pilots from Afghanistan graduated from training Dec. 18 at Moody AFB, Ga., while two maintenance trainees went missing. The eight pilots "will help establish a secure, stable, and unified country," said Col. John J. Nichols, commander of the 14th Flying Training Wing, at the graduation ceremony, according to a news release.

"They are enabling the future of Afghanistan, a future that will be decided by the Afghans themselves." The pilots began classroom training last February and flew their first A-29 training sorties in March. They will be the first of 30 trained by the 81st Fighter Squadron over the next three years. The Afghan air force's current light air support aircraft, the Mi-35 attack helicopter, reaches the end of its service life in January.

"Today does not mark the end, but the beginning, of our continued friendship," said Lt. Col. Jeffrey Hogan, com-

mander of the 81st Fighter Squadron. "Please know that we are shoulder-to-shoulder with you, and we look forward to many years of working together."

The two maintenance trainees had been missing since Dec. 7. A press release from the base stated that they had been at the base since February 2015 and were screened before they arrived in the US.

F-15s Depart Incirlik

The 12 F-15s that deployed to Incirlik AB, Turkey, in November returned to their home base of RAF Lakenheath, UK, in December after a brief deployment, US European Command announced.

Six F-15Es arrived at Incirlik on Nov. 12 to replace F-16s that had rotated through the base. The Strike Eagles conducted operations against ISIS in Iraq and Syria alongside 12 A-10s that were already deployed to the base. Six additional F-15Cs from Lakenheath had arrived at the base earlier in November to conduct combat air patrols and help Turkey protect its airspace.

Pentagon spokesman Navy Capt. Jeff Davis told reporters the deployment was not supposed to be "open-ended." The coalition will not lose any capability in the fight against ISIS, he said, because the Navy is deploying USS *Harry S. Truman* to the region, where it will join the French carrier *Charles de Gaulle*. Additionally, the Royal Air Force will continue conducting strikes from Cyprus, and the German Luftwaffe deployed Tornados to Incirlik. The US consulted with the Turkish government on the decision to remove the F-15s, Davis said.

Long-Range Reaper Goes to War

The MQ-9 extended-range Reaper remotely piloted aircraft debuted in combat over Afghanistan, launching from Kandahar Airfield on Dec. 1, officials announced. Maintainers and General Atomics Aeronautical Systems contractors retrofitted roughly half the 62nd Expeditionary Reconnaissance Squadron's MQ-9s at Kandahar a month after receiving the kits.

"One of the things that, at our level, we are really proud of here is that we did it on top of completing our regular flying schedule," a 62nd ERS maintenance operations officer said, according to a news release.

The Reaper-ER upgrade package includes an additional 1,350 pounds of fuel in two external tanks, a new four-bladed propeller, heavyweight undercarriage, and performance upgrades, according to a company release. Depending on the configuration, upgraded aircraft can stay aloft up to 40 percent longer than the standard MQ-9.

The Air Force ordered an initial 38 of the ER variants under a quick-reaction requirement last year and declared the RPA initially operational in September.

Dassault Rafales flying several missions daily against Red Air Aggressors made up of USAF T-38 Talons and F-15E Strike Eagles. The exercise is "all about integration" between the aircraft, said Col. Larry Broadwell, commander of the 1st Operations Group at Langley.

The aircraft on Dec. 15 were flying an air dominance scenario, with the three countries protecting a 100-square-mile area from the Talons and Strike Eagles. The exercise is a

way for the pilots to practice communicating and operating together in the aircraft, and integrate fourth and fifth generation systems, officials said.

The US and allies have been operating in a counterinsurgency environment in the past 10 years, rather than being focused on anti-access, area-denial threats, the leaders of the three countries' air forces told reporters during the exercise. The event is a "fantastic opportunity to get back into

USAF photo by A1C Nick Emserick



high-end" training, said Royal Air Force Chief of Staff Air Chief Marshal Andrew Pulford.

McCain Calls For Freeze on ULA Payments

Sen. John McCain (R-Ariz.) is calling for a freeze on launch subsidy payments to the United Launch Alliance, in part because he does not believe the explanations the Lockheed Martin and Boeing consortium gave for not competing in the first competitive national security space launch.

In a letter to Defense Secretary Ashton B. Carter, McCain asked the Pentagon to audit ULA's business systems and provide the results to the Senate Armed Services Committee, which he chairs. According to McCain, ULA said

Take a Breather: A1C Justin Wanke helps conduct a cabin pressure test on an F-15E at Kadena AB, Japan. Such tests aim to prevent hypoxia—a lack of oxygen reaching the pilot's muscles. Hypoxia can cause spatial disorientation, delayed reaction times, and death. See "What It Takes," p. 52.

it does not have any Atlas rockets available for the bid, because of sanctions in the National Defense Authorization Act against the use of Russian-made RD-180 engines that power the Atlas.

However, McCain said ULA has five engines that are not limited by the sanctions already in hand but "rushed to assign them to non-national security launches," not restricted by sanctions, in a bid to force Congress to allow ULA to buy more Russian-made engines. "I feel strongly that these tactics are inappropriate and intended to support an effort in the Congress to subvert the authorization process," McCain wrote.

By the Numbers

45

F-35s delivered in 2015, the second year in a row the program office hit its mark. The total represents

a 25 percent increase in one year. The 45 jets delivered in 2015 included 26 F-35As for the Air Force; eight F-35Bs for the Marine Corps; eight F-35Cs for the Navy-Marine Corps; the first two F-35As for the Royal Norwegian Air Force; and one F-35A for the Italian Air Force.

Potential RD-180 Replacement Passes Initial Review

Aerojet Rocketdyne's developmental AR1 rocket engine, designed to replace the Russian-built RD-180 to launch military satellites, passed its first major design review in mid-December, the company announced.

"We have achieved every milestone in our AR1 schedule to be ready" to deliver a flight-ready engine for certification in 2019, the company president and chief executive officer, Eileen Drake, said in a Dec. 17 release.

The Air Force Space and Missile Systems Center issued a request for proposals in June to develop space launch solutions that aren't reliant on the RD-180 to ensure military access to space in the face of heightened tensions with Russia. The Air Force plans to invest in as many as four promising industry efforts to develop either a new launch platform or a replacement engine for the current platform. ✪



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THE Air Force in December laid out a massive overhaul of its remotely piloted aircraft enterprise, calling for congressional support to adopt dozens of recommendations that stemmed from a months-long grassroots review of issues facing the RPA force.

Air Combat Command is calling for \$3 billion in additional funding over the next five years to double the number of pilots and sensor operators flying its unmanned aircraft, along with 75

additional MQ-9 Reapers to address manpower and capacity issues that have been more than 10 years in the making.

The RPA force has been stretched incredibly thin as demand for its work has skyrocketed, with continued operations across US Central Command, including a fight against ISIS in Iraq and Syria that depends on intelligence, surveillance, and reconnaissance.

"Our RPA enterprise was born in combat and recently surpassed 20 years

DON'T FEAR THE REAPER

By Brian W. Everstine, Pentagon Editor

The Air Force is taking dramatic steps to get its remotely piloted aircraft community on solid ground.

of service, many of which were executed at surge levels,” ACC Commander Gen. Herbert J. “Hawk” Carlisle said in a release announcing the roadmap. “We owe it to our airmen to remove the daily stressors that are responsible for the challenging environment they are operating in.”

ACC is also looking to overhaul the career tracks for officer operators and enlisted maintainers to address career development concerns within the force.

The Air Force will study the promotion and education tracks for RPA officers, as well as the feasibility of a single specialty code for RPA personnel. The service also is turning to the Air Force Reserve and Air National Guard for help.

The Air Force’s remotely piloted aircraft fly across the globe, but many of the airmen who operate them are based in a few locations inside the United States, with the main operating hub at Creech AFB, Nev.

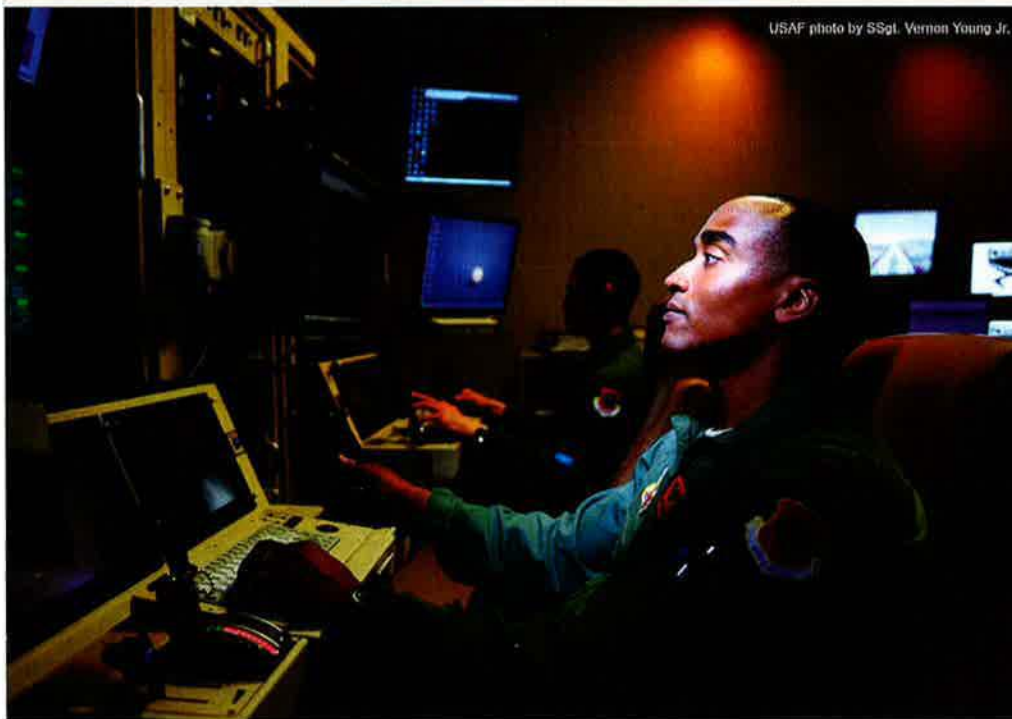


RNLA photo by Rinze Klein

An MQ-9 Reaper in Afghanistan undergoes an inspection. Air Combat Command is looking to address career development concerns for RPA personnel, including ground crews.



A Reaper loaded with GBU-12 Paveway II and AGM-114 Hellfire missiles on a mission over Afghanistan. The RPA force has been stretched thin due to an unrelenting and steadily increasing operating tempo.



USAF photo by SSgt. Vernon Young Jr.



The Air Force wants to establish new MQ-9 operating locations at other bases, such as Beale AFB, Calif., Davis-Monthan AFB, Ariz., and JB Langley-Eustis, Va. These would be supplemented by other locations abroad, pending congressional approval and agreements with

host nation governments on possible foreign bases.

The Air Force will stand up a new wing focused on remotely piloted aircraft. This is a way to integrate “RPA operations and command and control or intelligence processing,” Carlisle

said. It will streamline the RPA effort, from the aircraft itself, to the video it collects, and the intelligence that produces. It should also pay some career advancement dividends for RPA airmen, who are today largely crammed into the super-wing at Creech and lack a number

of career advancement and leadership opportunities.

A FORCE STRETCHED THIN

Ten years ago, as the US had 100,000 troops in Iraq fighting fierce battles in cities such as Fallujah, the Air Force flew five combat air patrols, Lt. Gen. Robert P. "Bob" Otto, the deputy chief of staff for ISR, told reporters in October. Those five medium-altitude patrols, each providing around-the-clock surveillance coverage, met about 56 percent of CENTCOM's requirements for full-motion video. Today, with Operation Freedom's Sentinel in Afghanistan and Operation Inherent Resolve against ISIS in Iraq and Syria, the Air Force is flying 61 combat air patrols. However, despite this massive increase in ISR flights, the Air Force can only meet about 25 percent of CENTCOM's mission requirements.

"So with 10 times the number of CAPs, we're meeting less of their requirement," Otto said. "What that tells me is, as we've learned how to use these assets, there's a demand for them that's virtually insatiable."

last summer. The demand caused pilots to often fly a schedule of six to seven days on and one day off, and days of up to 13 hours, she said.

The service has been unable to train enough additional pilots to alleviate the stress, simply because it needs its pilots to be flying operational missions instead of taking time to be instructors. The Air Force has been able to train about 190 new drone pilots per year, but that is much less than the number of drone pilots who leave the service or transfer inside the Air Force to another job. Three hundred are needed.

The Defense Department and Air Force took steps in early 2015 to try to relieve some strain. In April, Defense Secretary Ashton B. Carter approved a reset of combat air patrol guidance to let the Air Force fly 60 patrols, five fewer than it was previously tasked with. The Pentagon called on additional support from the Army, flying 16 combat air patrols with its MQ-1C Gray Eagle, and another 10 patrols from government-owned, contractor-operated aircraft.

"That's a heck of a lot better than telling the Air Force you need to go to

RPA pilot aviation pay to \$1,500 per month from \$650, along with developing a long-term RPA retention bonus of \$15,000 for five- and eight-year commitments.

FORCE MORALE

Still, there were issues of morale across the force and concerns about the long-term health of the airmen in the career fields. To address this, the Air Force used a model from another force that faced strain and morale problems: the nuclear missile community.

In February 2014, the Air Force launched the Force Improvement Program in Air Force Global Strike Command to address areas that first came to light the year before. Dozens of officers had been caught cheating on exams at Malmstrom AFB, Mont., and during the investigation, several serious morale issues in the ICBM community came to light. The service launched the FIP, consisting of both Air Force and outside experts interviewing hundreds of airmen at its missile bases to find out what they thought about their careers and what could be done to address the challenges. The program led to dozens of changes.

Air Combat Command decided to follow suit, and in August launched its Culture and Process Improvement Program, CPIP, for the remotely piloted aircraft community. The program included 3,366 surveys sent to officers and enlisted airmen, along with two teams that visited 12 bases to conduct meetings as a way to follow up on the surveys.

"We're seeing problems in the MQ-1/9 community at both the major command and base levels that can be solved quickly," Col. Troy Jackson, the C2ISR Operations division chief and officer in charge of the CPIP, said in announcing the program. "Airmen in this career field are being exhausted with no end in sight; we want to fix this."



This demand has had a dramatic impact on the airmen who operate the aircraft. The Air Force's RPA pilots are currently flying four times the hours that manned pilots do, and log an average of 850 to 900 flight hours annually, Air Force Secretary Deborah Lee James said

86," Otto said. "If we're going to do more of this kind of full-motion video, I think that's a good approach to it."

Air Force leadership also took steps to try to help the overworked pilots of the aircraft, starting with pay. In January, James approved a plan to increase

Far left: A Reaper pilot flies a mission from Creech AFB, Nev. Creech is the main Reaper hub, but USAF wants to add more bases to the mix. Left: Airmen at a Distributed Common Ground Station. Last year, airmen in DCGS centers processed nearly 400,000 hours of full-motion video focused on 490,000 targets. Airmen at the JB Langley-Eustis, Va., DCGS often worked 14-hour days, six days straight.

WHAT AIRMEN WANT

Carlisle said the review brought to light three main things airmen want. First, RPA airmen want time—time to visit family, to go to school, to have “different jobs,” to take a vacation, etc. Airmen throughout the Air Force are busy, of course, but the service has done a better job creating sustainable schedules in other career fields, Carlisle said.

Airmen want a “strategic plan for the enterprise”: a real idea of what the future of the MQ-9 Reaper mission will be.

And finally, he said, airmen want to know the Air Force and Defense Department leadership is listening to them.

The initial result of the program was the Dec. 11 announcement, a step Air Force officials say shows the service is serious about going forward with addressing issues airmen highlighted. Ultimately, the Air Force will take 140 actions to improve its RPA operations.

We’re operating on more than 70 years of training the best pilots on Earth, and that knowledge and experience goes into every airman in the remote aircraft career fields.”

Having additional airmen would help the service eventually climb back to its requirement of 65 combat air patrols. However, USAF wants to create a “stabilized deployment schedule” for airmen and not have a deploy-to-dwell ratio below one-to-two. Personnel should not be forward deployed for launch and recovery operations or staff jobs for more than six out of every 18 months, Newell said. Also, the combat-to-dwell ratio for RPA personnel should not be below two-to-one, so for every two days an aircrew flies combat missions, they should spend one day in training or reconstitution.

The effort extended outside of the RPA control centers, with airmen across the ISR community surveyed. CPIP survey teams visited airmen

working at a surge capacity in recent years, with a 1,900 percent increase in missions since 2001, said Col. Timothy D. Haugh, commander of the 480th Intelligence, Surveillance, and Reconnaissance Wing at Langley. In Fiscal 2015 alone, airmen in the Air Force DCGS centers processed 381,000 hours of full-motion video focused on 490,000 targets.

This has meant long hours. Until recently, airmen at the Langley facility worked up to 14 hours per day, for six days straight. After a few days of this schedule, the airmen’s skills and ability to think critically about the images and videos they were following began to deteriorate, another analyst at Langley said during a recent visit by *Air Force Magazine*.

On Oct. 1, the leadership at Langley changed the schedules for the airmen in the center. They no longer can work more than 10 hours per day, for four days of operations. The change immediately increased morale, and



USAF photo by TSgt. Ricky Best



If approved and funded, the Air Force’s RPA community would massively expand with 3,000 new pilots over five years, adding 17 new squadrons. However, standards would not change to get these new airmen in.

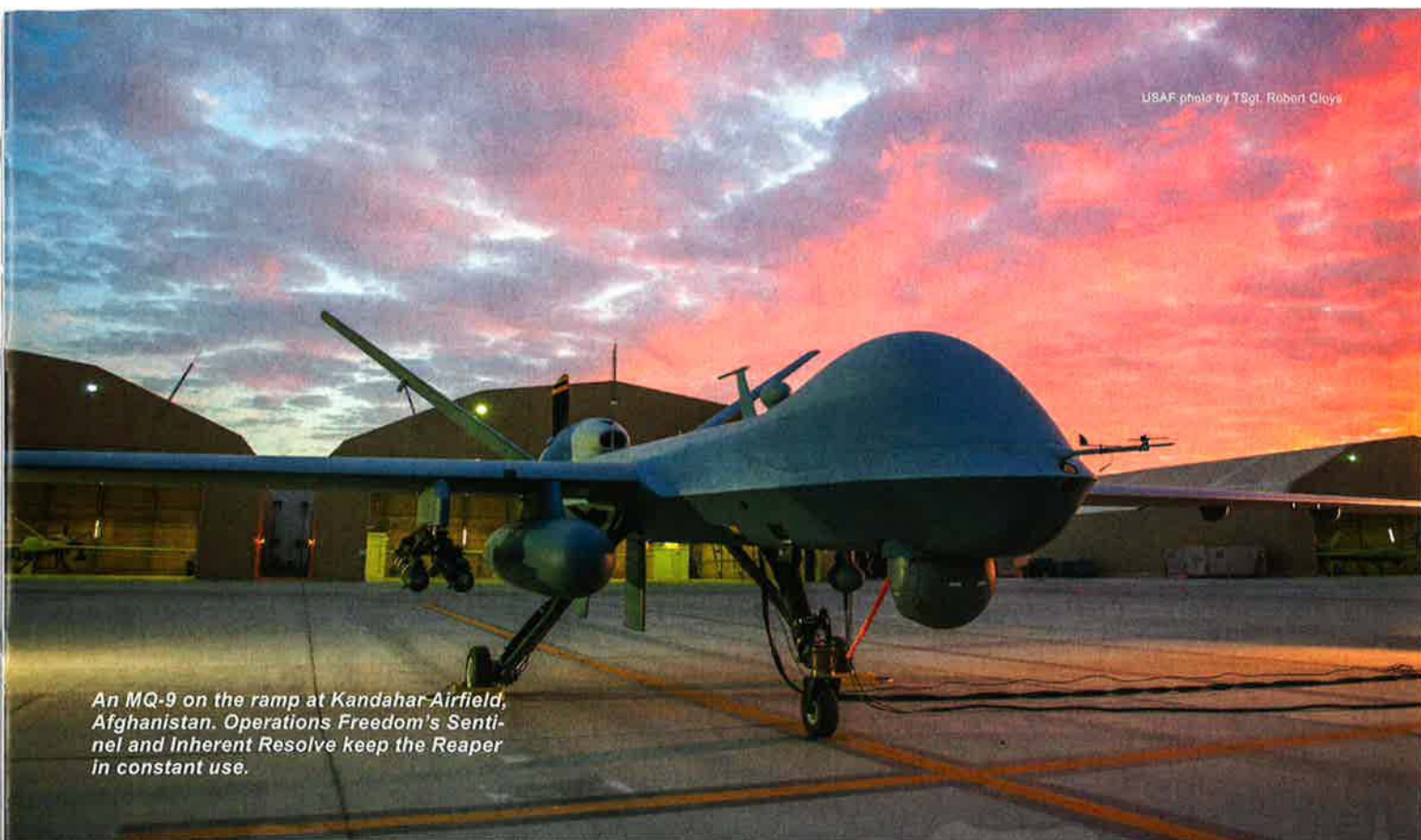
“Training standards for airmen are not based on manning, but rather on mission,” ACC spokesman Ben Newell said. “The standards for RPA airmen would remain as they are unless mission requirements dictate change. ...

assigned to the Distributed Common Ground Station at Langley after calling on the RPA bases. The surveys were all voluntary, said a staff sergeant analyst in the DCGS at Langley. (For security reasons, the Air Force does not release the last names of airmen in the intelligence fields.)

The airmen who process the full-motion video from MQ-1s and MQ-9s and the high-altitude still photography from U-2s and RQ-4s have been

Haugh said the airmen were fresher and more capable when they were better rested and able to spend more personal time outside of the center.

Each DCGS in the Air Force focuses on a specific area of responsibility, with Langley airmen concentrating on US Central Command. However, to watch daylight in the Middle East, they must work through the night in Virginia. Some were rarely able to see daylight at times because of long hours and extended



An MQ-9 on the ramp at Kandahar Airfield, Afghanistan. Operations Freedom's Sentinel and Inherent Resolve keep the Reaper in constant use.



USAF photo by TSgt. Robert Cloys

Far left: A student pilot and a sensor operator control a Reaper during a training mission. Above: A technical sergeant weapons load crew member runs a system check on a Reaper.

community saw some of the highest rates of dental problems in the Air Force because of their reliance on energy drinks, according to wing leadership. The fitness center is now open 24 hours, where previously the airmen in the DCGS relied on a makeshift facility in an empty room full of donated weights, noted an analyst.

ENLISTED PILOTS ON THE WAY

A week after the initial CPIP announcement, the Air Force decided it would make a change many in the force had been asking for: using the enlisted force to fly RPAs. After months of saying the idea was in review, the Air Force announced Dec. 17 that enlisted airmen would be able to fly the RQ-4 Global Hawk.

Air Force Chief of Staff Gen. Mark A. Welsh III said in January the service should look at the enlisted force as a potential approach and that he would come up with a recommendation.

Service leadership ordered ACC to use the first six months of 2016 to lay out entry requirements, training plans, career path development, delineation of duties, compensation details, and the appropriate force mix. The move is necessary to alleviate strain on RPA

crews, though enlisted airmen will still be unable to fly armed remotely piloted aircraft such as the MQ-1 Predator and MQ-9 Reaper.

“Our enlisted force is the best in the world and I am completely confident they will be able to do the job and do it well.” James said in announcing the decision. “The RPA enterprise is doing incredibly important work and this is the right decision to ensure the Air Force is positioned to support the future threat environment.”

While the CPIP review is over and the initial steps have been announced, the program led to many initiatives and recommendations that are still under discussion and analysis, Newell said, adding there will be more to come.

“RPAs have changed the game on the battlefield with their persistence and ability to both build situational awareness and close the kill chain,” Carlisle said. “Ultimately, CPIP is about establishing a coherent, Air Force-wide strategic plan that enables us to continue to provide this incredible capability to the joint force by moving the RPA community toward the sustainment model we’ve established for other Air Force weapon systems.”

shifts. Following the change, one airmen said, “I get to see the sun. This is awesome. I’m just going to walk around.”

Other simple changes have taken place at Langley for the airmen in the DCGS. There’s an updated vending machine. Previously, the airmen in the

Tanker Time Is Ti

By John A. Tirpak, Editorial Director



The KC-46 tanker project has entered a critical period. In the next few months, the flying test fleet will double from two aircraft to four, test flying will accelerate, and program managers will seek Pentagon approval to begin low-rate initial production. If all that happens on time, managers in the Air Force and at Boeing believe the project will make its key deadline of delivering enough airplanes to go operational circa August 2017.

That's just 18 months away, though, and there's no margin left in the schedule for any newly discovered problems.

Still, if all goes well, the Air Force will soon start receiving the most advanced tanker it's ever had—far more capable, flexible, and survivable than the KC-135s and KC-10s flying today.

"When the program was first started, ... the schedule we put on contract showed [Boeing] six months early to required assets available," said Brig. Gen. Duke Z. Richardson, USAF program executive officer for tankers. The required assets available (RAA) benchmark is 18 airplanes, needed for Air

Mobility Command to declare initial operational capability in August 2017 or soon afterward.

"From their [original] schedule, they would have delivered to that six months early," Richardson said in a December interview. However, "that six months margin ... that they had baked into the schedule" is gone.

The schedule went awry when Boeing discovered it had improperly wired the first test aircraft (and some of ships two and three), failing to separate certain wires that the Air Force specified be physically set apart from each other to meet battle damage redundancy requirements. It took months to rip out the old wiring, design new bundles, and install them, making sure that subsequent airplanes on the assembly line would also meet requirements.

Another delay was incurred when there was contamination of a test fuel system, requiring weeks to disassemble, repair, and recertify it. The two problems alone ate up nearly all the six months of leeway.

This was costly for Boeing, whose management admits to bidding stra-

tegetically on the fixed-price KC-46 program in 2011 to ensure a win. That meant Boeing bid less than it thought the development program would cost, expecting to make up the losses through volume efficiencies on its commercial airliner and freighter lines (especially the 767 that the KC-46 is largely derived from), by potentially winning the inside track on future USAF tanker buys and by being well-positioned for future worldwide tanker sales against its airliner nemesis, Airbus.

