

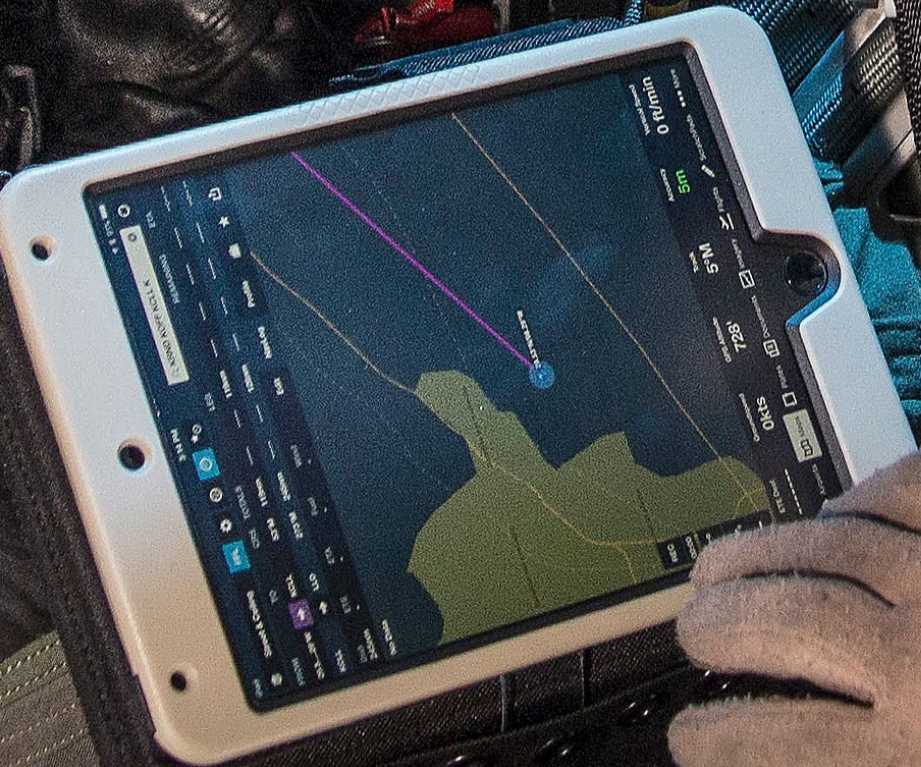


AIR FORCE

2018 AIR WARFARE SYMPOSIUM SPECIAL EDITION

MAGAZINE

THE STATUS QUO NEEDS TO GO



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10 Hours of White-Knuckle Hell

By Steve Hirsch

Christopher Lewis wasn't planning on spending the day in a gun turret, calling in air strikes, and shooting ISIS fighters.



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The Status Quo Needs to Go

By Gideon Grudo

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AFA National Report

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Maj. Earl Arnold uses an electronic flight-bag to run a pre-flight check. See "The Status Quo Needs to Go." Photo by Sean Worrell/USAF.

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Building an Air Force of Americans

Pilots listen to Chief of Staff Gen. David Goldfein at the Air Force Association Summit: The Future Air Force Pilot Force, on March 7.

By Adam J. Hebert,
Editor in Chief

The Air Force is nearly 2,000 pilots short of requirements, which impacts readiness, operating tempo, and long-range planning—not to mention individual airmen’s careers.

Meanwhile, the pilot force is overwhelmingly white and male—not reflective of America, and not reflective of USAF as a whole. Attracting a wider pilot cohort will not only help solve the shortage, it will create a stronger Air Force.

Now is the time for change. The Air Force needs to close its pilot shortage and reposition itself to meet the nation’s long-term strategic needs. Creativity and innovation are needed to outthink Russia and China. This will be easier if USAF can better draw upon the diverse backgrounds of its airmen by having more women and minorities in operations and key leadership positions.

To begin addressing this, a wide range of military, industry, nonprofit, and academic representatives met at the Air Force Association’s headquarters March 7 for a full-day summit to discuss the future Air Force pilot force. A series of presenters and working groups discussed the shortage, recruiting, retention, the merits of increased women and minority

USAF will be stronger with a more diverse pilot force.

representation in aviation, and the hurdles the service must overcome to diversify its pilot force. At the end of the day, Gen. David L. Goldfein, Chief of Staff, was briefed on the many observations and recommendations.

Goldfein noted the US again faces “great power competition” and “existential threats,” but USAF has an opportunity to carefully position itself for the future. This is a “warfighting imperative,” he noted.

Obtaining the benefits of a more diverse pilot force will require institutional commitment.