To date, Boeing's after-tax losses on the KC-46 exceed \$500 million. Because it is a fixed-price program, Boeing bears all liability for the overage and so has great "incentive" to stay on track from here on, Richardson observed.

"Time costs money, so the faster they can get through the program, the sooner they'll stop the bleeding," Richardson said.

Since those two big problems were corrected, though, the program has been moving well, according to Charles L. Johnson II, Boeing vice president for Air Force mobility programs. In a De-

ght

A KC-46 (c) goes through aircraft acceleration and vibration testing while in receiver mode behind a KC-10 and in formation with a KC-135. In the next few months, two more test tankers will join the fleet of two already flying.



The KC-46 program enters a critical developmental phase on schedule—but just barely.

ember interview, Johnson said the two tanker prototypes then flying—one a “provisioned freighter” and another fully equipped with all the KC-46’s tanker and other military equipment—had accumulated 350 flight hours on about 110 sorties. The ability to “turn the jets, do the postflight stuff, get the data downloaded, analyzed, ... and then get airborne again has actually been going pretty well,” he said.

FAA CERTIFICATION

The first jet flew in December 2014. Designated a 767-2C, it was based on the 767-200ER freighter, but with “provision” for the plumbing, electronics, and hard decking necessary to convert it to a KC-46 tanker. Because the KC-46 is considered a derivative, the 767-2C must be certified by the Federal Aviation Administration for airworthiness, and the test program has been designed so that FAA certifications and Air Force flight testing can be done in parallel to save time and reduce the number of flights necessary. New to this airplane from the stock 767 is a different wing design and

a glass cockpit adapted from the 787 Dreamliner, among other differences.

Two 767-2Cs and two all-up KC-46s will comprise the test fleet. The two 2Cs will be converted into KC-46s later, and ultimately, all four airplanes will join the operational force. The KC-46 program calls for 179 tankers to be delivered by about 2027.

Johnson said the test fleet was designed so there would always be a spare of each type during flight testing.

Engineering, manufacturing, and development (EMD) aircraft No. 2, configured as a KC-46 with functional refueling gear and other equipment, made its first flight Sept. 25 last year. During the four-hour hop, the flight controls, engines, environmental control systems, and other apparatus were tested up to an altitude of 35,000 feet. The aircraft carries two wing aerial refueling pods. WARPs will allow the jet to refuel aircraft (typically Navy and foreign types) that use the probe-and-drogue refueling system. The WARPs deploy a hose and basket that the receiver aircraft connects to with a probe. The WARPs

were tested Oct. 8, as was a hose system on the centerline. This feature will allow the KC-46 to refuel up to three aircraft simultaneously. The centerline refueling boom was deployed on Oct. 9.

Richardson and Col. Christopher Coombs, the Air Force’s KC-46 program manager, said test flights so far are going well and no major deficiencies have shown up, although “we’re a few weeks off our plan in terms of the fly rate for EMD 1 and 2,” Richardson said. He chalked that up to “standard stuff” such as a fuel leak and weather delays—things not having to do with the design of the jet. Testing of the cargo-loading characteristics of the KC-46 was done last October and revealed no problems, Johnson asserted.

The start of “dry hookups” with a series of receiver aircraft was set to begin early this year. The initial schedule called for, in order, connections with an F-16, C-17, F/A-18, A-10, AV-8B, and another KC-46. The F-16 is representative of a USAF “fast mover,” Johnson said. The C-17 is representative of a “heavy,” while the F/A-18 is a “fast mover” using the



The centerline drogue system and WARP pods will allow the KC-46A to refuel Navy, Marine Corps, and allied aircraft that use the probe-and-drogue system.

probe-and-drogue system. The A-10 is a “slow mover” boom-type receiver while the AV-8B is a slow mover of the probe-drogue type. Finally, the KC-46 is required to be able to both give and receive fuel, so there will be yet another test with a “heavy,” Johnson said.

After dry hookups, later tests will transfer fuel. A second wave of eight “receiver pairs” will follow, and a third phase will certify 11 more, Richardson explained.

The list does not yet include the F-35. Even though the strike fighter is expected one day to be the most numerous aircraft in USAF’s inventory—and possibly that of the Navy and Marine Corps as well—Richardson said a decision was made early on not to mingle two developmental programs.

“We don’t like change on this program,” he said, crediting a lack of shifting requirements with the relatively smooth progress of the project so far. Given that the F-35 was in flux when the KC-46 was mapped out, it was decided to save it for a “Phase 4” receiver pairs group.

The big programmatic hurdle ahead is Milestone C, when Pentagon acquisition, technology, and logistics chief Frank Kendall must approve starting low-rate initial production of the new tanker. If he does—that decision is expected around April—the Air Force will have the green light to award the first three year-lots of airplanes. Lot 1 will be for seven jets, and it could be awarded as early as May. Lot 2 is for 12 aircraft and it could be awarded in June. Lot 3 will have 15 aircraft.

The LRIP 1 and 2 contracts are “prenegotiated,” Richardson pointed out, “so once we get Milestone C approval, we will be able to award those immediately.” Lot 3 and beyond are not fixed price, but “they’re on what we call ‘not-to-exceed’” contracts. When the KC-X competition was held between Boeing and Airbus in 2011, “we competed all 179 aircraft, all the way out. So I think that was a smart move by the department,” Richardson said. “We know there’s a ceiling as to how much they could cost, and we won’t go above that ceiling, by definition.”

The price could well be lower because USAF will be applying “should cost” and “should schedule” analyses to the project to determine a fair price for the jets, he added.

ON TIME

Though Boeing won’t have the go-ahead to begin production of KC-46s until Kendall makes his Milestone C call, “it’s very likely,” Richardson said, that the company has begun procuring material for long-lead items already.

With first contact in January—“a good sign for the program”—Milestone C, and the first LRIP contract probably happening on time, “we’re in good shape,” Richardson said.

The KC-46 is one of three programs that USAF leaders have described as “existential” for the service—the other two being the F-35 fighter and the Long-Range Strike Bomber. Tankers extend the range of most Air Force aircraft, making it possible to reach around the

world and, if necessary, operate directly from bases in the US.

The need for the tanker is urgent, as USAF’s existing fleet of aerial refueling aircraft comprises 396 KC-135s Stratotankers—bought during the Eisenhower Administration—and 59 KC-10 Extenders, acquired during the Reagan Administration. Though updated over the years and scrupulously maintained, many of the jets suffer from corrosion, structural fatigue, and obsolescence.

Several separate efforts to recapitalize the tanker fleet during the 2000s failed, either due to politics or the Air Force’s own mismanagement of the effort. The KC-46 was selected in a 2011 competition against the Airbus KC-30, and the two continue to slug it out in international contests.

The KC-46 should not be considered merely a tanker, Richardson said.

“It really opens up the globe to us,” he said. “Every single KC-46 will be able to do, same sortie, boom and drogue.” Only 20 KC-135s are able to refuel both boom- and hose-type aircraft at the same time. These “have the highest number of hours” compared with the rest of the fleet “because they’re so flexible and in-demand.” Given that USAF almost always fights as part of a coalition, partnered with Navy-Marine Corps jets as well as foreign aircraft that use probe-and-drogue, the KC-46 will be a force multiplier, Richardson asserted.

He noted that only eight KC-135s can be refueled.

With a lab-demonstrated ability to pump up to 1,300 gallons per minute, the KC-46 will also be able to process jets

MSgt. Luis Rodriguez-Asad tries out the KC-46A boom operator simulator at McConnell AFB, Kan. The refueling boom was first deployed on a test aircraft Oct. 9.

USAF photo by A1C Colby L. Hardin



more rapidly, each spending less time on the boom, Richardson said.

Every KC-46 will have the Large Aircraft Infrared Countermeasures (LAIRCM) laser defense system to protect against anti-aircraft missiles, and a suite of integrated defensive systems, such as a radar warning receiver, that will make the jet more survivable. Moreover, the KC-46s will be linked to USAF's aerial networks, able to connect to Link 16 and threat advisory systems. It will have a "rerouting capability" to steer around threats, a "pretty significant capability" not found on the KC-135, said Richardson.

"It fulfills all the needs," he said. Both to contain changes and cost, requirements have not changed on the KC-46 since the KC-X competition, but they haven't needed to, either, Richardson said, because of the jet's capability and flexibility. Moreover, it will have the ability to carry cargo pallets and litters for aeromedical evacuation as needed.

Unlike the KC-135 and the KC-10, the boom operator will be seated right behind the cockpit, instead of at the tail of the jet. Equipped with a 3-D imaging system, the boomer will be able to view what's going on at the tail end of the airplane "wingtip to wingtip," Johnson said. Flight crew will also be able to view the refueling situation on a cockpit display, another upgrade from existing tankers. Furthermore, an advanced lighting system has been developed that gives crisp illumination for receiver aircraft at night, letting them see the KC-46 in sharp detail and allowing pilots to request greater or lesser lighting intensity. For

blackout or special operations, Johnson said, receiver aircraft pilots using night vision goggles will see the aircraft clearly, instead of the fuzzy images they see now. In blackout, without NVGs, the jet will be invisible against a night sky.

SAFETY FIRST

The KC-46 will be "a giant step" forward as far as safety goes, Johnson asserted.

Given all that's been accomplished so far, "there's really not a ton of work left" to do to meet requirements for LRIP to start, Richardson said.

Flight test, however, has a way of fulfilling its purpose: revealing problems and discovering deficiencies that need to be corrected.

Coombs said USAF and Boeing are working well together to try to mitigate the risks of doing so much testing and development concurrently, and both he and Richardson believe there are "opportunities" to buy back some of the schedule margin lost so far.

One way, Richardson said, might be to streamline flight testing. Flight test results so far have been "pretty darn positive," he said, and that may allow skipping some test points.

"We don't ever extrapolate from one test point to the next, but we interpolate. So if we have two data points that look good, we don't necessarily need to collect the data point that's between the two" if they "follow the model that we had built ahead of time."

Richardson acknowledged that this approach—applied to a much greater degree—was tried on the F-35 program

with limited success, but "I wouldn't say that's how we're going to make up schedule." He praised Boeing for its skill at "moving testing around" when an issue emerges so that full use of the test assets can be made and "so that we don't have any blank space" in the test program.

There may also be ways to do more of the required FAA testing in parallel rather than in serial fashion, and ways to speed up fatigue testing, he said.

Richardson said he doesn't want to "oversell" the idea of interpolating test points and maintained it wouldn't be done with a lot of the testing, but was rather more optimistic about the chances of making up some time with the FAA assessments. "A good bit of the [testing] falls into the FAA camp, because of the airworthiness process that Boeing has to go through ... to get the amended type certification and the supplement type certification."

What if an issue is discovered that delays the program? Richardson said the answer would depend on "how much they miss it by, ... and how many airplanes do they miss it by?"

His portfolio encompasses all the tankers, and further delay of the KC-46 would necessarily mean an extension of the oldest and "worst actors" in the KC-135 fleet.

"We're doing due diligence to look at those legacy fleets to answer exactly that question," he said. "If we had to extend [the old jets] a couple of months, what does that require us to do, to still fly safely?" All that information "will go into a contract

An artist's concept of a KC-46 refueling an F-22 Raptor. Boeing is driving hard to meet the contractual RAA date for the new tanker, and USAF is helping—as long as the service isn't obliged to spend any more money on it.



negotiation with Boeing to deal with that issue.”

Richardson didn't discuss specific remedies, but Boeing does a lot of the KC-135 and KC-10 support and might potentially have to provide in-kind service life extension on some aircraft at reduced or no cost if it misses RAA.

He hastened to add, however, that “Boeing has not let up on their drive to meet that contractual RAA date. And so, on the Air Force side, we're doing everything we can to help them as long as it doesn't cost us another dime.”

When issues are discovered in flight test, it means going back and retrofitting aircraft that have already been produced and altering the production line with a fix so that new airplanes don't have the same fault built in. In some programs, this cost is shared between the government and the contractor, but on the KC-46, Boeing is responsible for the cost of these retrofits.

Coombs explained that Boeing has the responsibility “to go back in and make corrections to any aircraft that has already been delivered ... or any aircraft that is in production, of anything that is found all the way through IOT&E” (initial operational test and evaluation). The way the contract is written, Boeing will decide “when is the right time, when

do they feel the engineering system is stabilized enough that everything is great to start producing those aircraft,” he said. Boeing will be mindful that “they're in the hole, so they're going to want to minimize any changes that they may have to incorporate later.”

SEEKING THE MARKET

Will Boeing be able to recoup its investment on the KC-46? So far, it has only won one international tanker contest—a three-airplane order for Japan. Johnson said, however, that it's still early in the program—only prototypes are flying—and the KC-46 will be in production, at a rate of at least 15 a year, for at least the next 12 years. Some of the international contests the KC-46 didn't win were for countries that needed a tanker right away, he asserted.

“There're still opportunities out there,” he said, and Boeing believes the tanker market will increase beyond those countries that have already expressed an interest in buying some.


“Even humanitarian aid” missions are requiring tanker support now, he said, and countries that want to respond—or provide their own tanker capability in wartime coalitions—are seeing the need to have their own tankers, he said.

In his own opinion, Johnson said,

many US partner countries may realize they've been “taking for granted” that they can get refueling support from the Air Force when they need it.

“That's changed so much, now,” he observed. “There's so much going on that not everybody can count on” a spare USAF tanker to help them get where they're going. And “certain key allies want more independence to do what they want to do.” Many countries are buying the F-35, he said, and “how are you going to get to the fight? ... How are you going to sustain the fight? Gotta have a tanker.”

He added, “The market is out there” and because the KC-46 will be in production a while, “they don't have to decide right now.”

Boeing also built the C-17 airlifter and had an arrangement with the Air Force that USAF would give up some of its slots on the production line to accommodate allies that wanted to buy C-17s for themselves. The benefit to the Air Force was that the C-17 production line stayed open longer, providing an option for increased production if wartime needs demanded it. Such an arrangement might well be made with the KC-46, especially if USAF is delayed in pursuing the next phase of tanker modernization, known as the KC-Y. 



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 **BOEING**

Even before the last round of Base Realignment and Closure (BRAC) was completed, the Pentagon had already started asking for another. According to Defense Department and Air Force estimates, the military services own and must operate much more infrastructure than they have need for, creating inefficiency and needless cost. Yet despite significant budget cuts and the looming threat of sequestration in recent years, Congress has repeatedly rejected those calls for a new BRAC round.

"I am in an ongoing argument, essentially, with Congress over this necessity," Defense Secretary Ashton B. Carter told troops in Germany in June. "We need BRAC. ... We can't afford to be inefficient and do all the things that we have to do all around the world."

The situation is particularly challenging in the Air Force. A 2014 analysis determined USAF only utilizes 70 percent of its capacity. Moreover, Air Force facilities, on average, are 40 years old, with a quarter more than 50 years old, and "the bottom line is our buildings and our facilities are just simply too costly to operate," Miranda A. A. Ballentine, the Air Force assistant secretary for installations, environment, and energy, told a House Appropriations subcommittee in March. "There is more we can do to

improve the affordability and viability of our installations, which today are simply too big, too old, and too expensive."

The Air Force has about 50,000 fewer people and about 500 fewer aircraft than it did when the capacity analysis was done for the 2005 BRAC round, Kathleen I. Ferguson, the Air Force's former principal deputy assistant secretary for installations, environment, and energy, told *Air Force Magazine*.

"When you start reducing anything, you start having excess capacity," said Ferguson, who is now a consultant.

However, 30 percent excess capacity doesn't mean the Air Force would close 30 percent of its bases, she noted.

"That's an indication that we could really gain efficiencies by having a BRAC," Ferguson said. "What BRAC really allows you to do is ... to move force structure from one location to another, and it allows you to close some installations to create those savings."

After several efforts to close military bases failed, Congress established the BRAC process in 1988 and amended it in 1990. Under the amended process, the President appoints an independent bipartisan commission to analyze the Secretary of Defense's recommendations on closures and realignments, hold hearings on the recommendations, and then

send its own list—with justification—to Congress and the President to be approved or rejected wholesale.

The process avoided the problem of the Defense Department closing or threatening to close bases for political reasons, according to a 2005 Congressional Research Service report.

Sen. John McCain (R-Ariz.), chairman of the Senate Armed Services Committee, this past October called BRACs "an act of cowardice" on Congress' part, since, he said, the legislative body could not bear to close a base on its own.

All together, the 1988, 1991, 1993, 1995, and 2005 rounds of BRAC closed or realigned hundreds of bases, including 40 Air Force bases. This saved the Air Force nearly \$3 billion a year, Ferguson said.

"I always call it ... the gift that keeps on giving, because once you close a base, you never have to pay for it again," she said.

BRAC provides "the only fair, objective, and comprehensive process" to eliminate excess infrastructure and avoid wasting money, the Pentagon said in a 2014 request for a new round of BRAC. In March, John Conger, performing the duties of the DOD assistant secretary of defense for energy, installations, and environment, told a House Appropriations subcommittee that a new round of BRAC would save about \$2 billion a year after implementation.



THE LONG ROAD

After BRAC 1991 closed Bergstrom AFB, Texas, it was repurposed to become Austin-Bergstrom Airport. The Austin community saw \$200 million in savings—money that would have been spent buying land and constructing a new airport.

“Many members of Congress have stated that the government as a whole could more efficiently use its resources. We absolutely agree,” Conger said. “BRAC is an objective, proven, and effective means of doing just that.”

As the defense budget continues to shrink and troop numbers decline, the Pentagon must find ways to save money, Conger has told Congress on multiple occasions.

During the House Armed Services Committee’s April 29 markup of the National Defense Authorization Act, Rep. Adam Smith (D-Wash.), the ranking Democrat on the committee, said that while there has been “a significant shrinkage in the force, we have not seen a shrinkage in the infrastructure.”

Smith said Congress should not spend money on excess capacity at the expense of new funding priorities. In a statement to *Air Force Magazine*, he called it “death by a thousand cuts.”

Through sequestration, “Congress has put the Department of Defense in a position where it has been required to reduce force structure in order to live within the budget constraints,” Smith said. “As a result, the department has fallow infrastructure that is excess to its requirement and is being forced to maintain it at a considerable cost and

without benefit to the military or local community.”

BRAC is not popular, he said, but it is the “only transparent process by which the Department of Defense can properly align its infrastructure capacity and force structure. Savings and efficiencies that would be realized through a BRAC could be used to reinvest in critical equipment, training, and other capabilities that will do more to increase military readiness.”

Michael E. O’Hanlon, a senior fellow at The Brookings Institution, said in a September essay published in *The National Interest* that in this budget environment, “it makes no sense to spend money on things the Pentagon no longer needs.”

Equipment and training are being shortchanged, O’Hanlon wrote, in part because of excess infrastructure. “For a finite number of defense dollars, something has to give,” he added.

With 30 percent excess infrastructure, the Air Force is “spending funds to maintain buildings, runways, hangars, and other infrastructure we don’t need, at the expense of funding critical mission requirements,” said Richard K. Hartley, Ferguson’s successor as principal deputy assistant secretary for installations, environment, and energy. “BRAC authority is required to effectively eliminate excess infrastructure so the Air Force’s limited

budget can be used for critical priorities like mission readiness, modernization, and support to our airmen.”

The money saved through BRAC could be used for the recapitalization and sustainment of weapons systems—such as the KC-46, the F-35, and the Long-Range Strike Bomber—for readiness, or for improving quality of life for airmen, Ferguson said.

“The private sector doesn’t have constraints on closing plants like we have on closing military bases,” she said. “I truly believe the Air Force needs another round of BRAC.”

One of the main roadblocks that has stalled recent BRAC discussions is the outcome of the 2005 round. Unlike the previous rounds, it focused on realignment, not closure, and was not designed to save money, Conger said in March.

“Roughly half of the recommendations from the BRAC 2005 round were not projected, even from the outset, to save money within the first seven years after implementation. Many of them weren’t projected to actually have recurring savings,” he testified.

Though the 2004 capacity assessment showed 24 percent excess capacity, DOD only reduced 3.4 percent of its infrastructure.

O’Hanlon wrote that the process may have focused too much on “fostering

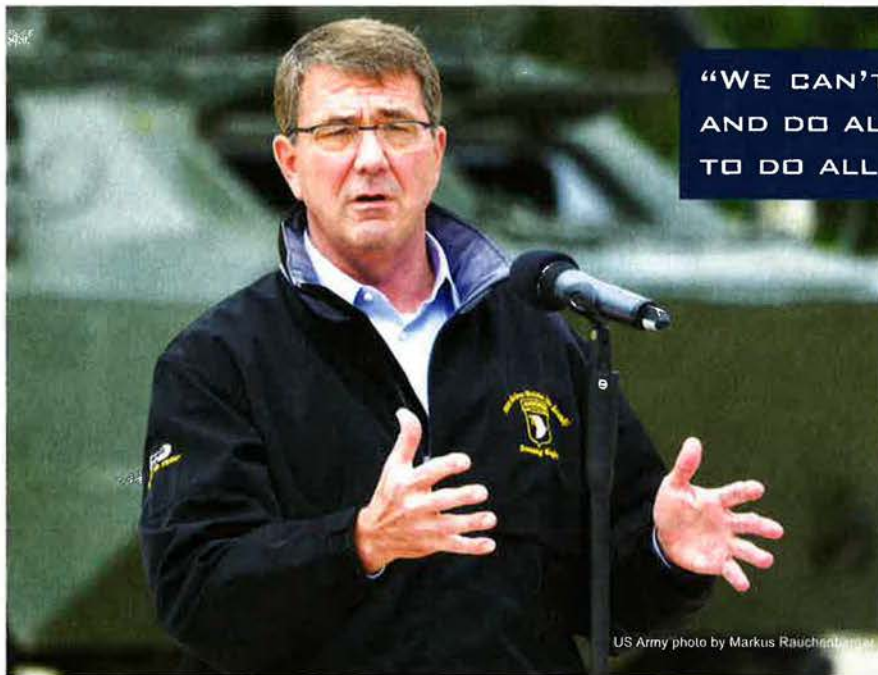
Photo by Dave Wilson



AD FOR BRAC

By Jennifer Hlad, Senior Editor

USAF AND DOD WISH TO SHED EXCESS INFRASTRUCTURE, BUT CONGRESS HAS LITTLE APPETITE FOR BASE CLOSURES.



“WE CAN’T AFFORD TO BE INEFFICIENT AND DO ALL THE THINGS THAT WE HAVE TO DO ALL AROUND THE WORLD.”

During a June visit to US Army Grafenwoehr Training Area in Germany, Defense Secretary Ashton Carter told soldiers “we need BRAC.”

jointness across various military services, rather than simply achieving efficiency,” leading to “worries that perhaps all the low-hanging fruit had already been picked in the base closure process.”

Still, Conger noted, the recommendations that were designed to save money cost just \$6 billion, out of \$35 billion overall, and have brought in \$3 billion in recurring savings.

“When we want to save money with BRAC recommendations, we do,” he said.

Many members of Congress are not convinced.

“I understand that the 2005 BRAC was a reshaping BRAC, but a lot of money was spent to move things around,” Rep. Sanford D. Bishop Jr. (D-Ga.) said in the same

March hearing. “I have some concerns regarding another round of BRAC, but I also have some concerns about maintaining infrastructure that we don’t need.”

At a roundtable in March, House Armed Services Committee Chairman Rep. Mac Thornberry (R-Texas) told reporters he would oppose a new round of realignment and closures.

“I’m not sure we can afford another BRAC,” he said, *The Hill* reported. “Remember, BRAC costs more in the early years than it saves. We have not yet broken even from the 2005 BRAC.”

In a discussion about the National Defense Authorization Act at the Brookings in October, McCain said he regrets some of the changes that came with past

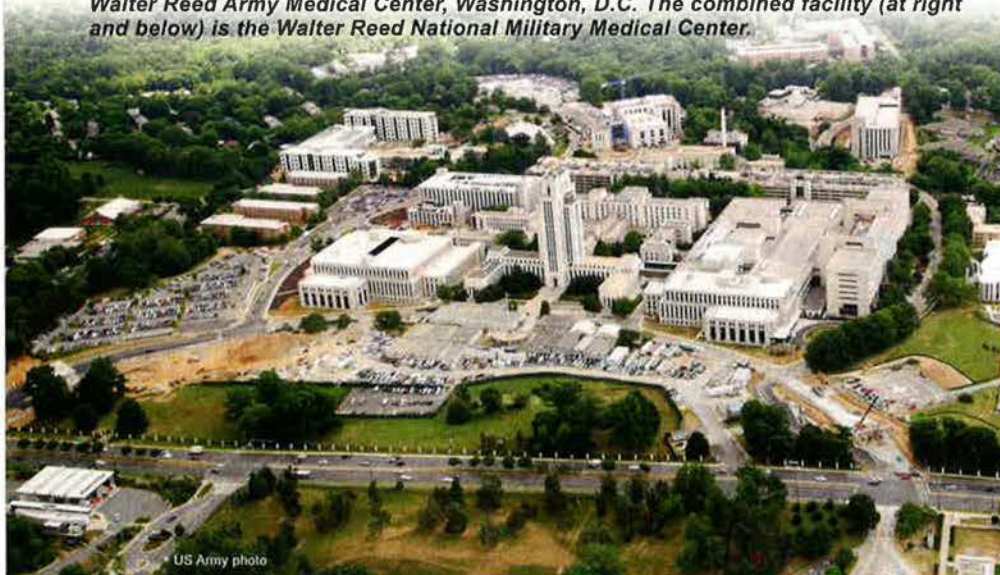
BRACs—particularly the closing of NAS Cecil Field, in Jacksonville, Fla., and the consolidation of the National Naval Medical Center at Bethesda and the Walter Reed Army Medical Center into one hospital.

“To think somehow that BRACs are nirvana is really not an accurate depiction,” McCain said.

The worries are all about the savings, said Ferguson, who managed the implementation and execution of the 2005 BRAC for the Air Force. The Air Force invested \$3.8 billion on 64 BRAC recommendations and completed them all on time and on budget, Ferguson said. Now the Air Force is saving a billion dollars a year, she said. These savings come primarily from military and civilian personnel savings, base operating support, recapitalization and sustainment savings, housing allowance eliminations, and mission activity reductions.

“We did have payback within six years. But that is one of the key concerns from Congress. They want to know, show me the savings,” she said.

BRAC 2005 consolidated the National Naval Medical Center in Bethesda, Md., and Walter Reed Army Medical Center, Washington, D.C. The combined facility (at right and below) is the Walter Reed National Military Medical Center.



US Army photo



USN photo by Chief Warrant Officer 4 Seth Rossman

Another recurring concern with BRAC is the impact on the communities with bases that are closed. Military families, civilian jobs, and support services go away, and communities are left with the shell of the installation.

"Anytime a base is closed, it's impactful," Ferguson said. "But what I would tell you is there are a lot of great success stories of bases being reused after Base Realignment and Closure."

DOD's Office of Economic Adjustment provides resources to communities dealing with issues related to BRAC, including unemployment and land use planning. The Association of Defense Communities also provides assistance to communities affected by BRAC.

Ferguson offered two examples of Air Force base success stories. In Austin, Texas, the community repurposed the former Bergstrom Air Force Base—closed in the 1991 round of BRAC—into a new international airport. The community was able to save \$200 million in land costs and now has about 16,000 new jobs associated with the airport, Ferguson said.

The former Williams Air Force Base in Mesa, Ariz., also closed in 1991, resulting in the loss of 728 local jobs. But it became an international aerospace center, with 2,200 new jobs, as well as 2,300 college and 600 high school students who go to school there, Ferguson said.

"They're looking to eventually get up to 17,000 jobs," she said. "Some areas are certainly harder to redevelop than others, but there is legislation and authorities to help the communities work through that process."

"WHAT BRAC REALLY ALLOWS YOU TO DO IS ... TO MOVE FORCE STRUCTURE FROM ONE LOCATION TO ANOTHER, AND IT ALLOWS YOU TO CLOSE SOME INSTALLATIONS TO CREATE THOSE SAVINGS."

Ferguson worked for the Air Force for nearly 35 years, starting her career as a design civil engineer at Plattsburgh Air Force Base in New York. So, she said, she was happy to be the one to hand over the keys to the community for the final transfer of that property.

Kathleen Ferguson, Air Force acting assistant secretary of installations, environment, and logistics, testified on BRAC before the House Appropriations Committee in 2014.

"It was amazing for me to go up there, ... to see the transformation," she said. "There are opportunities for installations and the community to have a life after BRAC."

The most recent NDAA did not directly address BRAC. However, it did call for a force structure plan from each of the services, as well as a "categorical inventory of worldwide military installations."

The provision requires the Secretary of Defense to describe the infrastructure necessary for the projected force structure, discuss excess infrastructure, and assess the value of keeping some excess infrastructure for future contingency and surge requirements.

Ferguson said the requirement is "great news, and it may be a step in the right direction for Congress to begin to feel more comfortable with the department's request for another round of BRAC."

She said, up until now, "I think the department's been saying, 'Hey, we need another round of BRAC, trust us,' and I think Congress is just looking for a little more information to be comfortable that that really is what is needed."

Thornberry in October was clear there will be no BRAC in the immediate future, but signaled he is willing to consider the data.

"Come give us more specifics about it, and we'll look at it, and there may well be another BRAC in the future," he said.

For Rep. Jeff Fortenberry (R-Neb.), the problem may be one of terminology. During the March 3 House Appropria-

tions subcommittee hearing on military construction, veterans affairs, and related agencies, he suggested changing the name BRAC to "Military Installations and Savings Commission."

The name and its acronym, MISC, imply "if there's miscellaneous or excess space out there," removing it will improve effectiveness and efficiency and save money. The money could be used for military readiness and therefore national security. "That becomes a much more important statement than just the negative idea of various communities competing against one another to stop their base from being closed," he said. "We need to think of this as a partnership as to how ... we strengthen the opportunities for you to protect America."

No matter what the name, Air Force officials continue to stress that Congress needs to authorize another round of closures.

"Both from a taxpayers' perspective and also from a former Air Force official's perspective, it's really about doing the right thing," Ferguson said.

The communities that support military bases are fantastic, she said, and it can be difficult and emotional to be faced with the possibility of losing that base. But, she said, the Air Force could better use the money elsewhere.

"It's the balance there, being able to execute the mission at a more effective cost," Ferguson said. "It's not easy, but I think it's necessary, given where the country is and given where the Air Force is." ☆



USAF photo by SSgt. Curtin I. redin

FLYING headlong into the ground is the single biggest killer of fighter pilots in the Air Force. The phenomenon known as Controlled Flight Into Terrain (CFIT) is responsible for 75 percent of F-16 pilot fatalities and is often due to disorientation or loss of consciousness while maneuvering at low altitude.

Separate CFIT incidents killed two F-16 pilots during the last two months

of 2014 alone. Contract pilot and retired Lt. Col. Matthew LaCourse crashed into the Gulf of Mexico after becoming disoriented during an intercept mission out of Tyndall AFB, Fla., on Nov. 6, 2014. A month later, Capt. William H. Dubois hit the ground after losing his bearings on landing approach at a base in the Middle East during Operation Inherent Resolve, Dec. 1, 2014.

At the time, the Air Force had just begun implementing the cure for this deadly scourge.

In September 2014, the F-16 program office began retrofitting the F-16 Block 40/50 fleets with a revolutionary new Automatic Ground Collision Avoidance System (Auto-GCAS), developed by the Air Force Research Laboratory at Wright-Patterson AFB, Ohio. Within four months of fielding the system two pilots' lives were saved, AFRL Automatic Collision Avoidance Technology Program Manager Amy C. Burns told *Air Force Magazine* in an interview.

The system saved its first life the same month that LaCourse died. In the save,

THE SCIENCE OF AVOIDANCE

By Aaron M. U. Church, Senior Editor

AFRL is perfecting ways to prevent collisions with the ground and other jets.

AFRL's new collision avoidance system automatically pulled a pilot out of a high-angle strafing attack split seconds before the aircraft struck the ground. "The system kicked on at the very last possible second and recovered the aircraft" just over 500 feet above the earth, said Burns.

The system saved a second pilot's life during a training sortie over the Mediterranean less than two months later. The second pilot, deployed with the 480th Fighter Squadron from Spangdahlem AB, Germany, wrote a letter to the AFRL team, thanking them for saving his life. "Auto-GCAS worked as advertised and allowed me the honor to write this," he penned.

The unnamed pilot added the somber note that he "personally knew the pilots who died in the two most recent F-16 mishaps, both of which may have been preventable if we had Auto-GCAS implemented earlier."

CFITS AND STARTS

Engineers have tried to prevent F-16 pilots from flying into the ground since the aircraft was first fielded. Before Auto-GCAS "there were actually six different manual warning systems that were put on the F-16 to try to protect pilots," admitted Burns. The downfall of each was a warning to pilots who were incapacitated or incapable of recovering the aircraft could not save lives. Worse yet, systems often annoyed pilots by warning them too early, causing them to ignore or even switch the safety systems off.

"If you go back and look at the accident rate per flight hour, it hadn't changed even though all these systems had been added," Burns pointed out. Her team quickly determined that a successful system would need to be "nuisance free" and capable of taking control and recovering the aircraft automatically if needed.

Research into automatic recovery systems stretched back to the 1980s, but it wasn't until early 2007 that seri-

ous efforts got underway to develop an operational system. The joint program, initially led by NASA's Dryden Flight Research Center, was stoked by a Pentagon directive to identify and prevent the leading causes of accidents.

"The goal was to reduce them by up to 75 percent, and when they looked at the top reasons for aviation mishaps, controlled flight into terrain and midair collisions were the top two reasons," explained Burns.

AFRL decided to tackle the problem in three phases, starting with ground avoidance, moving on to midair collisions, and finally merging the two into a single system for the F-16 and eventually the F-35.

Fighters are far more susceptible to these types of accidents than larger, slower aircraft that rarely maneuver aggressively at low altitude. Unlike the F-15, the three fly-by-wire aircraft are already essentially controlled by computer. AFRL focused on aircraft where they could "add software to the flight control computer and parts of the avionics to make the system work," noted Burns, though similar systems could theoretically be developed for non-fly-by-wire aircraft as well. Since the F-16 fleet meets the above criteria

NASA photo by Jim Ross



An F-16D with automatic collision avoidance technology flies close to a hill in the Mojave Desert in 2009. The Air Force Research Laboratory's collision avoidance technology began on the F-16.

and makes up a sizable portion of the Air Force's fighter inventory, work began on the Viper.

Cooperating with NASA, AFRL completed 103 operational test flights on the Automatic Collision Avoidance Technology (ACAT) program's F-16D test bed, before handing its work off to the three fighter program offices for integration in 2010.

The F-16 program office fielded the first full Auto-GCAS on late block aircraft last September, and AFRL is still working on a solution for earlier F-16s, largely flown by the Air National Guard and Air Force Reserve Command.

The F-22 program office chose to adopt a different system, but tailored it to the Raptor's individual needs.

Plans call for fielding an Auto-GCAS on the F-35 sometime around 2024.

GROUND AVOIDANCE

AFRL took a novel approach in developing Auto-GCAS. Unlike previous systems, it is based on calculated time-to-impact, rather than altitude. At high speeds and steep dive angles, initiating a

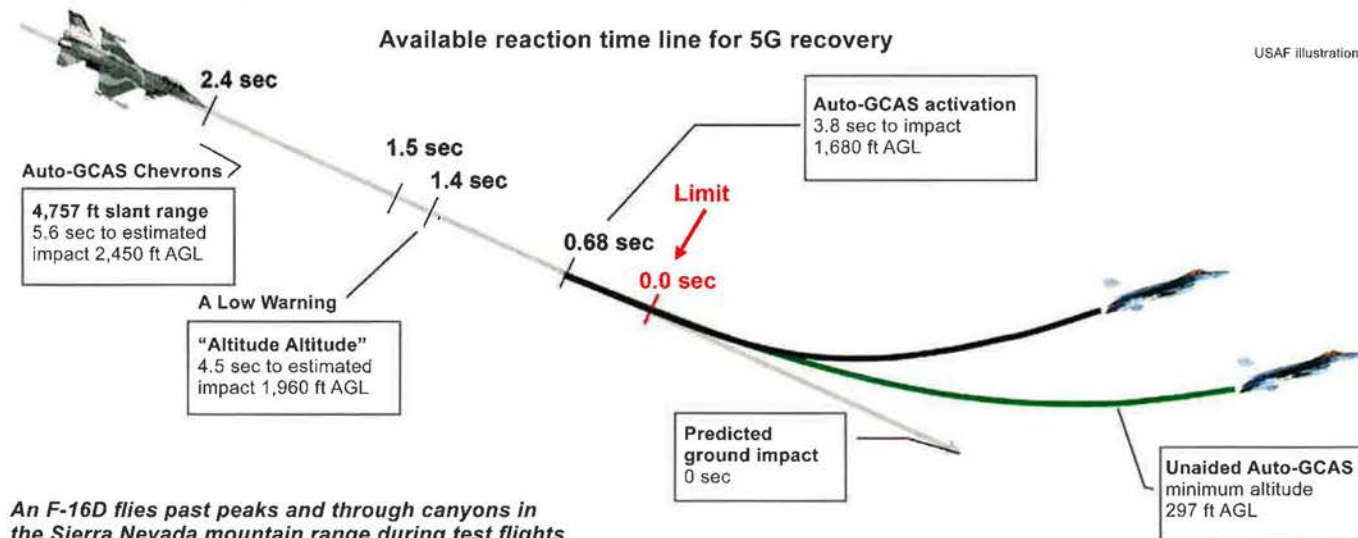
recovery at a predetermined altitude may not prevent a fighter from hitting the ground.

Auto-GCAS constantly calculates the aircraft's time to potential impact and intervenes only at the last moment to prevent a crash. "We had pilots go out and fly many different maneuvers toward the ground, at all different dive and bank angles" in testing, said Burns. What the team discovered was that "pilots really don't want to get any closer to the ground than about 1.5 seconds" from impact, she said.

A computer taking control sooner than this inhibits the pilot's ability to fly the mission, so the team "designed it to activate between ... 0.25 and 0.8 seconds of available reaction time."

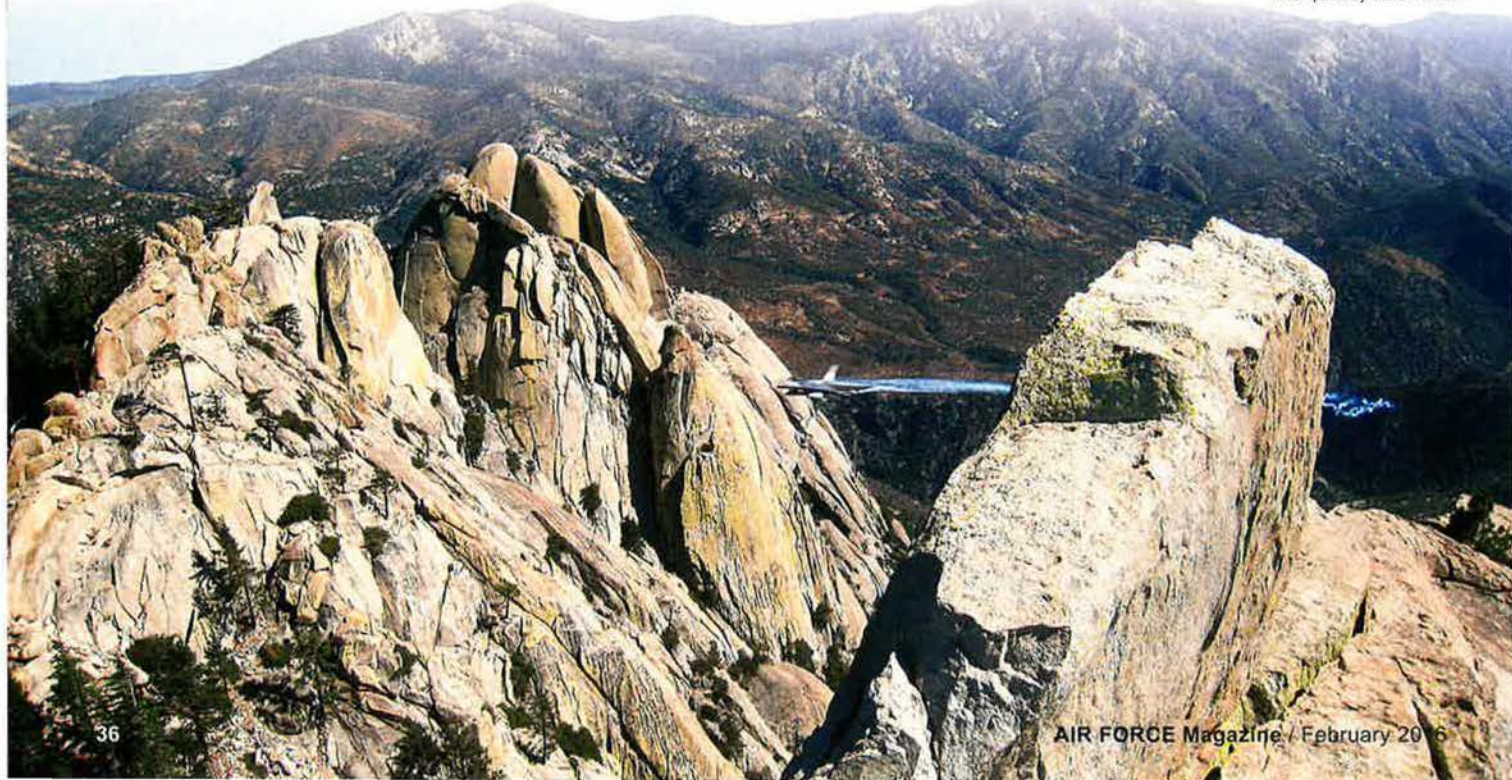
The time span is too short for the pilot to recover the aircraft unaided but sufficient to allow a computer to pluck the jet from disaster, roll the wings level, and execute a five-G pull up before releasing control back to the pilot.

If the pilot is conscious and pulls back on the stick to aid the recovery, the F-16 can actually exceed the automatic five-G pullout to recover quicker. The first pilot saved by the system



An F-16D flies past peaks and through canyons in the Sierra Nevada mountain range during test flights of the automatic collision avoidance system.

NASA photo by Carla Thomas





said Burns. Since the Air Force still operates a sizeable number of pre-Block 40 aircraft in the Guard and Reserve and for testing and training, the AFRL team is devising a separate solution.

The Hybrid Technology Program will physically add hardware to earlier aircraft to enable software mods. “We added digital processor cards to the analog flight control computer and a new mother board, so these digital processor cards give you the capability to add other automatic technologies,” recounted Burns.

MOVING TARGETS

AFRL is flight-testing the hardware and software package at Edwards AFB, Calif., and working with the F-16 program and the ANG to integrate Auto-GCAS onto the remaining F-16s, though they’re “still working on a timeline,” she said.

While integrating the technology onto the F-22 is less convoluted, the program chose to adopt only parts of AFRL’s software—keeping the auto-recovery maneuvers, but discarding the terrain-scanning feature in favor of a simple, preset altitude.



An F-16C (above) lost part of its wing in a midair collision during flight training near Moline, Kan., in 2014. The other F-16C (here) was a total loss. Both pilots survived.

assisted, and pulled seven Gs, recovering at 1,680 feet above the ground—roughly 1,300 feet higher than the system would have recovered him automatically.

Auto-GCAS projects a series of converging chevrons on the pilot’s head-up display and produces an audible warning before taking over, and the pilot does still have the option of disabling the system if required. “The way the system works is that, prior to takeoff, the pilot loads digital terrain elevation data onboard the aircraft” giving the system a computerized topographical map of the airspace, explained Burns. GPS and inertial navigation data from the F-16 allows Auto-GCAS to pinpoint the aircraft’s location and “scan” ahead of it to identify potential obstacles.

“It creates a two-dimensional profile of the highest points and at the same time it’s constantly calculating recovery trajectory, and if it ever thinks the recovery trajectory’s going to hit that, ... it would go ahead and command the recovery,” she said.

The system is “purely a software update” making it quicker and easier to transition to the operational fleet. Being a software upgrade also posed a problem for earlier model F-16s, however, because they employ analog—rather than digital—flight control computers. On the earlier F-16s, “there was no software to modify,”



The F-16D with ACAT testbed flies close to mountain peaks in the Sierra Nevada.

CFIT accounts for the lion’s share of F-16 fatalities, but in terms of sheer number of accidents, midair collisions destroy almost as many aircraft. AFRL calculates that 24 percent of F-16 operational losses are due to hitting other aircraft. Two ANG F-16s collided during an air-to-air training exercise over



MSgt. Mark Caton (r) and SMSgt. Mark Jones swap out an air combat maneuvering instrumentation pod on an F-16 at Barksdale AFB, La. ACMI pods are often used during training missions to record data and, linked together, can trade avoidance signals.

Kansas in October 2014, mirroring a nearly identical incident off the coast of Virginia a year earlier. In each case pilots were injured, one F-16 was destroyed, and the second was severely damaged.

A third F-16 collided with a civilian Cessna during a training sortie last July, forcing the pilot to eject and killing the two civilian pilots.

Unlike terrain strikes, midair incidents disproportionately occur during training—particularly during maneuvering engagements. As a result, AFRL's Automatic Air Collision Avoidance System—phase two of the program—is tailored specifically to preventing training accidents.

Dodging a moving aircraft requires a greater variety of preprogrammed maneuvers and coordination between aircraft. During training flights, F-16s often carry an Air Combat Maneuvering Instrumentation (ACMI) pod to record flight data for debrief. Burns' team opted to use the pod to link aircraft together to continuously swap avoidance signals.

The system constantly calculates possible avoidance moves, communicates with the other aircraft, and "agrees upon a recovery," Burns said. Like the other system, Auto-ACAS only takes control and executes the avoidance maneuver at the last possible moment, to prevent interfering with the mission.

The Auto-GCAS' pull-up maneuver could cause a midair collision instead of preventing it, so Auto-ACAS has "nine different recovery maneuvers it can select from," said Burns. These include a "bunt" to push the nose below another aircraft, a "maintain" that automatically locks out the controls until danger is averted, and seven unique "roll-and-pull" maneuvers, she said.

With Auto-ACAS' move to Edwards to begin flight testing in January, the ACAT program's next challenge is bringing the two systems together. "We've now moved on to phase three, which is working on combining the air collision avoidance system with the ground collision avoidance system into an integrated collision avoidance system" (Auto-ICAS), Burns reported. Harmonizing both requires prioritizing potentially conflicting commands.

The team is working to modify Auto-ACAS "to make sure it's ground aware and doesn't pull you into the terrain"—and likewise, that Auto-GCAS doesn't pull a jet onto a collision course with another aircraft—along with several other upgrades. The team has already begun working on Auto-ICAS and plans to begin flying it on the F-16 at Edwards in April.

"AFRL's goal is to have our program completed at the end of the calendar year 2017," said Burns. "Then it will be each program office's responsibility to pick it up if they're interested and then do whatever testing is required" for integration onto the F-16, F-22, and F-35 fleets.

Beyond fighters, Burns' team is toying with research into adapting collision avoidance technology for heavier aircraft, such as airlifters, in conjunction with the Air Force Institute of Technology. "We've just done really basic research" looking at how the needs of heavier aircraft differ from fighters, she said.

In the case of a heavily loaded C-130 "you might not always want to pull them over the mountains." Given their slower speed "you might want to do more of a lateral escape maneuver" instead, she said. "We have efforts with AFIT that are underway to look at other recovery maneuvers, ... but that is in the research phases still."

AIR FORCE ASSOCIATION

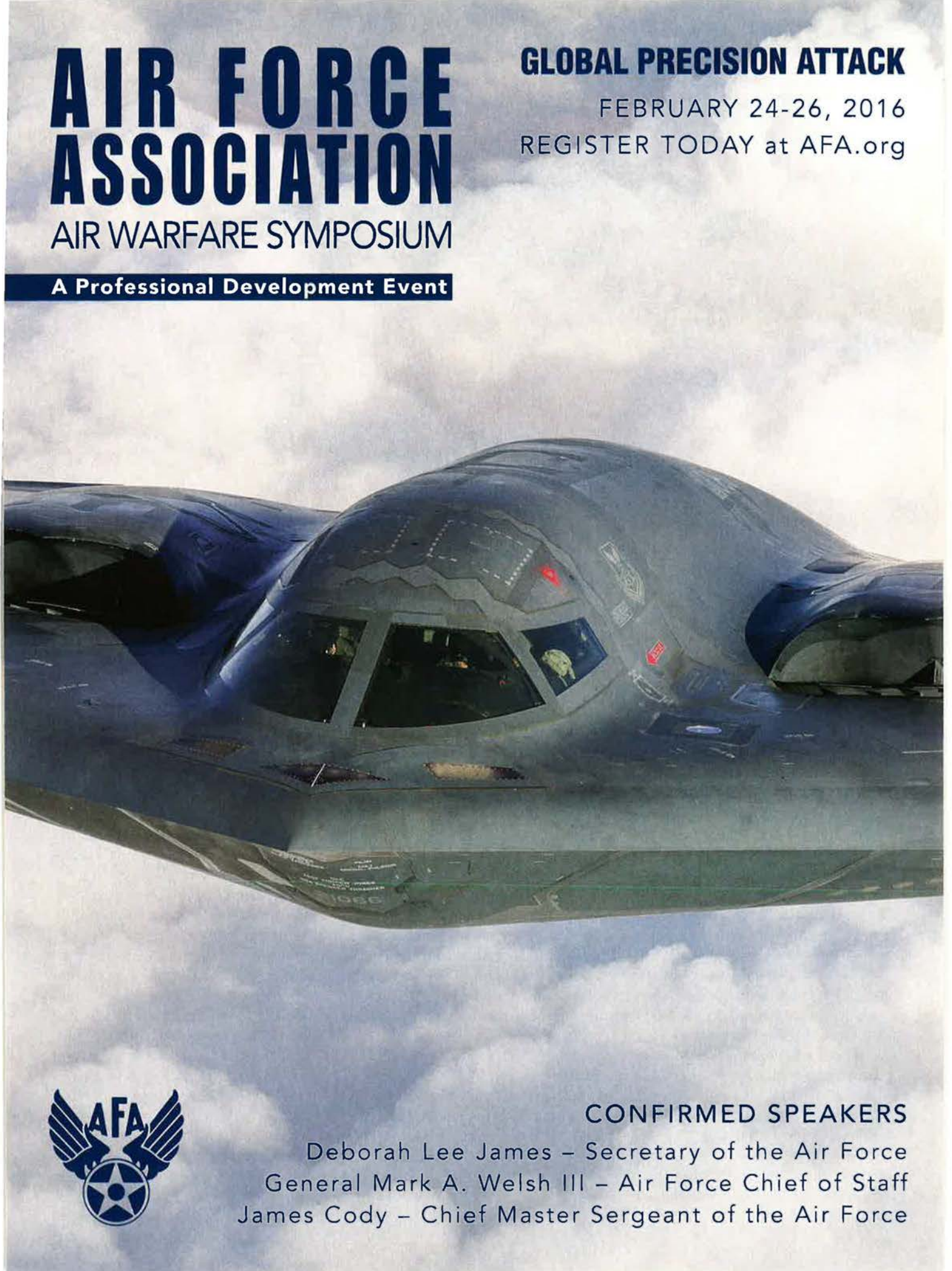
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CONFIRMED SPEAKERS

Deborah Lee James – Secretary of the Air Force
General Mark A. Welsh III – Air Force Chief of Staff
James Cody – Chief Master Sergeant of the Air Force

Two USAF F-15Cs and a Royal Saudi Air Force F-5E fly a mission during Operation Desert Storm. Saudi Arabia allowed coalition partners to stage aircraft from bases on its territory.



Ninety-nine percent strength. That's how Army Lt. Gen. John J. Yeosock, commander, Army Forces Central Command (ARCENT), assessed the fighting ability of Saddam Hussein's six elite Republican Guard divisions on Jan. 29, 1991.

Operation Desert Storm had been underway for two weeks. Air superiority was well in hand. The coalition commander, Army Gen. H. Norman Schwarzkopf, expected air attacks to attrit the Iraqi army to 50 percent strength or below before he began the ground attack.