Starting at the beginning, many girls and poor or minority children are never exposed to the Air Force or flying careers, and even if they are, they probably won’t see any pilots that look like them. This sends a psychological message that “Air Force pilot” is something white men do, not women, or blacks, or Hispanics. Kids who can’t see themselves in a role tend to look elsewhere, so the Air Force needs to get pilots from

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untapped communities into positions where kids see them, such as at airshows and in the Thunderbirds. One interaction is sometimes all it takes to light a spark of interest that will pay off for the Air Force years later.

At the high school level, Junior ROTC is an untapped resource. JROTC participants are 58 percent minority, 40 percent female, show dedication, and already have exposure to the Air Force's ideals. To maintain local support and access to schools USAF must be careful to not use JROTC as a recruiting tool. Careful outreach can, however, provide underrepresented cadets with a roadmap to an Air Force pilot career.

Changes are needed in USAF itself. Several pilots at AFA's summit lamented the lack of interest they saw from Air Force recruiters, who don't seem interested in leading potential airmen toward careers as pilots.


Other problems arise even after underrepresented Americans clear the hurdles. Monochromatism creates unintended consequences, such as the fact that black pilots are often unwilling to mentor younger black pilots—for fear of showing favoritism. Until the numbers begin to rise, the Air Force needs to consider what steps it can take so minorities don't struggle as one-of-a-kind airmen.

Finally, for USAF to get the most out of its female pilots, it needs to improve how it treats them. Summit participants noted that women's prime childbearing years are also key years in their Air Force careers, but the service effectively penalizes women for getting pregnant by taking them out of cockpits, making them less competitive for key assignments. The service should allow pregnant women to keep flying for as long as it makes sense to do so, then move them to staff assignments or schooling when they can no longer fly.

USAF does not realize its full potential if minorities are seriously underrepresented in the Air Force's pilot ranks—the dominant route to leadership in the service. Diverse backgrounds lead to competitive ideas and

innovative thinking—essential for long-term success. Making the force more diverse requires change, commitment, and for somebody to be responsible and accountable for success.

"My commitment to you is to ensure the next time we gather together we've actually made some sustained progress that will last," Goldfein pledged.

This is an important first step, but the results won't be known for two, 10, or perhaps 20 years. 



Gen. David Goldfein listens to a presentation at the summit. The Chief is committed to making sustained progress in the task of fielding a future pilot force that meets the nation's strategic needs.



10 HOURS OF WHITE-KNUCKLE HELL

CHRISTOPHER LEWIS WASN'T PLANNING ON SPENDING THE DAY IN A GUN TURRET, CALLING IN AIR STRIKES, AND SHOOTING ISIS FIGHTERS.

Above, SSgt. Christopher Lewis at an undisclosed location. Lewis was embedded with a Navy SEAL team in Iraq when the enemy ambushed them during the Mosul offensive of 2016.

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S Sgt. Christopher F. Lewis remains matter-of-fact about his day on Oct. 20, 2016, an ordeal for which he was awarded a Silver Star on Jan. 19.

A special tactics combat controller embedded with a SEAL team and Kurdish Peshmerga forces in Iraq, Lewis was cited for his efforts during the early days of the Mosul offensive as his team moved to clear two ISIS-held villages.

Lewis' Silver Star citation notes how he "selflessly exposed himself to grave danger" and "risked his life to provide life-sustaining medical care to his injured teammate." He braved heavy fire, directed F-15Es and B-52s to conduct air strikes within 400 meters of his team, destroyed a vehicle-borne improvised explosive device, and gave medical attention to teammates.

The citation is notable for its measured understatement, a style Lewis also presents. Another day at the office, the way he tells it. The events of that day were, however, rather lively. In fact, most would describe the day as 10 hours of white-knuckle hell.

Lewis, assigned to the 23rd Special Tactics Squadron based at Hurlburt Field in Florida, allows only that at one point in the action, things got pretty "nerve-racking," but otherwise takes it in stride.

He'd only been with the team in Iraq for about two weeks. On that day, he and about a dozen SEALs headed out at 2 a.m. in a southbound convoy with the Kurds. "It was ... probably about 100 vehicles and a few hundred Peshmerga fighters," he recalled in an interview with *Air Force Magazine*.

The convoy was "very, very slow moving," comprising tanks and, up

By Steve Hirsch, Senior Editor



front, large armored bulldozers carving new paths into the desert because of the danger from explosives on the roads.

Around daybreak, approaching the first outlying village, the convoy started to take mortar fire. It was not yet having any effect, but when he started to use the camera allowing him to control the truck's machine gun remotely, the system went on the blink. He hopped into the turret and thus "started my whole day behind the machine gun," he said.