"Our strategy all along was to hit tanks and artillery because that was how they could inflict casualties," recalled Gen. Charles A. Horner, who as a lieutenant general was the combined force air component commander.

According to the Army, it wasn't happening. Yeosock's alarming briefing came in spite of the fact that F-16s had flown 4,500 sorties and B-52 heavy bombers added 360 sorties over those very same forces. How deep did the problem go?

"I could see from the pilot reports and cockpit video that it wasn't all a feedback problem," acknowledged Brig. Gen. Buster C. Glosson, who was dual-hatted as director of campaign plans and commander of all USAF fighter units in the battle. "Our pilots were not attriting the fielded forces as efficiently as I wanted."

February 1991 was crunch time. In the third week of the war, the air component would cope with Scuds, a ground attack at Khafji, unexpected weather delays, all while attriting the enemy ground forces. The next several days would make or break the role of airpower against Iraq's army in this campaign.

PLAN A

Schwarzkopf had already put his trust in the air component. Operation Desert Storm began on Jan. 17, 1991, with a four-phase plan. Gaining air superiority was Phase One. Phase Two extended superiority across the Kuwait theater of operations while in Phase

Three coalition airpower hammered the Iraqi army. The Republican Guard was hit from night one.

"Our strategy to go after this army is very, very simple," Army Gen. Colin L. Powell, Chairman of the Joint Chiefs of Staff, declared at a press conference on Jan. 23. "First we're going to cut it off, and then we're going to kill it."

By design, Phase Three's attacks on Iraq army targets were not as tightly choreographed as the first few days of the air war. The segmented plan concentrated first on offensive counter air, command and control, and other strategic target sets. Planners estimated they would need two weeks for those targets before shifting emphasis to Iraq's fielded forces.

Likewise, Schwarzkopf set no firm date for ground attack in Phase Four. All depended on the pace and results of the air campaign.

But the January weather was slowing everything down. Crews started aborting missions due to impaired bombing



By Rebecca Grant

FLEXIBILITY in the STORM

The air campaign against Iraq quickly went from frustrating to devastating.

conditions. On some days “as many as half of the sorties did not attack or missed their assigned targets because of poor weather,” found the Air Force’s 1993 *Gulf War Air Power Survey*. At this rate, it would take much more time to phase the effort toward ground force attacks.

The bad weather of the air campaign was an ugly surprise to crews accustomed to the dry desert weather. “During training for the air campaign, skies remained clear for weeks at a time,” noted GWAPS. Planners expected January and February to bring two-day, passing weather fronts followed by three to five days of clear weather. Instead, “the weather fronts came and stayed.”

“This was the worst weather in 14 years,” commented Air Force Chief of Staff Gen. Merrill A. McPeak.

Weather updates became central to the joint force air component commander’s staff’s decisions on canceling sorties or

pushing ahead. “The decision to load TV guided Maverick missiles, for instance, depended on the forecast of optical slant ranges: Could the pilot see through the haze with his Maverick so he could lock the missile onto the target?” recounted Horner in his Gulf War memoir.

The weather aborts piled up a backlog of strategic targets just as Schwarzkopf wanted to ramp up attacks on Iraqi army targets. Ground commanders for the two US Army corps estimated it would take about 10 days of intensive air strikes to whittle down Iraqi tanks, artillery, and other front-line equipment. They “became increasingly concerned that they would be ordered into battle with their battlefield unprepared,” wrote Richard M. Swain, 3rd Army historian.

The US Central Command deputy commander in chief, Army Lt. Gen. Calvin A. Waller, quickly became a focal point for complaints about the air strikes. “I started receiving a lot of

phone calls from commanders saying when are we going to do more to shape the battlefield?” Waller recalled for the PBS program “Frontline.”

“The ground forces commanders were very concerned that the targets out to their immediate front were not being hit with the frequency that they felt ... would soften up or destroy these targets so it would make their job easier to breach the enemy lines and to reach their objectives,” he said.

Waller was unsympathetic about the weather. He couldn’t understand why the air component kept changing sorties as it struggled to check off strategic targets and keep the heat on the Republican Guard. Adding to the pressure, key bomb-droppers like the F-15Es were diverted to hunt for Scud missile launch sites.

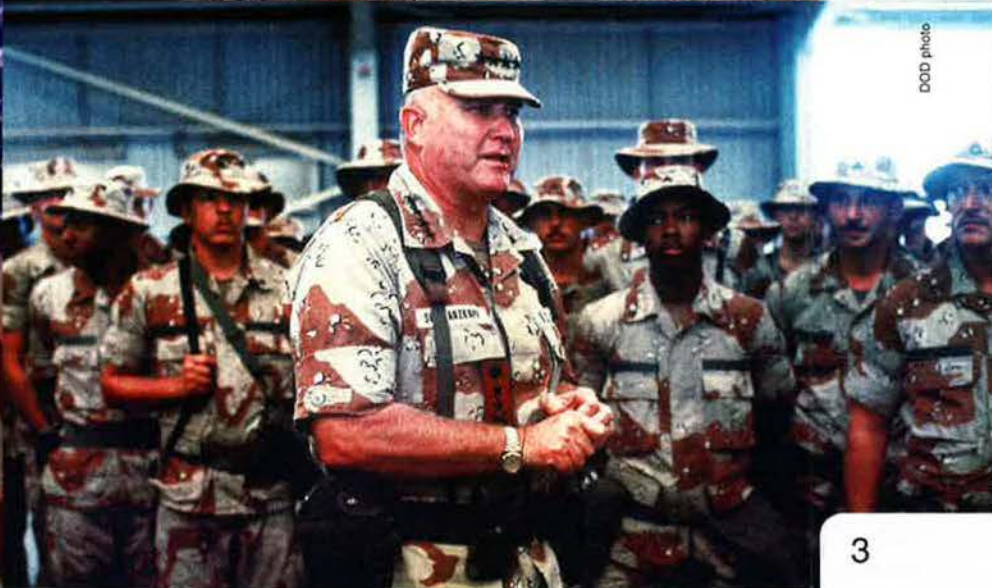
According to Waller, that pressure boiled over. “Buster, if you change one more target without my approval I’m



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going to choke your tongue out,” Waller said to Glosson in a fit of exasperation one day.

Glosson was unperturbed. “You either try to compensate, or you just cancel everything and wait for another day,” he explained later. “I wasn’t about to do the latter.”

KILLER SCOUTS

The air component was already making changes to improve tactical effectiveness. Two February fixes helped put Phase Three of the campaign back on track. They were Killer Scouts and tank plinking. Glosson’s objective was to “make sure that we destroyed as much as we could” and “make the ground effort as close to a police action as we possibly could.”

Glosson had asked for a handful of officers from the Fighter Weapons School at Nellis AFB, Nev. Leaving the Las Vegas desert for Riyadh, Saudi Arabia, the “Nellis brain trust” was led by Lt. Col. Clyde “Joe Bob” Phillips. Glosson later described Phillips as “probably the best natural aviator” he’d ever known, with a sideline as a bright tactical thinker. His job was to get battlefield attrition in the Kuwait theater of operations back on track.

Phillips and his team brought recommendations forward to Glosson on Feb. 3.

“We need to go to FACs,” Phillips told Glosson. The forward air controller or FAC concept worked in Vietnam. Pilots in slower OV-10s and “Fast FACs” in fighters such as the F-100 looked for

emerging targets, then directed other airborne aircraft to strike.

Glosson liked the idea of designating fighters to locate targets and direct the attacks on Republican Guard units in Kuwait. As he recalled, the post-Vietnam air force was once full of pilots who knew the airborne FAC job. But were there any in the Gulf now?

The Air Staff ran a check for pilots in theater with forward air control experience. One squadron of F-16s, the 4th TFS, had “16 pilots with FAC experience, A-10 close air support experience, or both,” wrote then-Lt. Col. Mark A. Welsh III in “Day of the Killer Scouts” for this magazine in April 1993. As it turned out, F-16 pilots also wanted a better solution. The 388th Fighter Wing sent a message



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to US Central Command Air Forces (CENTAF) on Feb. 3 requesting “an airborne platform be stationed in the second echelon area to validate air tasking order targets and find new targets if required.”

To implement the concept for Operation Desert Storm, Glosson’s staff first laid a grid over the battlefield dividing it into 30-mile blocks, then subdividing each into kill boxes measuring 15 miles by 15 miles. The bulk of Iraq’s army clustered in nine of the 30-mile boxes spanning Kuwait and the northwestern borders with Iraq.

The bulk of Iraq’s army clustered in nine kill boxes spanning Kuwait and the northwestern borders with Iraq. The Republican Guard divisions ringed the northern kill boxes. Most held elements of multiple divisions. Kill Box AE6 held the Tawakalna Republican Guard Division, 52nd Armored, and 12th Armored. Kill Box AF7 perched on Iraq’s border with Kuwait contained parts of four different Republican Guard divisions.

At dawn on Feb. 4 the first of eight new Killer Scouts—call sign Pointer—began one-hour orbits over the Republican Guard.

The forward air controllers would fly over their assigned box or boxes, spot Iraqi equipment, drop a marker bomb, then call in fresh fighters to follow up with more bombs. F-16s with new Global Positioning System units could pinpoint coordinates. In this concept, the same pilots would fly over familiar kill boxes each day. They’d learn the status and terrain and report back with accurate bomb damage.

Killer Scouts worked in pairs with the flight lead marking a target with bombs. Wingmen in fluid tactical formation flew cover. Typical missions featured three one-hour time on station blocks and four in-flight refuelings adding up to over five hours in the air. Killer Scouts first worked multiple kill boxes, then came to concentrate on single boxes or even sectors. AWACS and tankers passed them updated targets.

Killer Scouts concentrated on hitting back at random Iraqi SAM launches, too. Both SAM launches and anti-aircraft artillery fire in the KTO decreased.

Air also responded through the TACC. Sorties could be diverted to emerging targets. Fortunately, “the tactical air control system designed to do the defensive close support job

[during a Soviet attack] could also move ahead easily to support coalition ground forces,” stated the *Gulf War Air Power Survey*.

TANK PLINKING

Horner and Glosson had another spectacular tactic. “The No. 1 shortfall at this juncture: attriting tanks,” Glosson jotted in his diary. “Killer Scouts will help, but significant change will require F-111 and F-15E success with GBU-12.”

Try 500-pound laser guided bombs against Iraqi tanks, Phillips recommended. This tactic had also been successfully tried out late in the Vietnam War. By placing a laser spot on an enemy tank, a bomb equipped with a laser-homing guidance system could drill in on the laser dot and hit with great precision.

The F-111F swing-wing fighter-bomber had just such a system called *Pave Tack*. A pod projected a laser beam. A guidance kit on the Mk 82 500-pound bomb followed the laser-designated spot on the target. According to Horner, some US units had already practiced the technique during the fall.

The F-111Fs tried the first laser tank plinking mission on Feb. 5. Their tar-

1 A destroyed Iraqi T-55 tank at Jalibah Airfield, Iraq. Tank plinking was so successful that Iraqi troops worried they would die if they slept in their tanks, so they abandoned them at night.

2 Brig. Gen. Buster Glosson, director of campaign plans and commander of USAF fighter units during the fight to liberate Kuwait from Iraq, briefs reporters on Jan. 31, 1991.

3 Army Gen. Norman Schwarzkopf, coalition commander, trusted airpower to whittle down Republican Guard and other Iraqi forces before ground troops were sent to battle.

4 F-111s, like this one from RAF Lakenheath, UK, first tried tank plinking on a Republican Guard division. The result? “Unbelievable,” said one pilot. He reported making seven out of eight hits.



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USAF photo by SrA. Chris Putnam

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USAF photo by Sgt. Trambull Fuentes

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gets were in the Medina Division of the Republican Guard. Col. Tom Lennon, the 48th Tactical Fighter Wing commander, flew the mission himself on Glosson's orders.

"Unbelievable," Lennon reported back. "I got seven out of eight hits."

By late February, the F-111Fs were achieving up to 150 armor kills per night. At their peak the F-111Fs were destroying Iraqi armor seven times faster than the A-10s. Iraq's 52nd Armored Division lost 77 vehicles in a matter of hours.

Not that the Army was buying into the concept. "It took several days of pressuring CENTCOM and ARCENT staffs and showing F-111F video film of exploding tanks and artillery before ARCENT agreed to count the BDA,"

wrote Col. Richard B. H. Lewis, one of Glosson's planners, in a postwar study for the US Army War College.

Better bomb damage assessment was part of the fix. Overhead imagery picked up the destruction wrought by air attacks. Twelve U-2s based at Taif, Saudi Arabia, flew nightly missions lasting 11 hours and more.

"From our altitude, at night, we had a box seat to watch some of the most phenomenal light shows ever produced—the war," recalled Capt. Stephen I. Feldman, a U-2 aircraft commander, for the book *Airpower in the Gulf*.

U-2s flew specific routes producing crisp wide area pictures of the destruction of the battlefield. "Sometimes,

we would be called on the radio to do some spur of the moment BDA," Feldman added.

The U-2 and satellite overhead imagery showed tanks with tracks or turrets blown off. Soon imagery also showed Iraqi tank crews sleeping away from their tanks in fear of the deadly accurate attacks.

During the Iran-Iraq War, "my tank was my friend because I could sleep in it," one prisoner of war explained later. "During this war my tank became my enemy. ... None of my troops would get near a tank at night because they just kept blowing up."

"If anything, the psychological impact of tank plinking was more important than the sheer physical

5 TSgt. Theresa Hillis (front), SMSgt. James Cundall (right), and TSgt. Dennis Mulline, aeromedical evacuation specialists, listen to a mission briefing during Desert Storm.

6 An A-10 armed with bombs and Sidewinder and Maverick missiles on a mission over Iraq. For a time, ARCENT only counted ground kills reported by A-10s. This kept the perception of air strike effectiveness artificially low.

7 USAF munitions specialists load a Maverick onto an A-10. Using guided missiles for tank plinking and other targets was a successful strategy, serving to soften up the Iraqi forces and destroy equipment.

destruction,” summed up McPeak. “Previously, tank crews assumed that if they came under air attack, they could dig in and make it expensive in airplanes. ... Now, Iraqi soldiers simply abandoned armored vehicles, distancing themselves from their equipment.”

Even Waller applauded the tank plinking. “I was elated because I said now finally we are providing the ground commanders with something that they sorely need to reduce the number of tanks that they’re going to be faced with.”

Officials verified over 1,500 F-111 tank and armored vehicle kills, wrote USAF historian Richard P. Hallion.

APPEASING THE ARMY

By early February, the trend in armor attrition was headed in the right direction. The Republican Guard was down to 84 percent strength on Feb. 6.

Educating ground commanders on the overall effects proved another difficult task.

Part of it was a problem of perspective. Initial target lists came from the two Army corps in theater. Schwarzkopf directed his Army, Marine Corps, and Gulf ally commanders to list targets for air strikes needed in their sectors to execute their ground scheme of maneuver. They approached their target nominations by looking at what lay in front of troops in their sector.

VII Corps planners “worked this list hard, both because they believed it was their duty and responsibility and because they believed air would be wasted going after targets that didn’t matter to the real war if they didn’t,” Horner concluded.

No one disputed the Army’s expertise in generating targets. Counter-battery-radar and putting together the Iraqi order of battle were Army skills.

However, Horner and his staff grew frustrated when targets sent forward to the air planners turned out to be based on faulty intelligence that was days or weeks old. Air strikes couldn’t hit Army-nominated targets if they weren’t there.

Other times, Schwarzkopf’s priorities didn’t align with those of Lt. Gen. Frederick M. Franks Jr. at VII Corps or Lt. Gen. Gary E. Luck at XVIIIth Airborne Corps. By definition, these commanders did not have the same theaterwide responsibilities and perspective as Schwarzkopf.

Nor were they expected to take into account each other’s priorities. Schwarzkopf was the only one with a full view on priorities and tasking to the air component.

Artillery targets were a prime example. Major Iraqi units loomed in front of VII Corps commanded by Franks. His force numbered 146,000 American and British soldiers organized in five armored divisions—a force roughly equivalent to Patton’s army in Europe in World War II.

Given Franks’ plan to breach the lines, he was most concerned with when air attacks would hit artillery and other targets near the front lines. What “got me heated up prior to ... the ground campaign,” Franks told “Frontline,” “was my lack of success in getting the air that was forming in the VII Corps sector to attack artillery within range of the breach.”

Schwarzkopf had different priorities. Artillery was being hit, but another surge would come later. “Artillery had to wait because it was so easy to replace,” Glosson wrote later. “If we destroyed it too early, there was a good chance the Iraqis could go back into other areas in the northern part of Iraq and around Baghdad and pull new artillery down toward Kuwait.”

In comparison, Luck’s XVIIIth Airborne Corps had fewer Iraqi forces to face as it wheeled toward Basra. “I never got the impression he felt he was going to need any significant help,” observed Horner.

Equally important was digging in to why the Army assessed so little progress had been made. It turned out ARCENT was at first counting only reports from A-10 pilots. They’d literally discarded the impact of 15 days of bombing from F-16s and B-52s—strikes from any platform other than the A-10.

The air component began keeping a spreadsheet tracking attrition. Army ground liaison officers checked each equipment kill. Rules remained conservative with some counts crediting one-half or even one-third of a kill per sortie.

100 FINAL HOURS

Even with ground officers keeping the scoresheet, the air war made fast progress in February. By G-Day, the

Republican Guard was assessed at 66 percent strength while the enemy in the KTO was rated at 63 percent overall.

Coalition forces began the Phase Four ground attack at 4 a.m. on Feb. 24, 1991. Rain, fog, and wind created miserable conditions. Burning oil fires added smoke and gloom. Despite a few memorable skirmishes, they found the Iraqi army broken, just as Schwarzkopf intended. Coalition ground forces were soon racing ahead of schedule.

“The Army’s speed of movement during the ground assault meant that forward units could move up to 20 miles in a single hour,” wrote Welsh. Direct radio communications between Killer Scouts and ground units massed aerial firepower and “gave the ground commander a readily available source of real-time intelligence along his line of advance.”

JSTARS detected Iraqis beginning to flee north on the night of Feb. 25. Iraqi forces occupying Kuwait City stole Mercedes autos, limousines, trucks, and even school buses and fled toward the causeway at Basra. Coalition airpower struck the retreating invaders. “The wreckage was still smoldering four days later,” wrote P. J. O’Rourke in *Give War a Chance*.

It wasn’t only the sheer numbers of equipment lost. Each plinked tank also punctured the cohesion of that fighting unit. Concluded Horner: “There is powerful evidence from the 88,000 POWs that air’s most significant impact on Iraqi fighting strength was the destruction of morale.”

Overall numbers devoted to attriting the ground forces told the same tale. The *Gulf War Air Power Survey* listed 31,578 sorties handled by the Kuwait Cell, more than three times the number of the strategic cell. Horner described this Phase Four ground attack as “the 10 percent war” because its 100 hours roughed out to about a tenth of the total time of Operation Desert Storm.

It was, concluded McPeak, perhaps the first time in history that an army had been defeated by airpower. ✪

Rebecca Grant is president of IRIS Independent Research. Her most recent article for Air Force Magazine was “Comms Through the Aerial Layer” in December 2015.

Air superiority is the single most important factor in deciding the outcome of a modern conventional war. Military operations on land, sea, or in the air are extremely difficult, if not impossible, for the side that doesn't control the sky. In the words of Field Marshal Bernard L. Montgomery, "If we lose the war in the air, we lose the war and we lose it quickly."

There's a difference between air superiority and air supremacy, terms often used synonymously. Air superiority is defined as being able to conduct air operations "without prohibitive interference by the opposing force." Air supremacy goes further, wherein the opposing air force is incapable of effective interference.

Gaining air superiority isn't an end in itself. It's a means to an end: to damage, destroy, or otherwise affect an enemy's centers of gravity, whatever they may be.

Air superiority must be a commander's top priority, however. If surplus airpower is available, it can be allotted to other air

campaigns. Such "parallel operations" are unique to airpower and are one of its greatest strengths.

The Italian general Giulio Douhet and Marshal of the Royal Air Force Hugh M. Trenchard in Britain were the seminal thinkers on air superiority. They believed that airpower's ability to leap obstacles and attack anywhere, at any time, without warning, meant that defense against air attack was almost impossible. They considered anti-aircraft artillery so ineffective it could be ignored—a gross mistake—but also doubted the usefulness of air interception. Writing in the days before radar, they believed detection and timely interception of enemy attackers was unlikely. As bomber aircraft flew faster and higher in the 1930s, this belief grew even stronger. As a result, many airmen thought air-to-air combat unlikely and that enemy air forces could be ignored.

Billy Mitchell disagreed and argued that bomber deficiencies in speed and maneuverability would put them at a disadvantage when engaged by enemy fighters. Mitchell imagined a tough



Supremacy in the Skies

By Phillip S. Meilinger

struggle for air superiority between attacking bombers and defending fighters.

In *Victory Through Air Power*, Alexander P. de Seversky called for long-range fighter escort for attacking bombers. Most engineers at the time doubted that a fighter could be built having speed and agility as well as the long range of a bomber, but de Seversky, himself an aircraft builder, was sure it could be done. Others thought that even if the bomber was vulnerable to defending fighters, escort was inadvisable. Claire L. Chennault, later of Flying Tigers fame, perceived the fighter as an inherently "offensive" capability and opposed attempts to turn it into a "defensive" escort.


In World War II the Allied bomber offensive against Germany quickly settled the question: Air battles would occur, they would be long and bloody, and long-range escort was essential for daylight bomber attacks. The arrival in the theater of the P-47 and P-51, having the range to accompany bombers deep into Germany, proved a breakthrough. Upon taking command

at Eighth Air Force, Brig. Gen. James H. "Jimmy" Doolittle changed tactics to take advantage.

In early 1944, he decided that using fighters as bomber escorts was misguided. Doolittle directed fighter pilots to concentrate on enemy fighters, arguing for an aggressive doctrine of seeking out and destroying the enemy air force, which would in turn protect the bombers. The shift proved highly effective.

Allied air leaders also realized in early 1944 that if the aim was to eliminate the Luftwaffe, then bombers had to threaten targets so vital that the enemy was compelled to defend them. The bombers effectively became the bait that lured the Luftwaffe into the air, where it could be destroyed by Allied fighters.

Allied leaders at that time were preoccupied with the Normandy invasion. Because they realized air superiority was essential to the success of Operation Overlord, it was necessary to find a vital target quickly, attack it, and draw the Luftwaffe into the skies. Gen. Carl A. "Tooley" Spaatz, commander of the US Strategic Air Forces in Europe, believed such a compelling target was



The methods may change over time, but the need for air supremacy never goes away.

Fighter escorts leave vapor trails while accompanying B-17s over Germany during a mission in 1943. In 1944, US fighters shifted from an escort focus to making the destruction of the Luftwaffe the priority.



USAF photo



US Army photo by SSgt. Jose Otero

Top: A North Vietnamese MiG-17 is blasted with 20 mm shells from a USAF F-105D during the Vietnam War. Here: The carcass of an Iraqi MiG-29 lies on the desert floor after it was destroyed by coalition forces during Operation Desert Storm.

German oil refineries. Allied bombers, accompanied by their new escorts, struck oil targets deep in Germany, provoking a monumental air battle. It proved a decisive factor in the success not only of Overlord but of the entire Allied war effort.

After the war, air doctrine changed rapidly. The nuclear standoff between the two superpowers, the US and the Soviet Union, was one of intercontinental ranges, making the idea of fighter escort impractical. Attacking bombers would now rely on speed, surprise, altitude, decoys, night, and electronic warfare (EW) to penetrate enemy airspace.

Most American postwar bombers had little capacity for defending themselves: The B-52 relied on a lone, four-barreled gun in its tail. The situation had reverted to that envisioned by Douhet. The air superiority battle was simply assumed away.

During the Korean War, American B-29s couldn't hold their own against Soviet-built MiG fighters, and the use of escorts was revived. Korea was seen as an aberration, however, and by the early 1960s the idea of using fighters to gain and maintain air superiority was largely dead. Fighter pilots in aircraft like the

F-105 spent more time training to deliver nuclear bombs than they did practicing air-to-air tactics.

Vietnam changed things. The need for dogfighting to achieve air superiority was proved once more. Because air-to-air combat skills had been allowed to atrophy,

American pilots were initially at a disadvantage in contests against nimble North Vietnamese fighters.

Programs like Top Gun and Red Flag eventually made up for the skill deficiencies of the previous decades. Yet again, it became clear that penetrating enemy air defenses was difficult and required a number of tactics and technologies to ensure success.

The 1991 Gulf War was a watershed because stealth technology introduced an unprecedented element into the air superiority campaign: The F-117 stealth attack jet was virtually invisible to Iraqi radar. In a sense, air war had circled back to the era before radar, and the ideas of Douhet and others about the challenges of defending against air attack were again valid.

There are two faces to air superiority. The first—well-understood by soldiers—is that the enemy is prevented from attacking friendly forces and infrastructure. The flip side is that the enemy can't prevent attacks on his own forces and facilities. This aspect of air supremacy is often taken for granted, but it underpins the American way of war as it has been practiced for the last 25 years. Without air supremacy, all the missions on which ground forces depend—close air support, air interdiction, deep strike, reconnaissance, airlift, medical evacuation—are problematic. Allowing an enemy to obstruct those missions will likely mean failure on the ground.

Since 1991, the US has fought a number of air wars: over Iraq, Bosnia, Kosovo, Afghanistan, Libya, and Syria. In all cases air supremacy was quickly obtained and not a single USAF aircraft was lost in air-to-air combat. Only six Air Force aircraft have been lost in combat over the past 24 years, and most of the crew members were rescued.

Air commanders have a lot to consider in thinking about how best to achieve air supremacy. Is it necessary to attain theater air superiority or merely localized dominance in a specific time and place? The answer depends on the military objective of the operation, the expected duration of the action, the capabilities and nature of the enemy, and the geography of the area. The degree of air superiority needed to protect a major amphibious assault against a moderate-size country equipped with a modern air force, for example, is different from that needed for evacuating noncombatants from a small country with no air

force. In the former case, the struggle for air superiority would likely be not merely a battle but a campaign. This degree of air dominance takes time to achieve and requires constant maintenance thereafter.

Another issue is the relative balance between offensive counterair operations (OCA) and defensive counterair operations (DCA). Several air theorists have pushed the idea that the best defense is a good offense, but this is often politically unacceptable. A country's leaders can't tell their people they've rejected defensive measures so they can concentrate on hitting an enemy harder than he can hit back. Instead, politicians may insist on a robust air defense. An example of this occurred, fortunately, in Britain before World War II and produced victory in the Battle of Britain. Nonetheless, it's generally wise to use airpower's inherently offensive characteristics to attack and take the initiative.

There are several types of OCA. The first is suppression of enemy air defenses (SEAD), a mission that has steadily gained importance as worldwide air defenses have improved. Specialized aircraft have been developed to jam a defender's radars and communications or to track emitters and destroy them with homing missiles. SEAD has become a critical element in any air campaign, essential to reducing losses.

Another OCA mission is the offensive fighter sweep; however, this is generally unsuccessful until air superiority has been gained. The RAF attempted this over France in 1941 as a way of luring the Luftwaffe into battle, but the sweeps were a costly failure. The Luftwaffe wasn't compelled to engage on other than its own terms. In these early sweep operations, the initiative lay with the defender. Once the Allies gained air superiority over Western Europe in March 1944, aggressive sweep operations to find and destroy lucrative ground targets (including aircraft) proved very successful.

A third OCA mission is escort, or what's now termed "force protection." This is one of the oldest OCA missions, but it remains one of the most important. When attack aircraft are loaded with offensive ordnance and have to concentrate on finding and hitting ground targets, they need escorts to watch for enemy interceptors and to destroy them or drive them off.

The fourth form of OCA is airfield attack, the attempt to eliminate the enemy

air force on the ground by destroying the eggs in their nests, as Douhet said.

Defensive counterair, in the form of an interceptor force, can sometimes win air superiority over a specific area for a period of time. The Battle of Britain was perhaps the most telling example of this, but the resistance of the Luftwaffe prior to March 1944 is also significant. So was Egypt's layered, overlapping, and highly integrated ground-based air defense network in 1973, which proved formidable to the Israeli Air Force.

There are many advantages to playing defense, especially when the defender has a powerful interceptor force, an extensive air defense system, and an effective command and control network to tie it all together. It means shorter lines of communication—which generally translate into higher sortie rates and the conservation of resources—a good chance of rescuing downed aircrew, and the psychological advantages of defending one's own territory. Even so, DCA has not had an overly prominent role to play lately, partly because OCA has been so effective.

TACTICAL SUPERIORITY

While airmen have tended to dismiss the danger from enemy ground defenses, historically it has been anti-aircraft artillery and surface-to-air missiles that have proved most lethal to attacking aircraft. Even during World War II, ground fire brought down most aircraft lost in combat. In the 1991 Gulf War, all coalition aircraft lost—with one possible exception, a Navy F/A-18—were downed by ground defenses. Since the Vietnam War, USAF has not lost a single aircraft in air-to-air combat.

In a major OCA campaign, destroying several target sets is mostly likely to result in air superiority.

■ **Aircraft**—Destroying aircraft air-to-air is the least efficient, though most glamorous, way of gaining air superiority. However, there are exceptions. The F-15 and F-16 have been incredibly successful in air-to-air combat worldwide—some sources indicate these two aircraft have achieved more than 170 air victories with no losses. The F-22, though not yet tested in air-to-air combat, promises to be even better.

Destroying enemy aircraft on the ground often promises to be the quickest and easiest method of gaining air superiority.

The Luftwaffe destroyed more than 4,000 Soviet aircraft, most of them on the ground, in the first week of Operation Barbarossa.

In the first two days of the 1967 Arab-Israeli War, the Israeli Air Force destroyed over 400 Arab aircraft on the parking ramp.

In the first Gulf War, only 33 of the nearly 200 Iraqi aircraft eliminated fell in air-to-air combat; the rest were caught on the ground. Given the potential decisiveness such targets present, most air forces have labored over the past three decades to disperse and camouflage their aircraft and, when possible, place them in hardened shelters.

■ **Crew Members**—Modern combat pilots require a minimum of two or three years of highly specialized and expensive training to prepare for combat—more to become truly proficient. An attacker recognizes that his opponent's supply of combat pilots is limited and irreplaceable in the short term.

■ **Command, Control, and Communications (C3) Facilities**—This was a primary target of coalition aircraft in the 1991 Gulf War and every conflict since. Usually, the first targets struck are air defense radars and command and control facilities. The intent is to cut off individual air defense units from a centralized control and information network. In Iraq in 1991 and again in 2003, these efforts were successful. In fact, in 2003 no Iraqi aircraft took off to contest the coalition.

■ **Tankers and Other Enablers**—Air strike packages are highly dependent on specialized air assets such as tanker aircraft. Without tankers, much of Afghanistan, for example, would have been out of reach for most US aircraft. If prospective enemies are also dependent on air refueling, their tanker fleet should be considered a high priority target.

Electronic jamming assets are also essential. Without them, non-stealth aircraft are highly vulnerable. Unfortunately these assets are often in short supply, and a loss of even a handful of these airplanes would have big consequences.

■ **Runways and Other Bottlenecks**—Systems that are of inordinate significance to the overall operation make good targets. Hitting runways and airfields, for example, is a time-honored method of shutting down an enemy air force. During the First World War, Trenchard's bomber force devoted 40 percent of its sorties to enemy airfields.



An F-117 flies over the Nevada desert. Despite more than 1,300 combat sorties during Desert Storm, none of the stealthy attack aircraft were even damaged. During its operational lifetime, one F-117 was lost in combat—over Serbia in 1999.

In the Falklands War, the RAF used 11 tankers to put one Vulcan bomber over the Port Stanley airfield. This Vulcan strike illustrates both the strength and weakness of airfield attacks. Despite the effort, only one bomb of the entire string actually hit the runway, which was quickly repaired. Even so, the Argentines felt compelled to redeploy their Mirage interceptors to bases north near Buenos Aires, thus sacrificing their ability to contest air superiority over the Falklands.

In both Gulf Wars, scores of sorties were flown to crater Iraq's runways and keep its air force out of the sky. However, airfield attacks are risky and usually only close an air base briefly, while repairs are made. Therefore, they are justifiable only if it's necessary and worth the risk to attacking aircraft to shut down an airfield or fix the enemy in place for a short period of time. Hitting other airfield targets—such as refueling or rearming sites, command centers, or maintenance hangars—might have longer-term effect.

EXPLOITING VULNERABILITY

Intelligence, surveillance, and reconnaissance play a crucial role in an air superiority campaign. It's essential to have accurate and current knowledge of the enemy's air order of battle, tactics, doctrine, disposition, leadership, capabilities, and intentions. The success of the counterair campaign will often hinge on this.

Surface forces can also play an important role in destroying enemy surface-to-air defenses and in pinning the enemy down or flushing him out.

In 1973, for example, the depth and redundancy of Egyptian air defenses made Israeli air operations hazardous over the

battle area. It was necessary for Gen. Ariel Sharon's forces to cross the Suez Canal and sweep away four Egyptian air defense sites in order for Israeli aircraft to resume operations at an acceptably reduced risk.

In addition, the presence of substantial coalition ground forces in the Gulf Wars forced Saddam Hussein's forces—as well as the Taliban in Afghanistan—into an insoluble dilemma. If they concentrated to meet a ground attack they were vulnerable to air attack. On the other hand, dispersal eliminated their effectiveness in the face of widespread coalition ground forces. An army is never more vulnerable than when it turns to run. At such times a vigorous pursuit can turn a victory into a decisive rout, and nothing pursues like airpower. The synergies of air and ground forces are a key consideration in any campaign.

New technologies also affect air campaigns.

■ **Stealth**—The value and effectiveness of low observable technology was hotly debated prior to the first Gulf War, and skeptics doubted whether it was as good as advertised. All doubts were erased in the skies above Baghdad. Despite the nearly 1,300 F-117 combat sorties flown, no aircraft were even damaged by the enemy. Since then, only one stealth aircraft has ever been lost in combat—an F-117 over Serbia in 1999 (the pilot was rescued). The efficacy of stealth countermeasures is once again a subject of intense debate, but its utility in the near term is not in question.

■ **Precision Guided Munitions**—Stealth, or even modern high-performance aircraft in general, are so complex and expensive that only the richest countries can field them. This is not so, however, regarding PGMs and penetrators, which are true force multipliers.

Iraq's hardened bunkers of reinforced concrete and earth may have been designed to withstand a nuclear attack, but not a direct hit from a well-placed penetration bomb. The proliferation of PGMs and penetrating bombs makes it crucial to seek practical methods for shielding aircraft, command facilities, and other high-value targets from air attack.

■ **C3 in the Cockpit**—New to the air superiority campaign is the abundance of data that can now be piped into the cockpit. Space-based communications and information systems have increased by orders of magnitude the amount of data available to airmen. The result is a worldwide linkage to aircraft with real-time intelligence.

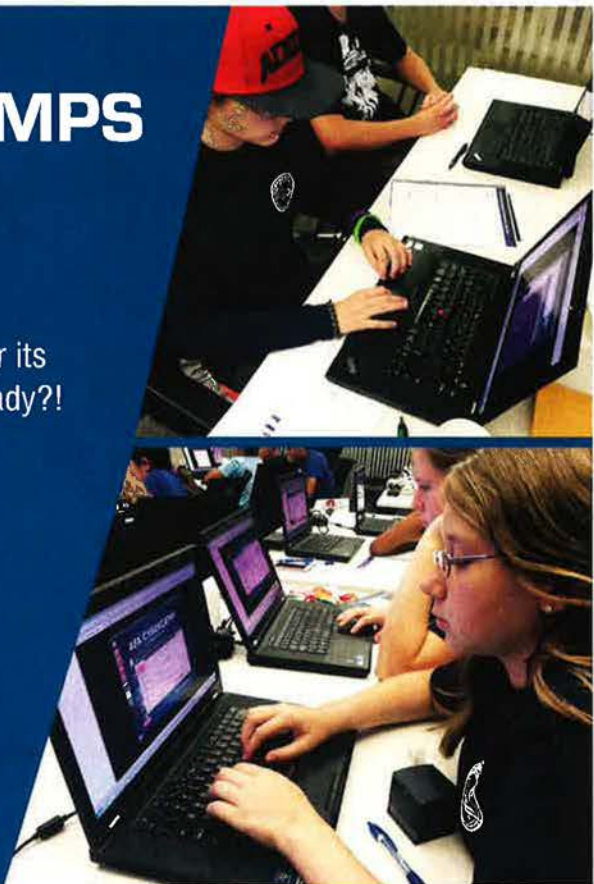
Air superiority continues to be the essential factor in modern military victory. It must be won, and to maintain it requires constant investment and training. It's not an end in itself but a tool to be exploited, and that exploitation will require commanders to understand the most useful ways it can be applied. Although air superiority will not by itself bring victory, it is almost impossible to achieve success without it. ☛

Retired Col. Phillip S. Meilinger was a command pilot and has a Ph.D. in military history. His most recent book is Bomber: The Formation and Early Years of Strategic Air Command. His most recent article for Air Force Magazine, "Sanctuary From Above," appeared in January 2015.

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What It Takes

By Elise Steinberger

A pilot flies an aggressor mission during Red Flag-Alaska in 2009. Flying a fighter jet can take a toll on pilots' physical condition. They must stay in tip-top shape.

Physiologically, being a fighter pilot does not come naturally.

FEW would argue that the human body is “built” for high-performance flight. Substantial physical and cognitive challenges routinely tax pilots’ bodies, including the need to fuel a working brain with the oxygen it needs—an easy task on the ground, not so much while experiencing the G-forces in a modern fighter cockpit.

Developing inherent physical characteristics and cognitive capabilities through years of training builds pilots who can operate with extraordinary precision and accuracy.

“We need the person who ... has those health standards to withstand that environment, that cognitive capacity to engage in that environment, and that optimized physical conditioning to endure that environment—and it’s pretty impressive the folks ... our country has been able to put out,” said Dr. James McEachen, an aerospace medicine physician and researcher at the Air Force Research Laboratory, Wright-Patterson AFB, Ohio.

In a modern day fighter aircraft, pilots defy gravity in more than one way. The force of gravity the aircraft overcomes to leave the ground almost pales in comparison to G-forces a pilot’s body and

mind cope with while trying to function normally while flying.

“If you’re trying to fly defensively, for example, put on six layers of clothes, strap yourself into your [aircraft], lean forward, turn around, put a helmet on your head, and then have an elephant sit on you,” said Lt. Col. Courtney A. Hamilton, an F-15C pilot and commander of the 12th Operations Support Squadron at JBSA-Randolph, Texas.

ANATOMY LESSON

The human heart is used to battling Earth’s gravity as it pumps blood to move oxygen to the brain, while muscles in the lower body help return the blood to the heart. However, when pilots experience positive Gs it’s as if gravity is on steroids.

“At nine Gs that column of blood [between the heart and the eyes] weighs nine times the weight that it does for somebody who’s just sitting at their chair at their desk. It makes it very difficult for the heart to pump that blood up back to the head,” said Lloyd D. Tripp Jr., program manager at Wright-Patterson’s 711th Human Performance Wing Human Effectiveness Directorate.

This makes delivering oxygen to the brain a unique challenge, but anti-G strain maneuvers and anti-G suits make it possible for pilots to somewhat regulate where the blood in their body goes.

“You’re working pretty much every muscle in your body, from your rib cage down,” said Maj. Willem Van Loon, a T-38 instructor pilot with the 560th Flying Training Squadron at Randolph.

Pilots tense lower body muscles to help return this “heavy” blood back to their hearts, while their anti-G suits help move the blood as well, said Tripp. Moving blood from the heart to the head is a coordinated effort between muscle contraction and breathing regulation, through the anti-G straining maneuver.

“You take that breath in and then you hold it for about two to three seconds. When you do that, you increase the pressure in your chest and that increases the pressure in the heart, which aids in increasing the head-blood pressure as well,” Tripp said.

All this makes the heart able to squeeze blood into the head against the strong downward force of Gs. Delivering this oxygen to the brain is necessary to main-

tain vision and consciousness—among other things.

Lt. Col. David Leazer, an F-16 pilot and 12th Operations Group deputy commander at Randolph, said that without employing these skills, the body's ability to tolerate Gs drops off sharply. "The more Gs you pull, the faster the blood will leave your brain. ... When you start getting up to the six, seven G range, now you're talking about having 10 seconds of useful consciousness if you're not doing [the anti-G straining maneuver]. ... When you're up in the eight to nine G range you're probably talking two to three seconds of useful consciousness, if you don't strain at all."

Using the straining maneuver while flying is crucial, as is exercising regularly and hydrating well.

"If you're a quart to a quart-and-a-half low with fluid intake, that can reduce your G tolerance by up to about 50 percent, leaving a pilot susceptible to a G-induced loss of consciousness [G-LOC] episode," said Darryn Bryant, a research aerospace physiologist at the Air Force Research Laboratory.

Along with G-forces, high altitude further complicates oxygen delivery to the brain when oxygen in the cockpit might be low.

Bruce Wright, senior research physiologist at the USAF School of Aerospace Medicine at Wright-Patterson, said slow-onset hypoxia—a lack of oxygen different from the rapid oxygen deprivation in the brain caused by G-forces—negatively affects cognitive function to varying degrees in different people. In a controlled environment on the ground, pilots learn to recognize their symptoms, such as dizziness or tunnel vision, to know when to use supplemental oxygen, he said.

"What in effect you're doing is you are asking an impaired person to detect how impaired they are," said Wright, adding that this pushes researchers to find other ways of detecting whether a pilot is becoming hypoxic.

Moving oxygen to the brain is just one of the physical hurdles that comes with high-performance flight, but as the mental and physical pressures on the pilot are intertwined, fueling the brain is essential for optimal performance.

"You combine that physical demand with a need to multitask at a very fast rate—... it feels like you're trying to solve math problems while doing a CrossFit

exercise," Leazer said, referring to a high-intensity strength and conditioning program. However, it becomes easier with time. "The longer that you do it, experience takes over, muscle memory takes over. So when you're just starting out, the hardest part is getting used to the physical endurance required and then building in the multitasking piece."

Maj. Gentry Mobley, Air Education and Training Command's fighter training branch chief, said a building block approach during training makes it possible for pilots to keep adding new tasks, like the G strain, because they become second nature.

MULTITASKING

Through training and repetition, G-strain becomes second nature, and an experienced pilot will skillfully manage large amounts of information and new tasks. "If I were leading an eight-ship of Eagles in front of a 40-ship strike package, I'm keeping track of my eight airplanes, where the other 40 strikers are, where's the tanker, where's the AWACS, where's the bad guys, who's going after which bad guy, how much gas do I have, how much gas does my wingman have, how many missiles do we have, how many shots have we taken, do we need to turn around now, do we need to go over there, how's the weather, are we on time, ... and I still have to fly my plane ... and deal with all the physical parts," said Hamilton, the 12th OSS commander.

Maj. Dorian Williams, aerospace physiology aircrew curriculum manager at AETC, added that as pilots learn, they use less "conscious input and brain bytes" on habitual tasks.

Capt. Christopher Umphres, a flight commander in the 435th FTS at Randolph, said simulators are valuable tools for learning how to quickly and effectively process information when flying. Van Loon said thinking through scenarios on the ground also speeds up decision-making in the air.

"Put yourself in that situation and think about what you would do, so that next time when it happens in the air and you're at 400 mph and you have four seconds to make the decision, you already kind of know, 'Ah, I remember thinking about this before,'" said Van Loon.

Even when pilots manage certain tasks subconsciously, knowing where and when to focus mental attention is critical to success.

"What that involves is having the ability to prioritize where you focus your attention and then to take the right sequence of actions, very deliberately, and do it in a time sensitive matter," said Lt. Gen. Mark A. Ediger, Air Force surgeon general.

Selection, training, and human systems integration—tailoring weapons systems to make them optimal for the physical and cognitive capabilities of humans—are instrumental in producing successful fighter pilots, said Ediger.

Flying fighter aircraft requires high levels of cognitive function, especially in areas of spatial functioning, reasoning, processing speed, and calculation, said Wayne L. Chappelle, a consultant in aeromedical clinical psychology in the Office of the Air Force Surgeon General at the USAF School of Aerospace Medicine.

Fighter pilots score in the 90th to 94th percentile for IQ in the general population, landing them in a "superior range of functioning," Chappelle said. Along with this cognitive functioning, fighter pilots are high on the axes for two other broad categories: stability and motivation. He said stability includes less autonomic reactivity, such as elevated heart rate, increased blood pressure, and sweating, in difficult situations.

"These are individuals that have a high level of stress tolerance and what we would [term] resilience to demanding conditions. In other words, they can remain calm and composed in very high-risk, high-demand situations," Chappelle said.

Hamilton noted that mental compartmentalization is a key tool to keeping her mind clear and focused on the task at hand.

"When I get in the jet, that's all I'm thinking about," she said. "Everyone has stressors in their life. Everyone has something at home and something else at work, ... but I have to ignore that."

Whether flying or on the ground, pilots must embrace the idea that there is always more studying and more practice that can be done—physically and mentally, said Van Loon.

"You want to be on that razor's edge of 99 percent perfect every time you go, because it means life or death for you or somebody close to you," he said. This, and the security of the United States, motivates pilots to strive to be better every day. "That's the cost of doing business. That's what it takes." ❊

The Lost Art of Naming Operations

By John T. Correll

Once there was Overlord and Rolling Thunder and Desert Storm. Now we get such mush as Enduring Freedom and Inherent Resolve.

US air strikes against ISIS in Iraq and Syria began in August 2014, but for more than two months, the operation did not have a name. The Pentagon finally settled on Inherent Resolve.

The press wondered why it took so long to come up with what the *Los Angeles Times* called “a moniker so inherently bland that it sparked jokes on late-night TV.” The *Wall Street Journal* quoted a military officer who acknowledged the name was “just kind of bleh.”

About the same time, a re-naming operation was underway in Afghanistan. After a run of 13 years, Operation Enduring Freedom ended in December

2014 and was superseded by Operation Freedom’s Sentinel.

There was some confusion from a reference during the transition ceremony in Kabul to Operation Resolute Support, but that turned out to be a NATO designation. By way of clarification, the US commander explained that “Resolute Support will serve as the bedrock of an enduring partnership.”

Inherent Resolve, Enduring Freedom, Freedom’s Sentinel, and Resolute Support share a mind-numbing similarity that makes it difficult to keep track of which is which. They sound like slogans or something made up by the marketing department.



US Coast Guard photo by Chief Photographer's Mate Robert F. Sargent.

These operations—and the military members serving in them—would have once had more distinctive designations that had some chance of being remembered. Unfortunately, naming military operations seems to have become a lost art.

The gold standard was set by Operation Overlord, the D-Day invasion in 1944, Operation Rolling Thunder, the air campaign against North Vietnam 1965-1968, and Operation Desert Storm, the Persian Gulf War in 1991.

That was too good to last. The selection process has been taken over largely by staff bureaucrats assisted by an automated system. Sometimes senior officials get in on the act. They make sure operation names have the right political texture and that—above all—they do not offend anyone.

WHERE IT ALL STARTED

“Naming operations seems to have originated with the German General Staff during the last two years of World War I,” said Lt. Col. Gregory C. Sieminski, who explored the history of it in the Army War College’s *Parameters* in 1995. “The

Germans used code names primarily to preserve operational security, though the names were also a convenient way of referring to subordinate and successive operations.”

Among the German operations in 1918 were Archangel, St. Michael, St. George, Roland, Mars, Castor, Pollux, and Valkyrie.

The Germans picked up the practice again in World War II. The planned name for the amphibious invasion of England—canceled after the unexpected victory of the British in the Battle of Britain—was Sea Lion.

The invasion of Russia was initially named Operation Fritz, after the son of one of the planners, but was changed by Hitler to Operation Barbarossa, the folk name of the Germanic emperor Frederick I, who conquered the Slavs in the 12th century.

Both the Americans and the British named their operations in World War II as well, mostly for reasons of security. In 1942, the US War Plans Division devised a list of 10,000 words that could be used without any suggestion of a specific purpose or a particular place.

On June 2, 1944, just before D-Day, the crossword puzzle compiler for the *London Daily Telegraph* was visited by intelligence agents who wanted to know about one of the answers published that day for the May 27 puzzle. The word in question was “overlord,” the code name of the operation about to begin.

Furthermore, words in other puzzles in past weeks had included “Utah,” and “Omaha,” code names for two of the D-Day invasion beaches. As recounted by Cornelius Ryan in *The Longest Day*, it was simply a coincidence. The puzzles had been prepared months before but did not appear in the newspaper until just before the operation.

There is some claim that the British were more diligent than the Americans in choosing names that would give no hint of the plan. One example cited is Market Garden, the failed British-led airborne operation in the Netherlands in 1944.

However, US Operation Matterhorn was at least as opaque. The Matterhorn is one of the highest peaks in the European Alps and there was nothing about it to suggest the nature of the operation, which



Troops disembark at Omaha Beach, France, on D-Day, June 6, 1944. The invasion of Normandy was named Operation Overlord.

was the strategic bombing of Japanese forces in Asia by B-29s based in India and China in 1944-1945.

Code names for programs and projects—separate from operation names, but related—also came into widespread use in World War II. The Manhattan Project, for example, was the program to develop the atomic bomb. The first two bombs were Little Boy and Fat Man.

These names were not chosen randomly. Little Boy and Fat Man derived from the relative size and shape of the bombs, and the initial base for the project was the Manhattan Engineer District of the Army Corps of Engineers.

THE GOLDEN AGE OF NAMING

USAF photo

British Prime Minister Winston Churchill loved code names and picked them personally whenever he got the chance, but one of his most notable contributions was about an American operation.

For reasons long forgotten, the mission to bomb Ploesti in 1943 was first known as Operation Soapsuds. Churchill warned President Roosevelt that a whimsical name was “inappropriate for an operation in which so many brave Americans would risk or lose their lives.” The name was duly changed to Tidal Wave.

Some World War II operations were elegantly named, such as Torch, the North Africa campaign in 1942-1943. Some were not, such as Grubworm and Rooster, two US airlift operations to redeploy Chinese army forces and their equipment in 1945. Operation Chattanooga Choo Choo, the air offensive against trains in France and Germany in 1944, could also have been better named.

Among the notable named operations in World War II were these:

- Husky, the invasion of Sicily in 1943.
- Strangle, the aerial interdiction of Italy in 1944. The US liked Strangle well enough to use it again in Korea.
- Point Blank, the combined bomber offensive in Europe.



F-105s and an RB-66 on a mission over North Vietnam. Many operation names during the Vietnam War, such as Linebacker, were ill-conceived.

■ Argument, also known as “Big Week,” Feb. 20-25, 1944, the coordinated attack on the German aviation industry.

■ Frantic, the shuttle bombing missions in 1944, launched from Britain and Italy, landing in Soviet-controlled territory and launching from there for the return missions.

■ Crossbow, air attacks on German V-1 and V-2 rocket launch sites in 1944.

■ Carpetbagger, Army Air Forces night flights over occupied Europe to support partisans.

Two of the best operation names were not used, scrubbed when the atomic bombs brought the war in the Pacific to an end without invasion of the Japanese home islands. Operation Olympic would have been the attack on Kyushu, projected for November 1945, followed by Operation Coronet against Honshu in the spring of 1946.

OTHER NAMES, OTHER WARS

The custom of naming operations continued after World War II, but there was no need for secrecy in most peacetime actions so the names were often open and direct. The folksy designation of Operation Vittles was given to the

Berlin Airlift. In Operation Haylift in 1949, Air Force transports dropped feed and supplies to isolated ranchers in Nevada and Utah where cattle were stranded and starving in deep snowdrifts during the worst winter in 60 years.

The first recorded political problem with an operation name was in Korea in 1951, when Lt. Gen. Matthew B. Ridgway was chastised by Washington for calling his Eighth Army offensive Operation Killer. Unrepentant, Ridgway said, “I did not understand why it was objectionable to acknowledge the fact that war was concerned with killing the enemy.”

Something similar happened in Vietnam in 1966

when Operation Masher was changed to Operation White Wing because President Lyndon Johnson wanted it to sound more benign.

Operation names in the Vietnam War were mostly in the classic tradition. In addition to Rolling Thunder, they included these:

■ Farm Gate, 1961-1963, training and support for the South Vietnamese air force.

■ Barrel Roll, 1964-1973, support of ground forces in northern Laos.

■ Steel Tiger, 1965-1973, interdiction of the Ho Chi Minh Trail.

■ Igloo White, 1968-1973, seeding of the Ho Chi Minh Trail with 20,000 acoustic and seismic sensors to detect enemy movement, monitored by aircraft orbiting overhead.

■ Bolo, 1967, the “MiG Sweep,” in which seven North Vietnamese aircraft were shot down in 12 minutes.

■ Commando Hunt, 1968-1972, intensified air strikes in southern Laos.

■ Arc Light, 1965-1973, B-52 strikes in Southeast Asia.

Some of the air operations in Vietnam could also have been better named. Linebacker, for example, was an uninspired sports metaphor that did not really fit. Linebacker II, the bombing of North Vietnam in 1972 that brought the peace talks to fruition, was the most

F-15s and F-16s fly over burning oil wells in Kuwait during Operation Desert Storm. The operation name was a throwback to more classic naming conventions.

important offensive operation of the war but it was named after a defensive position in football.

The "Menus," named with misplaced levity, was the covert bombing of Cambodia in 1969-1970, a series of missions named Breakfast, Lunch, Dinner, Snack, Supper, and Dessert.

On the other hand, Operation Homecoming was just right for the airlift of the POWs from North Vietnam in 1973.

THE DRIFT TO MUSH

The planners were obviously not on a tight leash when they called the airlift to Israel in 1973 Operation Nickel Grass. It was adapted from a bawdy World War II fighter pilot ballad ("Throw a nickel in the grass. . .") but it was a strange choice for a mission in which the fate of an allied nation hung in the balance.

The era of freewheeling names was fast coming to a close. In 1972, the Department of Defense issued Directive 5200.1, which said that operation names must not "express a degree of bellicosity inconsistent with traditional American ideals or current foreign policy."

The Joint Chiefs of Staff implemented the guidelines in 1975 with a computer system called the Code Word, Nickname, and Exercise Terminology System, an unwieldy title shortened to NICKA, which is still in use today. The present directive says that names must not "convey connotations offensive to good taste or derogatory to a particular sect or creed" or offend US allies or "democratic free world nations."

Contrary to popular belief, NICKA does not generate random lists of names. Mainly, it assigns two-letter alphabetic sequences to various commands and agencies, which develop two-word operation names beginning with a letter pair from one of the sequences. For example, NORAD and US Northern Command are assigned sequences AM through AR, FA through FF, JM through JR, and VG through VL.

Even so, assigned names do not always stick. The attempt to rescue American hostages held in Iran in 1980 was dubbed Operation Evening Light, but it will be forever remembered instead as "Desert One," which was the refueling site where the mission was aborted when two US aircraft collided in a sandstorm.

From the NICKA letter pair UR assigned to US Atlantic Command, a staff officer came up with Urgent Fury for the invasion of Grenada in 1983. That wasn't exactly a reprise of Operation Killer but nevertheless aroused some press comment that it was "too militant."

"With Operation Just Cause in 1989, code names began to be used consistently to shape public opinion," said William M. Arkin, a journalist who has collected and analyzed more than 3,000 names of military plans, programs, and operations. The *New York Times* called Just Cause "Operation High Hokum." The follow-on, Operation Promote Liberty, did not attract much attention.

DOWN FROM DESERT STORM

Gen. H. Norman Schwarzkopf, commander of coalition forces in the Gulf

War, is credited with naming Operation Desert Storm, but that was not his first choice. He initially recommended Peninsula Shield, but that was rejected by the Joint Chiefs of Staff. The second proposal, Crescent Shield, was not accepted either.

Stormin' Norman next suggested Desert Shield, which was accepted for the preparatory phase of the Gulf War. Desert Storm spun off from that. It was a throwback to the classic tradition of operation names and one of the last of its kind.

Typical of things to come was Operation Productive Effort, a disaster relief mission to Bangladesh in 1991, but even the Pentagon couldn't abide that one and renamed it Sea Angel.

Provide Comfort, 1991-1996, was humanitarian relief to the Kurds in Iraq. Provide Hope in 1992 was an airlift of food, fuel, and medicine to the former Soviet Union. That was not to be confused with Restore Hope, which was humanitarian relief for Somalia in 1993-1994.

The names for Operations Southern Watch and Northern Watch, enforcing no-fly zones in Iraq through the 1990s, were plain and literal, unencumbered by political overtones. That could not be said for Uphold Democracy, the invasion of Haiti in 1994, Deliberate Force in Bosnia in 1995, or Allied Force in Kosovo in 1999.

In 1994, the *Los Angeles Times* complained that "today's military code names lack flair." A "Pentagon strategist" who spoke with the reporter agreed

An A-10 takes off from Bagram AB, Afghanistan. The US-led coalition effort there was named Operation Enduring Freedom—a nice thought, but one that hasn't proved prescient.

USAF photo by CMSgt. David L. Stuppy



that the selections were “not the kind of thing they’ll remember in the year 2021.”

Soon enough, US planners would have reason to reflect on their vastly overstated designation of Infinite Reach for an air assault on Osama Bin Laden’s training camps in 1998.

SINCE 9/11

Since the terrorist attacks on Sept. 11, 2001, it has mostly been one forgettable operation name after another. The best of them was the first, Noble Eagle, the ongoing homeland security effort that includes air defense of the United States.

Then came Infinite Justice, the broad military response to the attacks. It lasted only a week before being changed to Enduring Freedom on Sept. 25, when Islamic scholars complained that only Allah can provide “infinite justice.”

Enduring Freedom continued overseas, mostly in Afghanistan, until 2014 with a parallel Iraqi Freedom in Iraq from March 2003-August 2010.

In September 2010, transitional operations began in Iraq under the rubric of New Dawn. Secretary of Defense Robert M. Gates said the United States was sending “a strong signal that Operation Iraqi Freedom has ended and our forces are operating under a new mission.”

In March 2011, US forces took part in a two-week intervention in Libya called Odyssey Dawn, attributed by the *New York Daily News* to an “operation gibberish name generator.” There was big uproar in May 2011 when news

media reported Operation Geronimo as the action in which Osama Bin Laden was killed.

Angry reaction poured in from the Apache tribe, the Cherokees, the Navajos, the Onandagas, the Senate Committee on Indian Affairs, and Geronimo’s grandson, a Vietnam War veteran. The government claimed the name of the operation had been Neptune Spear, with Jackpot as the code name for Osama and Geronimo as the code word for his capture or death. A book by a former Navy SEAL who participated in the mission said that Geronimo had been the code name for bin Laden.

In addition to the military departments and the combat commands, code names are assigned to operations, projects, and programs by others, including the CIA, the Department of Homeland Security, and NATO.

Some of them are pretty good, such as Elephant Grass, CIA intelligence operations in Iraq, 1987-1988, later changed to Druid Leader and Surf Fisher. Some have origins that can only be guessed at, such as Reindeer Games, an Army airborne operation in Iraq in 2003.

The DOD directives on operation names are shredouts from the series of publications that deal with information security and classification. However, there is no longer any pretense or secrecy.

A press release announces the name of an operation as soon as it is chosen.

“The current fashion in nicknaming operations is to make the names sound like mission statements,” Sieminski wrote in *Parameters*. “There is also a certain formulaic monotony about such names, which makes them less memorable than they might otherwise be. Like having a 1950s classroom full of Dicks and Janes, it’s hard to tell the Provide Hopes and Comforts apart.”

If there had been only one or two operations named in the Just Cause/Enduring Freedom/Inherent Resolve mold, it might not have been so bad, but having found their formula, the namers ran it into the ground.

The habit has developed of referring to operations by their initials: OEF for Operation Enduring Freedom, OIR for Operation Inherent Resolve. It is impossible to imagine Operation Overlord being called “OO.”

Operation names from the past 20 years provide administrative identification—sort of the way a number might do—but not much else. They have little power to inspire or motivate. The biggest loss, though, is that they do not convey the instant recognition and sense of history that the operation names of yesteryear still possess after the passage of half a century or more. ✪

John T. Correll was editor in chief of Air Force Magazine for 18 years and is now a contributor. His most recent article, “Chennault and Stilwell,” appeared in the December 2015 issue.

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AIR FORCE ASSOCIATION

INFORMATION AGE AIRPOWER

By Marc V. Schanz

At a recent AFA/Mitchell Symposium, Air Force leaders explored how airpower will evolve.

Any future conflict between the US and a near-peer adversary will increasingly turn on the ability to collect, disseminate, and exploit information faster than the opponent, senior USAF leaders and others declared at a recent forum in California cosponsored by the Air Force Association's Mitchell Institute for Aerospace Studies.

Air Combat Command boss Gen. Herbert J. "Hawk" Carlisle said in a speech that during Operation Allied Force over Serbia in 1999, Serbian air defense artillery shot down an F-117 stealth fighter aircraft with a 1960s-model SA-3 missile. Using innovative tactics, basic communications, and even human spotters watching strikes take off from Aviano AB, Italy, the Serbs were able to take down one of USAF's top-of-the-line assets at the time, in the opening days of the campaign.

The loss is a teachable moment as to how information drives advantage, Carlisle said. "Whether it's old school or new school," success will hinge on how airmen can leverage what they know about their enemy, Carlisle said in his remarks to the Dec. 4 Mitchell-RAND Corp. forum on aerospace power. Hosted at RAND's

headquarters in Santa Monica, Calif., Air Force leaders, airmen, business executives, aerospace industry officials, and others came together to discuss how the US will adapt its aerospace power and its air, space, and cyber forces and reform its acquisition processes to better prosecute the challenges of the "information age."

WHAT I NEED, WHEN I NEED IT

The Air Force faces a future where its dominance will be challenged in all the domains it operates in—air, space, and cyberspace. Power projection will hinge on finding the right information grid in a given crisis or scenario and working to get inside adversary decision-making cycles. Situational awareness, Carlisle said, is the ability to "know what I need, when I need it, and nothing more."

This need is why initiatives such as enabling the powerful sensor and computing capabilities on the F-22 and the F-35 fleets are so critical to success in the years to come, he added. As demonstrated in Operation Inherent Resolve missions, information and target sharing among F-22s, the combined air operations center, and the rest of the combat fleet is crucial to the completion of a robust and responsive find, fix, target, track, engage, and assess (F2T2EA) chain.

USAF has built two fifth generation aircraft capable of taking in enormous amounts of information, but at present the F-22 and F-35 cannot disseminate that data beyond those fleets via data link, Carlisle said. That connectivity is how USAF is going to complete an effective kill chain and enable survival and success of combat forces in future wars.

It is also why USAF is transforming its high-end training to better leverage these new tools.

For decades at Nellis AFB, Nev., aircraft would show up, with good guys on one side and bad guys on the other, they would fly, and then lessons would be sorted out in debrief, said Maj. Gen.



Gen. Hawk Carlisle speaks at an Air Force Association-Mitchell Institute for Aerospace Studies event in Los Angeles.

Staff photo by Abby Gillett

Jay B. Silveria, commander of the USAF Warfare Center, during a panel on modern air operations. But one Red Flag last year saw some 3,000 participants, with about a third of the participants not flying at all, he stated. These airmen operated ISR elements of the air operations center, helping run a “virtual war” while live flying occurred simultaneously. Distributed Common Ground System airmen helped utilize U-2 imagery for the exercise, and cyber operators were protecting against aggressors attempting to infiltrate network systems. This integrated training is helping airmen across the force see how different capabilities plug in and leverage each other, he said.

But this will involve more than just linking modern fighters to the rest of the fleet. Carlisle said it also means building a responsive and flexible “combat cloud” network, linking up forces from a joint terminal attack controller on the battlefield to the analysts working in a Distributed Common Ground System somewhere around the world.

Today, after more than a decade improving close air support practices in Afghanistan and Iraq, strike coordinates are now sent digitally to pilots, but the process is still human driven and deliberate.

Machine learning—which drives technology such as commercial smartphone apps guiding cars to more efficient routes in the civilian world—could be harnessed for use in combat, he said. As a result, the once-deliberate 72-hour air tasking order is evolving toward being a “constant product,” one taking prioritized information and threat analysis and signals intelligence and disseminating it to the combat air forces in a given operation, Carlisle said. Instead of pilots working various systems to operate their aircraft, as the pilots of fourth generation fighters were taught, they can now perform mission management with the powerful tools and sensors at their disposal.

“We can make them the decision-makers, based on what we are giving them,” Carlisle said. This will keep combat power survivable, as network nodes can be dispersed beyond centralized locations such as a combined air operations center.

The future force will increasingly be defined by the evolution of what

Carlisle dubbed “in-garrison combat operations,” or missions performed by airmen supporting tasks ranging from remotely piloted aircraft operations to satellite movements to cyber defense and offensive operations. “We need to talk about it—and how we do that moving forward,” Carlisle said.

Information exploitation will improve use of limited and in-demand assets like RPAs, he said. Rather than chopping a single aircraft to a combatant command to fill a requirement at a given time, USAF and DOD should employ predictive intelligence capabilities better to “cross cue” assets to surge to meet demands when they emerge.

As ATOs evolve and get more responsive, the ability to predict needs and “share” capabilities will increase, with the help of USAF’s distributed ISR network and global command and control infrastructure.

UNDER THREAT

USAF’s dominance on the battlefield is increasingly tied to its vast space and cyber capabilities, but that dominance is under threat as never before, Air Force Space Command boss Gen. John E. Hyten said in his address to the forum. “We used to fight based on mass. Now we have information as the discriminator on the battlefield,” he said. “We have come down huge numbers in size, but we can leverage information.” USAF must better prepare to defend those domains and fight in them. This is why AFSPC is moving forward with an overhaul of its shift system for space operations, to stand up a “space mission force.”

The experience and proficiency of airmen operating space assets must be enhanced uniformly, Hyten noted. To do this, USAF must rebalance the experience levels of airmen tasked with operations. Currently, AFSPC’s satellite operations crews perform at a high level, but they are usually very young and lack significant experience in their respective system. This is because the old AFSPC system was a split system, featuring a “crew force” of airmen who perform operations for a certain period of time, then progress to “day staff,” who are not generally operating assets but working staff and headquarters functions. The result of this system, he noted, is that AFSPC’s most experienced and capable

operators are not working on crew shifts running valuable space capabilities, a potential danger if something bad were to happen on orbit.

This is why AFSPC is moving to “blow up the day staff,” Hyten said, and stand up the space mission force.

AFSPC will now have two sets of crews operating its on-orbit capabilities, rather than a separate “day staff” from the airmen who perform operations. These two crew sets will carry out operations four months at a time, and as one shift maintains USAF’s space capabilities, the other will undergo rigorous high-end training and skills development, such as participating in Red Flag and other high-intensity training events. This new training and operations regimen will help sharpen new capabilities needed to defeat the hardest threats that could emerge in orbit.

But the cyber domain is also rife with potential threats and vulnerabilities, and the Air Force needs to better prepare for those avenues of attack as well. A culture shift needs to take place to move cyber airmen into more of an operational footing, rather than support a mindset that prioritizes tasks such as network support, Hyten observed.

“The cyber squad of the future will work with the ops group,” he said, not the mission support group, and the cyber airmen will fight with computers—their weapons system—just like airmen fight in other mission areas.

This need is driven by the increased vulnerabilities through the cyber domain that could affect US operations in the future. “If someone hacks into my email, I’ll be annoyed,” Hyten said, but he’s more worried about the vulnerability of systems such as the GPS network or the computerized logistics system that support the F-35 fleet.

Though policy guidelines are slowly catching up to capabilities in cyberspace, and cooperation among other arms of government, the Intelligence Community, and international partners is at an all-time high, there is work left to do, he said.

“Fly, fight, and win in air, space, and cyber,” Hyten noted. “It’s that simple.”

Marc V. Schanz is the director of publications for the Mitchell Institute for Aerospace Studies.



SAVING THE GOLDEN HOUR

By Elise Steinberger

The ancient Greek physician Hippocrates once said, “War is the only proper school of the surgeon.” The past 15 years of combat in Iraq and Afghanistan have been that for us, said Brig. Gen. Kory Cornum, Air Mobility Command surgeon.

After all these years of war, Air Force medical professionals have gotten very good at evacuating, transporting, and treating traumatically injured troops in less than an hour, a concept known as the “golden hour.” This timeliness has come despite dealing with long distances, remote austere locations, and mountainous terrain, specifically in Afghanistan.

Much improved aeromedical evacuation (AE) techniques have led to higher survival rates in recent decades. The survival rate hovered between 70 and 80 percent in all of America’s 20th century wars. In the 1991 Persian Gulf War the survival rate was typical, at 76 percent.

Fast forward to the war on terror, and by the mid-2000s injured troop survival rates jumped to 90 percent, thanks to better AE, including faster

action and en route care. But survival rates for the traumatically injured continued to lag.

In 2009 in Afghanistan, the survival rate of critically injured troops was at 86 percent, according to a September 2015 study led by the Army Institute of Surgical Research. With a renewed focus on the golden hour, the traumatic injury survival rate has increased to 90 percent.

“The golden hour is great, the golden 50 minutes is better, the golden 40 minutes is better than that, the golden 30 minutes is better than that. ... The sooner you can take care of somebody, the better,” said Cornum. “Military medicine is set up from the beginning, when you go to combat, with getting care to the injured person as quickly as possible.”

According to the study, from the start of combat in Afghanistan, the military reduced median transport time from 90 to 43 minutes. Now that combat has

officially ended and operations have decreased in Afghanistan, maintaining readiness of these highly skilled units is key.

So now comes the hard part. “For much of US military history, after each conflict ends, the focus of care for [the] military medical corps transitioned to less acute care, and the lessons learned were not systematically preserved or formally passed on to inform military medicine during the next conflict,” stated a March 2015 Defense Health Board report. “In the recent conflicts in Afghanistan and Iraq, many lessons have been learned in trauma and injury care, providing an opportunity to amend past missed opportunities by documenting, validating, and disseminating this knowledge.”

“That’s why we wear the uniform,” said Lt. Gen. Mark A. Ediger, Air Force surgeon general. “We keep our readiness to meet the requirements for deployable capabilities at the level they need to be for the Air Force mission. That’s the top priority.”

Cornum said the Air Force uses a “multiprong approach” to ensure all

aspects of readiness, including working at home hospitals to keep clinical skills current. “You do as much as you can at home. You stay as busy as you can.”

Air Force medical professionals employ their medical skills in a civilian setting when not deployed. However, Cornum said, they must also prepare for the aspects of medicine that are unique to combat.

“Civilian trauma and war trauma are not quite the same—they’re similar. There’s no real place to [experience] war trauma,” Cornum said.

To give medical professionals experience with treating trauma, the Air Force embeds them in civilian trauma centers in Baltimore; St. Louis; Cincinnati; Las Vegas; Sacramento, Calif.; and Birmingham, Ala. These periodic rotations, for a week or two at a time, are part of predeployment and general readiness training.

“It’s a constant thing, plus the ‘just-in-time’ training,” Cornum said.

Maintaining uniformity of care with allies is also important. Ediger said that with allies in Afghanistan, “we were all using the same guidelines within the coalition, whether the team providing the care was German or British or Dutch or US.”

With the reduced operational tempo, Ediger said international allies periodically work together to maintain readiness. “We have an exercise every year with the British military health services where we actually exercise in stabilizing and moving trauma by air,” he said.

Left: MSgt. Scott Wilkes (l) demonstrates a device that reads vital signs to an Iraqi air force captain during an aeromedical evacuation mission over Iraq in November 2008. USAF strives to maintain uniformity of care with allies.

Care Evacuation Team personnel for unique in-flight medical scenarios.

“We have it set up so that it feels like you’re [in] the back of an airplane—there’s noise and vibration. We can make it dark or light, smoke, and all those kinds of things, so that you can get used to working in the back of an airplane,” Cornum said.

LOOKING FORWARD

Col. Virginia Johnson, consultant for nurse anesthesia in the Office of the Air Force Surgeon General, has deployed three times with a Tactical Critical Care Evacuation Team and was part of the first TCCET in 2011. These units bring casualties to forward surgical teams on the ground or from forward surgical teams to sites of further medical care.

According to Johnson, having advanced medical providers on TCCETs offers care in the air, beyond “damage control and resuscitation”—such as managing noncompressible hemorrhage or “something you can’t put a tourniquet on,” giving blood, and administering certain drugs—during transport.

Johnson trained with an emergency room physician and another nurse anesthetist, who then deployed separately to Afghanistan. Cornum said

“We have the capability now in the US military to send critical care capability all the way to the point of injury, to move that patient—initially by rotary wing—and then to do the subsequent aeromedical movements and [air evacuation] with critical care capability in place,” Ediger said.

According to Cornum and Ediger, Air Force leadership is working on a strategy for implementing rapid medical response and air movement in logistically challenging regions, such as Africa and the Pacific.

“Unless you’re traveling in the space shuttle,” the traditional golden hour rule becomes difficult for especially long distances, without careful advanced planning. That’s why Air Mobility Command, Air Combat Command, and Air Force Special Operations Command are working together to ensure teams adapt as necessary and stay agile, ready, and capable, said Cornum.

Researchers are working on capabilities for pre-hospital surgical stabilization. Other factors such as operational scenario, geography, and security could impact the outcome, said Ediger. “Our interest is always in pushing more trauma stabilization capability into the pre-hospital environment because we know that will always be important, but there are a lot of factors that are weighed in terms of setting the medical lay-down in an operational theater.”

For example, as the way the forces are engaged changes, medical teams will also shift, said Ediger. “We’re working on an adaptation of the mo-

The Air Force is working to ensure it preserves its lifesaving aeromedical evacuation skills.


The Air Force uses patient simulation technology to expose medical professionals to different scenarios and a broad spectrum of injuries. “The military is really heavily invested in simulation. All of our hospitals have really great simulation centers,” Cornum said.

The Cincinnati simulation center is outfitted to specifically train Critical Care Air Transport and Tactical Critical

future iterations will remain small, with three to six medical providers, while technology might eventually allow medical specialists at home to apply their expertise remotely.

Though the concept continues to evolve, Johnson said the more these units have the capability of “bringing the emergency room to the patient, instead of bringing the patient to the emergency room,” the more optimal they become.

bile surgical team so that we would combine the capability to do surgical stabilization with the capability to actually provide critical care support during the air movement.”

Johnson said she looks forward to seeing how the TCCETs evolve, and Cornum said innovating and adapting to new challenges is central. “You have to keep thinking and trying” to improve outcomes, Cornum said. 

Command and Control Evolution

By John T. Correll

The conduct of war was essentially a local affair until electronics and airpower changed the game.

To command and control his army, Napoleon went with his soldiers all the way to Moscow and back.

Painting by Adolph Northen

on



Command and control, as the term is generally understood today, is a relatively new concept in warfare. It will not be found, for example, in Napoleon's *Principles of War*. To control military operations in Napoleon's day, the commander had to be present in the battle area. Napoleon went where his army did, all the way to Moscow in 1812.

Battle was essentially a matter of firepower and maneuver. Sometimes the cavalry could discover useful information about the enemy. Sometimes not. Communications were slow, often measured in days if not weeks. Andrew Jackson's famous defeat of the British in the Battle of New Orleans, Jan. 8, 1815, happened more than two weeks after the Treaty of Ghent was signed in Belgium to end the war.

By 1850, telegraphy made it possible to send messages over long distances but its reach was limited by the availability of lines and poles. It was not until the 20th century that the combination of electronic technology and airpower provided the means to communicate with the force wherever it was, collect information, interpret it, and use it for command and control at all levels of war.

As recently as World War II, the conduct of war was in many ways a local proposition. Messages could be exchanged between headquarters and distant locations, but headquarters seldom had timely information. The standard practice was to assign broad objectives and wait for after-action reports.

The Army relied on the concept of "mission command" in which orders provided only enough detail to establish intent and objective. Local commanders took it from there. Similarly, the Army Air Forces in World War II developed the tenet of "centralized control-decentralized execution" but mainly took it to mean that airpower should be controlled by airmen, not ground commanders. The broader and more important interpretation did not evolve until later.

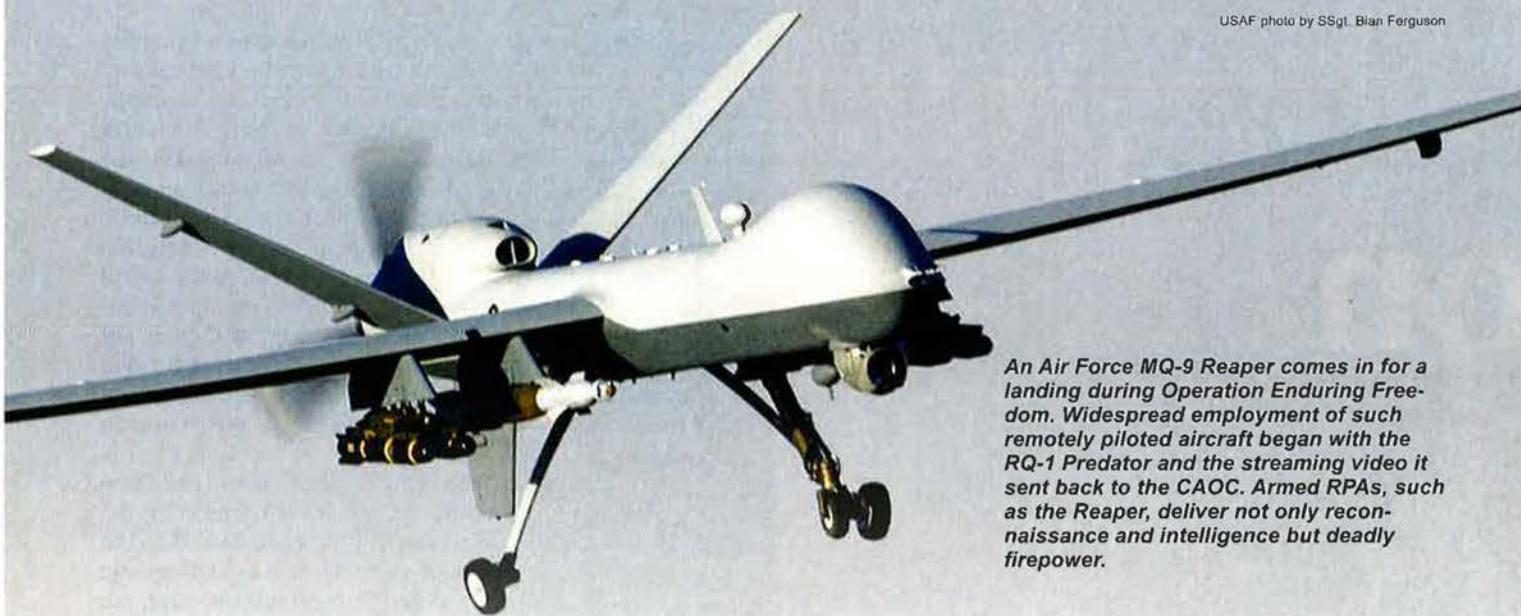
The introduction of radar in the Battle of Britain in 1940 was a major milestone, but the big breakthrough in command and control came in the 1950s with data-crunching electronic computers that rapidly sifted and merged information inputs from multiple sources. The 1980s brought another pivotal development, digital data links that allowed a network of users to receive and share information.

There was a running quandary about what to call the growing function. The terminology evolved from command and control to "C3" (adding communications) to C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance).

Today, the superscript and two of the Cs have mostly been eliminated. The prevailing usage is C2 rather than C4 and ISR is generally treated as a separate but related subject.

In the 75 years since World War II began, command and control has become a critical factor in war, as important as the weapons themselves. The current USAF vision statement, adopted in 2013, recognizes five core missions. One of them is command and control; another is intelligence, surveillance, and reconnaissance.

The demand for ISR is so great that the Air Force strips money from other parts of the budget to provide it. The technology is so good that it has created its own danger: the temptation to micromanage from afar, dubbed



An Air Force MQ-9 Reaper comes in for a landing during Operation Enduring Freedom. Widespread employment of such remotely piloted aircraft began with the RQ-1 Predator and the streaming video it sent back to the CAOC. Armed RPAs, such as the Reaper, deliver not only reconnaissance and intelligence but deadly firepower.

“reachforward.” Accordingly, Air Force leaders make a special point of maintaining “decentralized execution.”

DAWN OF THE TECHNOLOGY

In the opening hours of World War I in 1914, a British ship fished up and cut five of Germany’s trans-Atlantic cables in the North Sea. Two weeks later, they cut Germany’s last cable, between Africa and Brazil, and hauled away a 30-mile section of it. For the remainder of the war, the Germans had to rely on the new technology of “wireless,” or radio, for overseas communication. The British promptly intercepted the signals and figured out how to decode them.

Both the radio and the airplane made their combat debut in World War I but they were not advanced enough for real command and control. The radios were big and heavy, and it was difficult to shield them from interference from the airplane engine. Reconnaissance pilots found it easier to drop a handwritten note by parachute in a tube or pouch. Radios did not become standard on military airplanes until the 1930s.

The printing telegraph, also known as the teleprinter or teletype, came into use between the world wars, but the military networks were not extensive. Contact with many locations depended on the radioteletype, which connected two or more electromechanical teleprinters by radio rather than a wired link.

Military operations of the 1930s did not require elaborate command and control and the armed forces did not expend much time and money on it. The famous story of the last Pearl Harbor

war warning illustrates the weakness of military communications as World War II began.

Messages, including several previous “war warnings,” had been flowing back and forth for weeks between Washington and the military commanders in Hawaii. However, on the morning of Dec. 7, 1941, Gen. George C. Marshall, the Army Chief of Staff, scribbled a final such warning for Lt. Gen. Walter C. Short, commander of the Hawaiian Department.

Just before noon—which was 6:30 a.m. in Hawaii, which was on a half-hour time zone—the note was given to the War Department signals center for dispatch “at once” by the “fastest safe means.” The security of the scrambler telephone was suspect and atmospheric conditions were interfering with the Army’s own lines to Hawaii.

Consequently, the message went by Western Union commercial service. It reached Honolulu at 7:33 a.m. local time (22 minutes before the attack) but was not delivered by the motorcycle messenger until 11:45 a.m. After decoding, it was handed to Short’s adjutant at 2:58 p.m.

It made no real difference, of course. There had been previous war warnings and besides, commanders in Hawaii knew as much about the situation as Washington did. The significance was in what it revealed about the state of military command and control.

THE WORLD WAR II EXPERIENCE

In 1940, radar was the critical factor that enabled the Royal Air Force to beat the odds and defeat the Luftwaffe in the

Battle of Britain. Radar sites along the coast fed reports into the RAF command center near London, which then directed Spitfire and Hurricane fighters to meet the attack at the most effective time and place.

Although radar was used to advantage by both sides throughout the war, coverage was limited by its inability to see beyond the curvature of the Earth. The horizon was only about 15 miles away.

Longer-range aircraft allowed deep reconnaissance, but it did not always occur. When the US Ninth Air Force made its big attack on the Romanian oil refineries at Ploesti in 1943, there was no reconnaissance ahead of time for fear that an overflight would alert the enemy. Thus the bomber crews did not know that the Ploesti defenses had been improved to include 250 first-line aircraft and more anti-aircraft guns than were deployed around Berlin.

More than half of the B-24s that took off for the mission were lost over the target area or so damaged that they never flew again.

Long-range communications developed gradually. The Army Command and Administrative Net moved westward from Hawaii to Australia, India, New Guinea, and eventually the Philippines. Stations in north Africa were added to those in Britain. The air forces had their own supplementary network, the Army Airwaves Communications System.

For security reasons, wire was preferable to radio and was used extensively within the United States, but radio was the only option to connect with overseas terminals. In 1943, the

land line operation went as far as San Francisco. West of there, messages went by radioteletype.

In the first part of the war, the network was slow and overloaded, with delays of hours or sometimes days in getting messages through to field commanders and receiving answers. By 1945, the system was handling an average daily load of about 50 million words, and the links included a terminal in the President's train as it moved around the country. Eventually, secure voice communications improved enough for Allied leaders to talk to each other regularly over long distances.

Early on, the United States broke the Japanese imperial code and the British decrypted the German communications system. As in World War I, the Allies were able to read the enemy's mail.

SAGE AND ITS FRIENDS

Nuclear weapons brought new imperatives for command and control but the armed forces were slow to react. The Air Force, responsible both for delivery of the atomic bomb and air defense, was more interested than the other services and set up a command post in the Pentagon in 1950. There was a direct phone line to the White House. It was the closest thing to a national command post until the Joint War Room was established in 1960,

expanding into the National Military Command Center in 1962.

In 1956, the Defense Department announced the existence of the Semi-Automatic Ground Environment, or SAGE, a string of air defense centers that were the earliest variants of modern command and control.

SAGE centers were huge multistory blockhouses built around Whirlwind computers, each of them running on 50,000 vacuum tubes. A battle staff followed the flow of surveillance and warning information on radar scopes and electronic situation maps and scrambled fighter-interceptors as required. SAGE remained in business until 1983, by which time the technology was obsolete and the threat had shifted from bombers to ICBMs.

In 1957, Strategic Air Command moved into its famous underground command post, built to survive anything less than a direct hit by a nuclear weapon. For the duration of the Cold War, SAC was synonymous with command and control in the popular understanding.

The US launched the world's first communications satellite, Project Score, in December 1958. It broadcast a recorded Christmas message from President Dwight D. Eisenhower from space for 13 days before the battery failed.

In 1963, the Defense Department attempted to pull all of its command and

control assets together in a sprawling computer-based network called the Worldwide Military Command and Control System, or WWMCCS. The primary mission of WWMCCS was support of the national command authorities, with the needs of all other participants secondary. It never worked smoothly, though, because the component systems, built for individual purposes, were not interoperable. WWMCCS was finally replaced in 1996 by the Global Command and Control System.

FORCE MULTIPLIERS

In the Vietnam War, attention returned to the command and control of general purpose forces. The conflict also marked the peak of analog military communications. AUTODIN, which began in 1968, was the first generation of digital communications.

The Air Force operated several command posts on the ground—notably “Blue Chip” in Saigon—supplemented by Airborne Battlefield Command and Control Center EC-130s and “College Eye” EC-121 radar aircraft, which warned fighters over North Vietnam of approaching MiGs and kept US aircraft from straying across the border into China.

In addition to regular reconnaissance by RF-4s and other aircraft, the Air Force experimented in Vietnam with some

An E-3 AWACS, such as this one, can look out for hundreds of miles, spot enemy aircraft, and direct friendly aircraft to enemy positions.



USAF photo by Val Gempis



Command and control was seen in a new light after the Gulf War, in which Lt. Col. David Deptula (center)—later USAF's first deputy chief of staff for ISR—was the principal attack planner for the air campaign.

unusual methods. Among these were Buffalo Hunter reconnaissance drones—30 years before the RQ-1 Predator—and 20,000 acoustic and seismic sensors seeded along the Ho Chi Minh Trail and monitored by orbiting EC-121s.

Technology did not yet provide officials in Washington with a full picture of the war but that did not stop President Lyndon B. Johnson from micromanaging the air operation, down to the selection of individual targets.

Elsewhere, the Air Force was putting the finishing touches on the E-3A Airborne Warning and Control System, which would revolutionize air combat. AWACS, operational in 1977, mounted a rotating radar dome on a Boeing 707 airframe.

The radar reached out for more than 250 miles, beyond the curvature of the Earth, to see every airplane in the air. It was also able to pick low fliers out from the hodgepodge of "ground clutter" returns, which previous airborne radars could not do. Operators aboard AWACS could direct the air battle with great effectiveness and economy, establishing the E-3A's value as a force multiplier.

Another innovation, with vast importance in later years, was the Joint Tactical Information Distribution System in the 1970s. It divided every second of time into 128 segments, each allocated to a user for transmission of short data blocks. There were no central nodes to disrupt or destroy.

JTIDS evolved into the Link 16 digital information network, which Gen.

Gilmary Michael Hostage III, then commander of Air Combat Command, described as "the backbone of our modern tactical command and control architecture."

FROM THE GULF TO THE CAOC

The Gulf War of 1991 was a major turning point. The last big air action had been in Vietnam, and in the 20 years that had elapsed, the Air Force had not put any great emphasis on the conduct of command and control.

During the Desert Shield preparation phase in 1990, the tactical air command center in Riyadh was initially in an inflatable shelter—the outdated "Rubber Duck," familiar from Vietnam days—set up in a parking lot until space was made for it indoors.

Even so, the bumper crop of modern technologies gave the coalition an unbeatable edge. Desert Storm is sometimes described as "the first information war" or "the first space war." Imagery, intercepts, and linkages from all kinds of aircraft and satellites were in daily use. The E-8 JSTARS, which tracked enemy forces moving on the ground as AWACS did with forces in the air, was rushed into action while it was still under development.

The Iraqi command and control network was struck in the opening night of Desert Storm. By sunrise, its no longer existed, wiping out Iraq's capability to mount a coherent military response.

The principal attack planner for the Desert Storm air campaign was Lt. Col.

David A. Deptula, who 15 years later would become the Air Force's first deputy chief of staff for intelligence, surveillance, and reconnaissance.

The Gulf War demonstrated the critical importance of command and control, and Air Force leaders were quick to respond. Air operations in Bosnia in 1995 were effectively directed from a combined air operations center. One of the sensors feeding in battlefield information was the new MQ-1 Predator unmanned aerial vehicle.

For the air campaign in Kosovo in 1999, the CAOC had more than tripled in size and was the nerve center of the operation. "Streaming video," live from Predator, allowed rapid targeting and retargeting. Gen. John P. Jumper, commander of US Air Forces in Europe and a future Chief of Staff, declared that the CAOC had become a weapon system in its own right.

Confirming Jumper's judgment, the AN/USQ-163 Falconer Air and Space Operations Center was established as the standard command post configuration. Falconer CAOCs now support commanders in various theaters. In 2003, the big CAOC for the Middle East moved from Prince Sultan Air Base in Saudi Arabia to Al Udeid Air Base in Qatar.

REACHBACK/FORWARD

By the late 1990s, digital data links made the procedure known as "reachback" possible. Information going into the CAOC could just as easily be sent to the United States. Operators half a world away could refine and analyze the data and have targeting information on its way back to the theater in 30 minutes. This meant that hundreds of people no longer had to deploy forward. Their tasks could be done as well, if not better, from ISR centers at home.

In 2002, the Air Force adopted a concept of "remote split operations" in which Predators were launched and recovered by crews at forward locations but flown on their missions by pilots in the United States using satellite links. Shortly thereafter, the Distributed Ground System created online "chat rooms" with ISR analysts in the United States joined in a control loop with the CAOC and others in the theater.

Reachback lost some of its credibility in 2001 when Army Gen. Tommy A. Franks of US Central Command decided to run Operation Enduring Freedom from his headquarters in Tampa, Fla., rather than relocate to the theater, as Gen. H. Norman Schwarzkopf Jr. did in Desert Storm.



The Combined Air and Space Operations Center at Al Udeid AB, Qatar, provides command and control of airpower throughout Iraq, Syria, Afghanistan, and other countries in the region.

The CENTCOM staff watched live video links from Predator and individual strike aircraft and made decisions about targeting and other matters eight time zones away. In one instance, the legal officer persuaded Franks to veto a target on the grounds that it might be a trick to sucker in a strike that might have legal ramifications. As a result, an important convoy was not struck.

Conversely, CENTCOM intelligence, demanding “total certainty” of attack results, forced the re-attack of targets that were already destroyed.

The benefits of a strong in-theater CAOC augmented by reachback were obvious, but Air Force leaders felt a need to adjust the balance with renewed emphasis on the principle of centralized control-decentralized execution. It was important to leave battle area decisions, where possible, to those closest to the action.

“We need discipline to ensure that ‘reachback’ does not become ‘reach-forward,’” said Deptula, who retired in 2010 as a lieutenant general and is now dean of the Air Force Association’s Mitchell Institute for Aerospace Studies.

The traditional terminology is misleading. “Centralized control should be centralized *planning*,” Deptula said. “It’s not control. You’ve got to have a coherent plan that’s focused on the end game. You also have to enable those who are executing it, who have the greatest degree of situational awareness, to act within the guidance to capitalize

on the immediacy of what’s going on to support the overarching objective.”

In an article for *Air & Space Power Journal*, Deptula said, “Information synthesis and execution authority must be shifted to the lowest possible levels, and senior commanders and their staffs must discipline themselves to stay at the appropriate level of war.”

INTO THE CLOUD

Former Air Force Secretary Michael W. Wynne believes that large C2 and ISR platforms like AWACS and JSTARS will be too vulnerable to survive in future conflicts and their functions should be redistributed. Stealthy aircraft like the F-22 and the F-35 can and should take on more of the ISR role, he says.

Deptula agrees but predicts that “it’s going to happen over a longer period of time than either Mike Wynne or I would like.”

“The era of specialized aircraft is over, as technology has moved on and resource constraints have grown,” Deptula says. Modern airplanes should be thought of as sensor-shooters, he says. “Every aircraft should have a sensor function,” he says. “Most of them will have a shooter function. They should be viewed as nodes in an integrated ISR-strike-maneuver-sustainment complex where the underlying operative is the

ability to ubiquitously and seamlessly share information.”

The way to achieve this integration is the “combat cloud,” of which Deptula is the leading advocate. “The combat cloud concept is somewhat analogous to ‘cloud computing,’ which is based on using a network (e.g., the Internet) to share information rapidly across a highly distributed, self-evolving, and self-compensating network of networks,” he says.

“However, instead of combining the computing power of multiple servers, the combat cloud combines the war-fighting power of combat systems by capitalizing on C2 and ISR networks to quickly exchange data derived from any source across an all-domain architecture of sensors and shooters to increase their effectiveness and attain economies of scale.”

Command and control continues to grow. In recent years, USAF force structure has declined but its ISR assets have almost tripled.

Between 2001 and 2015 the number of ISR missions launched per day has increased by an incredible 2,300 percent. Most of that has been by remotely piloted aircraft that can loiter over targets for an entire day.

One of the more recent developments is “Gorgon Stare,” a wide-area capability on long-endurance MQ-9 Reaper RPAs. Instead of the narrow view provided by Predator, Gorgon Stare imagery takes in a swath of 64 square miles.

In 2014, the Air Force ISR Agency was upgraded to 25th Air Force under Air Combat Command. It is billed as “the one-stop shop for operational ISR within the Air Force,” also responsible for electronic warfare and airborne national command and control.

“During the Desert Storm air campaign, aircrews were assigned the vast majority of targets to be attacked before they took off,” Deptula said in 2014. “Today, over Afghanistan, the vast majority of such targets are not specified to the aircrews delivering the effects—and often remain unknown to planners—until well after the sensor-shooter aircraft are airborne.”

“Network-centric, interdependent, and functionally integrated operations—performed by the right mix of available forces, regardless of service, are the keys to future success in war fighting.”

John T. Correll was editor in chief of Air Force Magazine for 18 years and is now a contributor. His most recent article, “Chennault and Stilwell,” appeared in the December 2015 issue.

By Robert S. Dudley

Reading Putin

"I am not sure what he [Russian President Vladimir Putin] is thinking, but I can look at what he is doing and derive from that what we should be thinking about on our side: He's building forces. The fact he has codified [a threat] in this language, publicly, is a message. He sent us a message."—*USAF Gen. Philip M. Breedlove, NATO Supreme Allied Commander, Europe, on the new Russian defense document naming US as a threat, Stars and Stripes, Jan. 4.*

Deterrence and Reassurance

"It was very important to introduce the F-22 [into NATO territory] to see how we could fly it in the airspace and how we could support it. ... I don't know if it's deterring Russia or not, but I do know that it's assuring our partners."—*Gen. Frank Gorenc, commander of US Air Forces in Europe, on 2015 stationing of F-22s in Germany, Poland, and Estonia, Air Force Times, Dec. 28.*

Black Flag

"The black flags of [ISIS] still fly over Mosul, Raqqa, and other key parts of Iraq and Syria. This threat is also metastasizing across the Middle East, North Africa, and South Asia. And it now poses a more direct threat than ever to our homeland and that of our allies. ... If our goal truly is to destroy [ISIS] in the near future, rather than kick the can down the road for others to deal with, the United States must play a far more active role than we are now, especially in supporting local Sunni Arab forces to take the fight to [ISIS] themselves."—*Sen. John McCain (R-Ariz.), statement, Dec. 28.*

Small Step, Giant Leap

"Falcon 9 back in the hangar at Cape Canaveral. No damage found. Ready to fire again."—*SpaceX President Elon Musk, message on Dec. 31, 10 days after historic launch, re-entry, and upright landing of a reusable booster.*

Damn, They Exclaimed

"They [traditional US space booster contractors] are all trying to play catch-up now, because their vehicles are suddenly too expensive to compete with SpaceX over the near- or mid-term. There is no way that a company that has expendable launch vehicles

can compete effectively over the long term."—*Marco Caceres, Teal Group space expert, Defense News, Jan. 6.*

Are You Certain?

"What we're doing, every day today, is producing super-stupid entities that make mistakes. Machines are dangerous because we are giving them too much power, and we give them power to act in response to sensory input. ... These rules are not fully thought through, and then, sometimes, the machine will act in the wrong way—but not because it wants to kill you."—*Boris Katz, MIT researcher in field of computer-driven artificial intelligence, quoted in Washington Post, Dec. 27.*

Folders No More

"It's been a great operational day. We're hitting them [ISIS fighters in Ramadi, Iraq] with combination punches now. They're getting hit in multiple places simultaneously. ... What this shows is that the Iraqis have moved from an army that folded on initial contact [with ISIS] in the summer of '14 to an army that has been able to conduct a complex operation in a large, built-up area. This is the biggest thing the Iraqi army has done. Period."—*US Army Col. Steve Warren, defense spokesman in Iraq, on the Iraqi army's recapture of Ramadi, formerly an ISIS stronghold, USA Today, Dec. 27.*

Reaching Out and Touching

"It's way past time [to honor operators of US remotely piloted aircraft]. People should be acknowledged and rewarded for their contributions to accomplishing security objectives, regardless of where they are located."—*Retired USAF Lt. Gen. David A. Deptula, on new military decoration for service members who affect the battlefield from afar, New York Times, Jan. 6.*

No More Hugging the Bear

"If you look at Russia's actions all the way back to '08—in Georgia, in Nagorno-Karabakh, in Crimea, in the Donbass, and now down in Syria—we see what most call a revanchist Russia, [which] has put force back on the table as an instrument of national power. ... Now every soldier, sailor, airman, or marine that comes to European Command will be focused on redeveloping [a] high-

end kinetic fighting capability."—*USAF Gen. Philip M. Breedlove, NATO SACEUR, Washington Free Beacon, Jan. 7.*

Seismic, as in Earth-shaking

"America's armed forces are the most highly trained, best equipped, and most experienced in the world, but the margin of their battlefield superiority is eroding. ... [There] is a consistent trend that powerfully influences the nature [of] global security competitions. That trend is the slow but steady erosion of America's military-technical superiority. ... Unless that trend is arrested, America's armed forces will find it more difficult to prevail in future conflicts. ... The United States can no longer rest its defense strategy on the confidence that it enjoys a qualitative military edge against its potential future adversaries. That the United States can no longer base its military planning on its presumed technological superiority is a seismic disruption in military affairs—one not yet fully grasped by many in the defense community."—*From "While We Can—Arresting the Erosion of America's Military Edge," by defense analyst Shawn Brimley, Center for a New American Security, December 2015.*

Going Up?

"I've trained in every environment—jungle, the desert, mountains, cold weather, but I've never really trained well in an urban environment. ... We have to figure out how we are going to fight in this environment. ... We are going to have these megacities that are ringed with these shanty towns, and we are going to fight there, because it will be the people who are uneducated, unemployed, the young men who are not married [who] are mad about their lot in life. We talk about the 'three-block war,' but we are moving quickly to the 'four-floor war.' We are going to be on the top floor of a skyscraper ... evacuating civilians and helping people. The middle floor, we might be detaining really bad people that we've caught. On the first floor we will be down there killing them. ... At the same time, they will be getting away through the subway or subterrain. How do we train to fight that?"—*USMC Brig. Gen. Julian Alford, Marine Corps Warfighting Laboratory commander, Defense News, Dec. 28.*



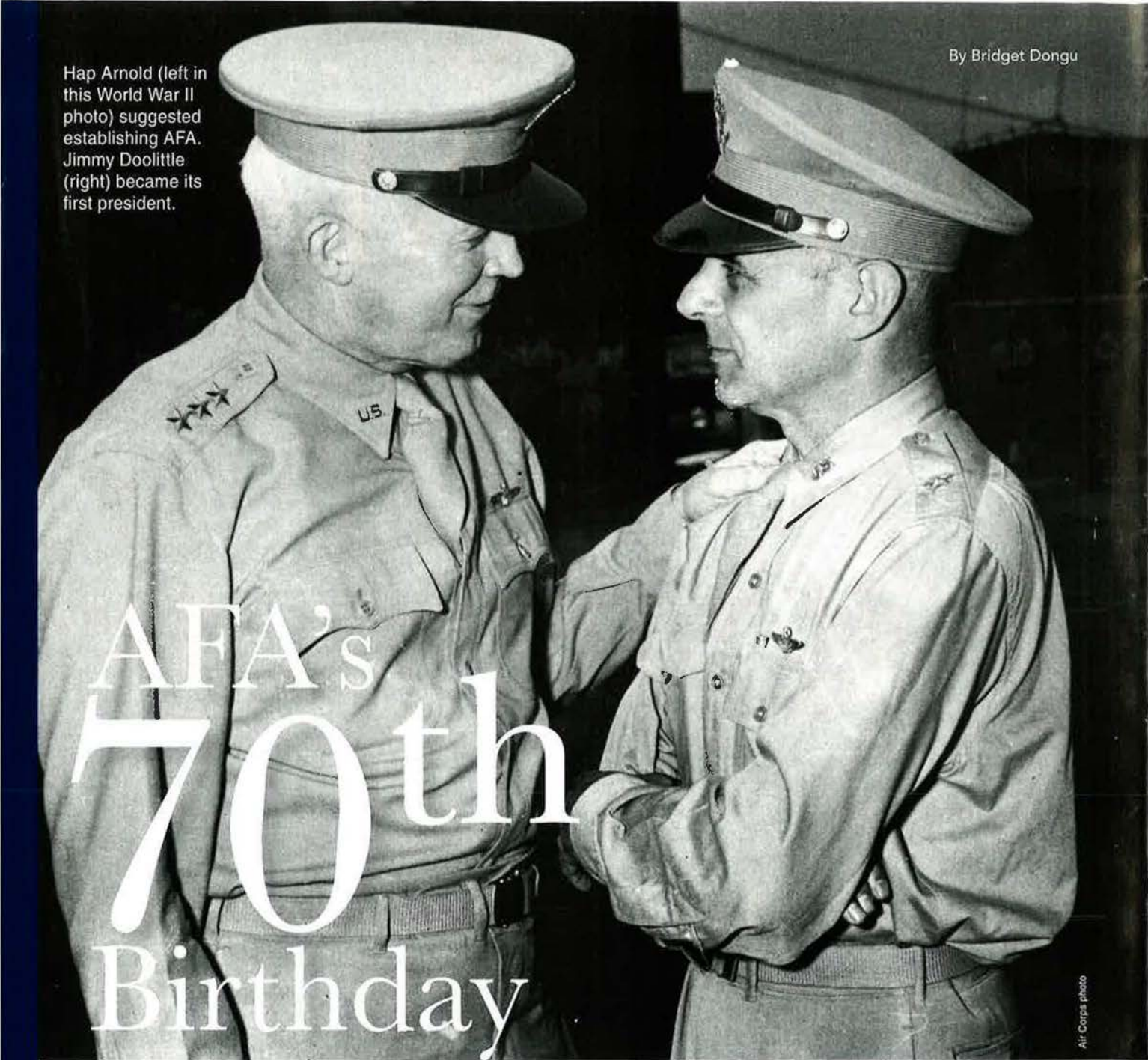
Published by the Air Force Association

WINGMAN



AFA Celebrates 70 Years

Hap Arnold (left in this World War II photo) suggested establishing AFA. Jimmy Doolittle (right) became its first president.



AFA's 70th Birthday

70 years of supporting the Air Force family.

On Feb. 4, 2016, the Air Force Association celebrates its 70th birthday. We look back on these seven important decades to highlight AFA's heritage, founding, and how we have supported the Air Force throughout the years.

Following the end of World War II, Gen. of the Army Henry H. "Hap" Arnold searched for a way to keep Army Air Forces veterans together and to advocate for a strong, independent Air Force. This task planted the seed for the creation of AFA.

1940s

Arnold's first task was to establish a grassroots network of volunteers to spread the word about AFA. Lt. Gen. Jimmy Doolittle was selected as AFA's first president, and the association was incorporated in Washington, D.C., on Feb. 4, 1946. In July 1946, AFA published its first issue of *Air Force Magazine*, which had previously been an official Army Air Forces publication. AFA was created with the objective of establishing the Air Force as a separate service branch from the Army. AFA achieved this goal on Sept. 18, 1947, when the National Security Act of 1947 officially established the independent Air Force.

1950s

AFA continued its commitment to the Air Force by working to highlight the accomplishments of the enlisted force. At AFA's 10th National Convention in 1956, the Outstanding Airmen of the Year (OAY) Program was established to showcase the dedication and contributions of the enlisted force. The program has evolved, and in its current format OAY are honored at a formal dinner at AFA's Air & Space Conference and at other events during the year. To date there have been 820 Outstanding Airmen of the Year.

1960s

AFA continuously searches for new ways to support airmen. One of its proudest achievements has been its work to help create the Community College of the Air Force in partnership with the US Office of Education (now the Department of Education). In 1967, AFA's Aerospace Education Foundation undertook an initial pilot program called "Project Utah" to demonstrate the feasibility of using Air Force technical training courses for college credit. This paved the way for securing accreditation for the Community College of the Air Force.

1970s

The welfare of airmen has always been paramount to the association. AFA took the plight of American prisoners of war and those missing in action in North Vietnam directly to the American public through articles in *Air Force Magazine*, one printed in conjunction with *Reader's Digest*. This put the issue before Congress. *Air Force Magazine* also published an "MIA/POW Action Report" each month, from June 1970 to September 1974. AFA simultaneously began a grassroots letter writing campaign aimed at bringing attention to the plight of the MIA and POWs. Beginning in early 1973, the POWs returned home.

1980s

In January 1985, AFA held its first Tactical Air Warfare Symposium in Orlando, Fla. Later in the decade, to honor the veterans from World War II, the Korean War, and the Vietnam War, the association hosted the "Gathering of Eagles" in Las Vegas in 1986. This five-day program focused on the Air Force's heritage and the capabilities of airpower.

1990s

The association learned that families seeking military honors for veterans' funerals were finding it difficult to secure this final salute. AFA took the issue to Capitol Hill, and 587 delegates from the Air Force Association personally delivered messages to Congress on the necessity for deceased airmen to receive burial honors. The congressional-education effort led to the issue being included in the Defense Authorization Act of 1999. The act stated that an honor guard detail of no less than three people will honor a veteran's passing.

2000s

One of AFA's most visible and beautiful accomplishments has been the creation of the Air Force Memorial. Before the construction of what is now a landmark in the National Capital Region, the Air Force was the only service branch without a memorial in the Washington, D.C., area. The association's role in creating the memorial was immense, as a group of AFA volunteers raised nearly \$50 million to build it. The Air Force Memorial was completed in 2006 and was dedicated by President George W. Bush. The Air Force Association continues to support the memorial by managing its day-to-day operations.

2010s

AFA remains committed to the well-being and support of wounded, ill, and injured airmen. In 2011, under a formal memorandum of understanding with the Air Force, AFA established the Wounded Airman Program to provide much needed support to wounded airmen. The association is especially proud that 100 percent of funds donated to AFA's Wounded Airman Program are used in direct support of wounded airmen.

For 70 years the Air Force Association has served as the Force Behind the Force. As we celebrate this birthday, we thank the dedicated members who have contributed to AFA's mission and participated in all that it has accomplished. ★

Bridget Dongu is AFA's senior manager, communications.

FROM THE MUD UP

TACP school calls Lackland home.

Imagine standing in a pit of mud, staring straight ahead. It's 6 a.m. and you wait apprehensively for direction from your instructor, who stands on a wooden platform before you.

"Morning, flight!" bellows the instructor. "What are you?"

"Gung ho!" comes the response from you and your 39 classmates, in unison.

"How far?" shouts the instructor.

"All the way! Every day!" comes the answer.

The next hours are filled with push-ups, bear crawls, flutter kicks, painfully tedious time standards, consequences for not meeting those standards, and more personal attention from the instructors than requested.

Such begins 84 grueling, challenging days of training at the Air Force's Tactical Air Control Party Apprentice Course at its new location at JBSA-Lackland, Texas.

"From Day One, the course built up our intestinal fortitude. We learned to push beyond our known mental and physical limits," commented A1C Paul J. Cdebaca, who graduated in the first Lackland class last August.

Tactical Air Control Party airmen, known as TACPs, fight alongside Army soldiers, requesting and controlling precision close air support (CAS) for ground forces. Since the inception of this career field in April 1977, TACPs have repeatedly proved their worth on the battlefield.



USAF Photo by A1C Justine Rho

No clean T-shirts, anymore. A Tactical Air Control Party instructor from the 342nd Training Squadron leads students in push-ups last April. These airmen were among the first attending the TACP level three apprentice course at JBSA-Lackland, Texas.

Developing a TACP takes years, and the journey now begins at Lackland and its Medina Training Annex. Producing a TACP apprentice airman costs the Air

Force \$57,000 on average. The washout rate for trainees stands at 65 percent. The goal of TACP training remains quality over quantity.

TACP school used to call Hurlburt Field, Fla., home. Starting in 2006, however, the Air Force was unable to keep up with the Army's demands for TACPs with its setup at Hurlburt.

In 2011, the search began for a new location. Service officials settled on Lackland in 2013; production of TACPs there officially began last April.

The Air Force set aside real estate for the TACP instruction at Lackland and Camp Bullis, Joint Base San Antonio's geographically separated field training facility.

At Lackland, renovations are underway so the TACP training squadron's command building will accommodate up to 160 students. This space will provide the TACP school with six classrooms, a radio laboratory, digital CAS lab, 1,000-square-foot combatives room, and supply storage areas.

Medina Annex has a pool for TACP combat water survival testing and a shooting range for qualification tests.

At Camp Bullis, the TACP school has a dedicated compound with beddown facilities, a gymnasium, and plenty of land for the two field-training exercises now part of each apprentice class. There, instructors evaluate the trainees' ability to patrol, maintain 24-hour base security, land-navigate by vehicle and on foot, and

84 grueling, challenging days await airmen at the Air Force's Tactical Air Control Party Apprentice Course at its new location at JBASA-Lackland, Texas.

execute a mock CAS mission. During these activities, the course experiences the most attrition.

With the change in venue, the Air Force is improving training quality. This includes restructuring the curriculum and training objectives and aligning instructors more closely with students for the duration of the course. Those instructors now serve four-year assignments, and the Air Force has increased their numbers from 25 to 29. Further, the Air Force now vectors its best-qualified noncommissioned officers from across the service to the school to serve as instructors.

Recent graduate A1C Jonathon W. Bock said the "instructors maintained a high level of professionalism, yet never failed to demand the best from us. The quality of instruction was top-notch and on point."

Looking back, Cdebaca said the experience "gave us a taste of what the TACP profession expects from us. After days of exposure to harsh elements and with little sleep, we had to find a way to keep our composure and effectively use the tools we were provided to accomplish the mission."

The TACP community has a legacy of getting the job done no matter the circumstances. These airmen have been vital to US military operations, enduring numerous combat tours, destroying thousands of enemy combatants, and distinguishing themselves in service to their nation.

Now, there is a new foothold in San Antonio for their apprentice training. ☘

CMSgt. Matthew A. Nugent is commandant of USAF's Tactical Air Control Party School at JBASA-Lackland, Texas. He has been a TACP for 22 years and is a member of AFA's Alamo Chapter. MSgt. Eduardo Ramos is the TACP school operations superintendent.



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CHAPTER NEWS

By June L. Kim, Associate Editor

Updates from across the United States on AFA's activities, outreach, awards, and advocacy.

WILLIAM J. "PETE" KNIGHT CHAPTER

Teachers from California's Antelope Valley schools were in for a treat when they attended a workshop last fall at Edwards AFB, Calif. Workshop coordinator and William J. "Pete" Knight Chapter member Megan Tucker introduced model rocketry to the middle school and high school teachers.

"We had a literal blast at the teacher workshop," said Tucker, who teaches at Palmdale Aerospace Academy in Palmdale, Calif. "The teachers were flabbergasted and so excited." The whole idea of the "Blast Off Basics" Workshop was to get teachers "comfortable with using model rocketry in their classroom," she said, according to an Edwards Air Force Base news release.

Teachers spent the day learning about the history of rocketry, operating MQ-9-like simulators—unclassified, of course—and building their own rockets and launching them. "We had some great launches and some interesting failures," said Chapter Secretary Randolph H. Kelly. "Melted parachutes, shock cord failures, knot failures, and rocket fins that flew without their rockets."

All participants left with curriculum guides and science, technology, engineering, and math kits.

USAF photo by Rebecca Amber



At the workshop organized by the William J. "Pete" Knight Chapter, teacher Archana Venugopal from the Palmdale Aerospace Academy launches a model rocket.

GENESEE VALLEY CHAPTER

Silver Wings members helped out at the Mid-Atlantic Air Museum in Reading, Pa., last summer for the largest World War II air show in the country, according to Genesee Valley Chapter (N.Y.) member Frederick Miller. The annual "Gathering of the Warbirds" not only brings together historical aircraft but they also have live re-enactment battles, he said.

Members traveled to the air show, camped out, and helped taxiing aircraft on the runways. "It was an amazing experience being able to offer time to help keep people safe while they enjoyed watching these old birds fly again," said Miller, who is also a Silver Wings chapter vice president in New York.

When not being put to work, members got to spend time talking with pilots and re-enactors. The air show also held a 1940s-era swing dance on the first night and attendees showed up dressed for the occasion. "I can honestly say it felt like a step back in time," Miller said.

ALBANY-HUDSON VALLEY CHAPTER

In New York, the Albany-Hudson Valley Chapter held a dinner in November to honor eight local veterans from World War I and World War II. Only two, Richard Johnson and William Young, "are still alive and were present at the affair," said Ronald Campbell, chapter treasurer. The other veterans remembered were: Frank Addario, Thomas Coffee, Joseph August Ganser, Joseph Kucskar, Owen Soraghan, and Thomas Youngs. The chapter had wooden shadow boxes made for each veteran with medals and awards attached to the boxes, said Campbell. The dinner was organized by Chapter VP for Veterans Affairs John Mullen and his wife, Donna. Chapter President Mike Szymczak was the emcee, and the AFROTC detachment from Rensselaer Polytechnic Institute provided the honor guard. US Rep. Paul Tonko (D-N.Y.), AFA's Northeast Region President Maxine Rauch, New York State President Charles Rauch, and other officials attended the dinner.

MEL HARMON CHAPTER

The Mel Harmon Chapter helped honor veterans during Veterans Day ceremonies in Pueblo, Colo. Led by Chapter VP for Veterans Affairs John Saenz and Chapter VP for Membership Paul Maye, the event recognized 22 local veterans who died in the Korean War. A bell was rung for each veteran. The event also featured an F-16 flyover by the Colorado Air National Guard and "a four-ship formation of training aircraft." Later, a 21-gun salute and a presentation of the colors took place at Pueblo Community College. Maye pointed out that the ceremony exhibited "how involved the chapter is with veterans affairs."

Photo by Ray Brown



Two-war vet Steve Csogi (light blue shirt) of the Mel Harmon Chapter was in the spotlight at a Veterans Day event that the chapter helped sponsor. Chapter Membership VP Paul Maye spoke at two events that day.

MONTGOMERY CHAPTER

The Montgomery Chapter in Alabama hosted a cybersecurity training luncheon last fall in an effort to draw more awareness to CyberPatriot, AFA's national youth cyber education initiative. Evidently, the chapter knew what it was doing because after the luncheon, a staggering 45 CyberPatriot teams registered for the competition. Prior to the luncheon, the local area had only six teams in the cyber competition, according to a chapter news release.

CyberPatriot Commissioner Bernie Skoch was keynote speaker and he spoke on the critical nature of national security. "We have come to see that the STEM education issue [is] a national security issue now," he said. Lt. Gen. Steven Kwast, commander of Air University, also spoke at the luncheon and emphasized sustaining national cyber security through education and training.

Local cyber specialists from both the government and private sector attended and volunteered to become team mentors, reported the *Montgomery Advertiser* newspaper. More than 130 educators and mentors were there, including Maj. Gen. Joseph Vazquez, the national commander of Civil Air Patrol, and Col. Bobby Woods Jr., the director of the Air Force JROTC, said Susan Mallett, AFA state aerospace education VP.

Air University Foundation, Auburn University Montgomery Outreach, Civil Air Patrol, and Montgomery Education Foundation all sponsored the luncheon.

Photo by Keith Bodley



Pioneer Valley Chapter member Tim Day (center) clears branches during the chapter's annual work day at the Soldiers' Home in Holyoke, Mass. Volunteers moved furniture and appliances and did landscaping. "We don't mind getting dirty," commented Chapter Veterans Affairs VP Keith Bodley.

Photo by Bob Hale



Nevada Republican Gov. Brian Sandoval (left) presented Thunderbird Chapter VP Roberta Pike Oates (right) with an award recognizing her as Veteran of the Month. The ceremony took place in December in Las Vegas. Bob Hale, chapter aerospace education VP, attended the event. A retired senior master sergeant, Pike Oates belongs to numerous veterans organization and has been an AFA member since 1994.

Photo via Lt. Col. Jason Brock



The Gen. Bruce K. Holloway Chapter presented Amn. Charles Stephens with a \$500 scholarship during a 134th Air Refueling Wing Commander's Call at McGhee Tyson ANGB, Tenn. Stephens is studying microbiology at a local Community College and now a chapter member. L-r: Wing Commander Col. Thomas Cauthen, Chapter President Steve Dillenburg, Stephens, and State and Chapter Treasurer Polly Morrissey.

SARASOTA-MANATEE CHAPTER

Sarasota-Manatee Chapter members were busy in November participating in two Veterans Day parades. Chapter Treasurer Chester Harriman drove through the streets of Palmetto in a Ford Mustang convertible as part of the Manatee County parade, wrote Chapter Secretary Charles Shugg. The parade route ended at the county's Veterans Memorial where Chapter President Mike Richardson manned an AFA information booth. In the other parade of the day, chapter member David Downer Sr. drove in a Ford Mustang convertible, provided by Community Partner Sarasota Ford, through the streets of downtown Sarasota to the J. D. Hamel Park for Veterans Day ceremonies.

LANCE P. SIJAN CHAPTER

The Lance P. Sijan Chapter awarded scholarships to 10 students during a reception at the Space Foundation in Colorado Springs, Colo., last summer. The recipients of the scholarships ranged from high school seniors to college juniors. The high school recipients were: Andrew Roth, Cheyenne-Asia Hutto, Spencer Randell, Daniel Ziegler, Julie Henninger, Christina Reyes, and Mitchell Reddish. College recipients were: Emilie Loehr, Vivian Harmon, and Mary Allison. Students had to write an essay explaining why a nation's military is important in the modern world and how it compares to other instruments of power.

The scholarships were open to family members of the Total Force, retired Air Force, and Arnold Air Society and Silver Wings members, according to chapter VP Linda Aldrich. The awardees received varying amounts from \$500 to \$1,000.

The chapter also recognized high school seniors Emmanuel Pascual of Mitchell High School and Selena Quintanilla of Harrison High School with the Francisco Garcia Scholarship. This is a state-level scholarship that awards students going into STEM fields. Pascual plans to study computer information systems and Quintanilla plans to study chemical and biological engineering.

At the same ceremony, the chapter announced two Teachers of the Year. Carah Barbarick of Manitou Elementary School and Rae Ann Dotter of Cotopaxi Consolidated Schools were recognized for their dedication to their students and to the STEM field.

Reunions

AF Public Affairs Alumni Assn, open to retired and Active Duty, military and civilian, or public affairs, broadcasting, band, and multimedia fields. May 12-14 at the DoubleTree by Hilton Colorado Springs in Colorado Springs, CO. **Contact:** John Terino (703-239-2704) (johnterino@afpaaa.org).

Air Weather Assn. April 27-May 1 in San Antonio. **Contact:** Tom Accola (321-544-3107) (taccola@cfl.rr.com).

Officer Candidate School Class 1956-B. June 13-18 at the Savannah House in Branson, MO. **Contact:** Glynn McCoy Jr., 8683 S 262 East Ave., Broken Arrow, OK 74014 (210-573-6413) (glynn.mccoy@cox.net).

USAF/DOD Air Traffic Control Instructor, ATC/AETC badge wearer, former or current. April 24-28 at Keesler AFB, MS. **Contact:** Bill La Monte (252-308-3507) (4william6@gmail.com).

335th Tactical Fighter Sq. (1970-75). This summer at Seymour Johnson AFB, N.C. **Contact:** Gary Nelson (817-657-9080). ★

SHOOTING STAR CHAPTER

Shooting Star Chapter Secretary Tobia Terranova and other chapter members attended a forum organized by AFA's Mitchell Institute for Aerospace Studies in New York City last May.

Retired Lt. Gen. David Deptula, dean of the institute, introduced the morning's speakers at this forum, entitled "Aerospace Power in the Information Age." The speakers included Lt. Gen. Steven Kwast, Air University commander, who spoke about the combat cloud, the increasing role of information in the battlespace, and modernizing acquisition. Commenting on these presentations, Terranova wrote, "Their message was clear: Stealth and the combat cloud will be the new paradigm for aerospace combat."

USAF Chief of Staff Gen. Mark Welsh III delivered the forum's keynote address that afternoon. According to Terranova, Welsh was "emphatic" that the Air Force's "top priority items" would be covered, despite budget constraints. ★

AFA Emerging Leader

The Air Force Association's Emerging Leaders Program began in 2013 as a way to prepare volunteers for future AFA leadership roles. Here's the second profile in AFA's third group of Emerging Leaders.



Mark R. Douglas

Home State: Virginia.

Chapter: Langley.

Joined AFA: Life Member, joined 1990.

AFA Offices: Chapter secretary, veterans affairs VP, and executive VP. Now state aerospace education VP, national Strategic Planning Committee.

Military Service: Nearly 23 years on Active Duty.

Occupation: Training manager, Northrop Grumman.

Education: B.S., Air Force Academy; M.A., Embry-Riddle Aeronautical University.

Q&A:

HOW DID YOU FIRST LEARN OF AFA?

I think it was brought to my attention by my leadership who encouraged me at the time. I was strongly encouraged to join. I looked at it as my professional organization, although I didn't get active in it until retirement—and the reason I got active in it after retirement is because I wanted to keep my ties active.

WHY DO YOU WANT TO LEAD AFA?

Because I think it's really important. I believe in the mission. I think it's important that [it is] an organization that is advocating for airmen and airpower, ... and I want to be a part of bringing that message to the general public.

WHAT'S AFA'S STRENGTH?

Its people. You have a group of 100,000 people who believe in the mission and are thankful to the people who are currently serving. When you have that many people who are passionate, they can make a difference.

HAVE YOU INCREASED AFA MEMBERSHIP?

Yes. I went to my coworkers and I talked about the activities that the Langley Chapter's doing, ... and when I showed them there was an organization that was bringing in important guest speakers, ... I got six people in the company who have signed up to become members.

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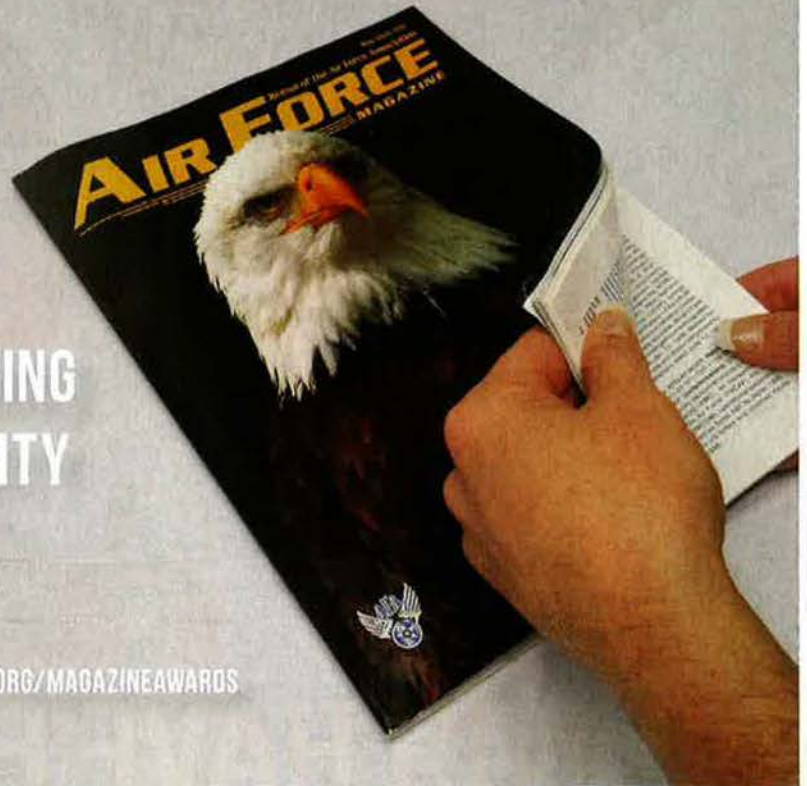
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Predator



Predator, a remotely piloted aircraft, became world famous as the first successful weaponized RPA and first to conduct lethal strikes. Designed by General Atomics Aeronautical Systems, this medium-altitude, long-endurance system was first used by USAF for surveillance. Later it was armed with laser guided missiles and flown against terrorist targets. Many lethal missions were CIA ventures, but the aircraft, pilots, and command and control systems belonged to the Air Force.

Predator descended from RPAs conceived in the 1980s by designer Abraham Karem. Predator was made of light graphite epoxy composites and given long wings, downward tail planes, and a large head bulge. Powerful EO/IR cameras and sensors yielded full-motion video and still radar images. It saw first combat—in a reconnaissance

role—over Bosnia in 1995. By 2000, improved communications let US-based pilots operate Predators 7,000 miles away. This led to “remote split operations”—a forward deployed team for takeoff and landing and a US-based crew to fly the mission.

Gen. John Jumper, commander of Air Combat Command, pushed USAF to add two Hellfire missiles to strike fleeting targets. In September 2000, an unarmed Predator likely located Osama bin Laden in Afghanistan. On Oct. 7, 2001, Predator fired its first missile in combat, in Afghanistan. The Predator’s Air Force designation then changed in 2002 from RQ-1 to MQ-1, denoting new multimission capabilities. It then went into continuous operation, orbiting over numerous war zones.

—Robert S. Dudley with Walter J. Boyne

This aircraft: USAF MQ-1B Predator—#00-3015—as it appeared in April 2012 when assigned to 15th Reconnaissance Squadron, 432nd Wing, Creech AFB, Nev.



USAF photo by SMSgt. Paul Holcomb

An MQ-1B flies over Creech AFB, Nev., in 2013.

In Brief

Designed, built by General Atomics Aeronautical Systems ★ first flight July 3, 1994 ★ number built 304 (USAF 268; Army 22; Navy three; Italy nine; GA two) ★ crew of zero onboard, two remote (pilot, sensor/weapon system operator) ★ one Rotax 914 turbocharged piston engine driving one prop ★ defensive armament typically none ★ weight (max T/O) 2,250 lb ★ max speed 138 mph ★ cruise speed 84 mph ★ service ceiling 25,000 ft. **Specific to MQ-1B:** main function armed reconnaissance ★ offensive armament two AGM-114 Hellfire or six AGM-176 Griffin missiles ★ payload 450 lb ★ range 770 mi ★ endurance 40 hr ★ span 55 ft ★ length 27 ft ★ height seven ft.

Famous Fliers

DFC: William Pixton, Michael Gordon, **Air Force Notables:** Scott Swanson (first combat air strike, Chis Chambliss (ex-Thunderbirds pilot, first RPA wing commander), William Tart. **Enlisted Sensor/Weapon Operators:** Jeff Guay, Brandon Bryant. **First Beta Pilot Class:** Jeremy Fortier, William Freemantle, Chris Gesch, Rob McGowan, Steven Petrizzo, Jack Rhodes, Timothy Rott, Michawn Yuvienco. **Test Pilot:** Tim Just (first flight).

Interesting Facts

Named by Smithsonian’s *Air & Space Magazine* as one of 10 “aircraft that changed the world” ★ seen combat over Afghanistan, Pakistan, Bosnia, Serbia, Iraq, Yemen, Libya, Syria, Somalia ★ powered by a four-cylinder Austrian engine used in snowmobiles and ultralight sport aircraft ★ featured in films “Syriana,” “The Bourne Legacy,” “Good Kill” ★ first unmanned aerial vehicle in air-to-air combat with a manned aircraft (December 2002 over Iraq) ★ can be disassembled and loaded into

a travel container nicknamed “the coffin” ★ can operate on a 75-foot-wide hard-surface runway ★ used to monitor wind direction and other characteristics of large US forest fires ★ once staged a flight lasting for 40 hours, 5 minutes ★ has accumulated well more than 2 million flight hours with a fleet fully mission capable rate of 90 percent ★ helped rescue encircled US combat team in 2002 Battle of Roberts Ridge in Afghanistan ★ in 2011, used to kill Anwar al-Awlaki, an American-citizen cleric and al Qaeda leader.



Illustration by Zaur Eylanbekov

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