As the force approached the village, it started taking "much more effective fire," and Lewis had to suppress multiple buildings with the machine gun while simultaneously identifying ground targets for aircraft overhead.

He remained in the turret as he coordinated air attacks on multiple buildings, while also laying down suppressive fire. Then the combined force came under "extremely effective fire" from machine guns, rocket-propelled grenades, and mortars—enemy positions were as close as 30-40 meters away. As he engaged the attackers, the convoy changed tactics and moved to advance around the village from a different side. His vehicle took up a defensive position while a truck started barreling across the field toward the allied force's position. Lewis hosed it with fire until it exploded about 100 meters away. As he deduced, it had been a vehicle-born bomb.

"That was pretty nerve-racking, to say the least," he said.

The force then came under grenade and machine-gun attack from ISIS fighters coming out of a nearby building.

"There must have been a tunnel that came out of the bottom of that building, and a few ISIS fighters had made their way through that tunnel and were able to throw hand grenades out of the windows and start shooting with their machine guns outside of the windows," aiming for the SEAL team and the Peshmerga, Lewis said.

The ground commander "immediately tells me he wants that building destroyed with munitions from aircraft overhead, so I told him, OK, we're going to need to get some distance between us and that building," according to Lewis.

Maneuvering out to some open space, he said, "that's when we end up driving into ... a minefield."

The convoy halted when the lead explosive ordnance disposal technician, Chief Petty Officer Jason C. Finan, identified an IED.

Finan himself was soon gravely wounded when his own vehicle hit

Lewis and an armored fighting vehicle in theater.



Lewis' Silver Star Medal and citation, presented at a ceremony at Hurlburt Field, Fla., in January.



Airmen ready a JDAM on Oct. 19, 2016. Guided munitions were a big part of helping to eliminate ISIS in Mosul.

an IED. The concussive blast from that explosion set off about seven other devices nearby.

Lewis was still in the turret at this point, probably 30 meters from the explosions. When the dust settled, he and the other EOD technician in his vehicle dismounted and ran up to Finan's destroyed truck. They pulled Finan out, let the medics in to help, and removed others from the destroyed vehicle. He then started coordinating Finan's medical evacuation.

"While this is going on, we're still receiving fire, we're only about 200, 300 meters from the village," he related. "The other aircraft overhead were able to identify a mortar position and also another vehicle-borne IED making its way toward us as well," he said.

He coordinated fire on both of those targets, eliminating them, and started "moving the patient out to the medevac HLZ [helicopter landing zone]."

According to the citation, the air strikes he called in killed 20 enemy fighters.

While the day seems "very action-packed," he said, "in real life in a fight, there's always a little bit of a lull, here and there." Still, the off-script convoy operation "was pretty much the whole 10-hour day."

Lt. Gen. Brad Webb, commander Air Force Special Operations Command, told the award ceremony audience at Hurlburt, "this a big deal," noting the Silver Star is the country's third-highest award for valor and gallantry.

Of the action that day, Webb noted, "every street was contested, every building was unsafe." Lewis "epitomizes what we all strive to be in this command. I am extremely proud of him."

Special operations units are particularly humble and secretive, but comments from an official Air Force interview with Lewis' troop leader (USAF did not release his name, citing preference to protect the identity of operators within the field) give a fuller picture of what kind of operator Lewis is.

This officer said he has known Lewis for about four years, having served with him in the field.

He and Lewis had deployed together in Operation Inherent Resolve in the summer of 2016, and Lewis was one of the joint terminal attack controllers—JTACs—embedded with a number of special operations teams.

"Chris was our go-to guy, he was one of our most experienced JTACs in the theater, and for that reason, we put him in the toughest spots,"



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Lewis' team leader said.

Prior to the battle for Mosul, "we ... handpicked him as the most seasoned operator" to go to teams "in order to develop our other terrific operators who were there."

The officer added, "We just wanted—I wanted—Lew to create the most or the best force multipliers for the impending battle that we could. That was his tasking from us."

There was minimal ground intelligence from areas where Lewis was operating, the officer said.

Such was the speed of action and movement that "it kept the information from flowing in and out of the teams, so it was coming through in pieces."

SILENT PROFESSIONAL

Lewis' humility meant that word of his deeds on that day didn't spread as quickly as they otherwise might have. "He didn't really want to talk about everything that he had done," Lewis' team leader said.

The "full story finally started to emerge" of what happened on Oct. 20, only through "some different conversations and picking at him." The ground force commander's summary of events and "conversations with other JTACs in the area, really validated what Chris had done, and we slowly started to get a grasp of the full picture."

However, the officer added, "it was at first, not directly from Chris himself because he was being the professional that he is and directing the credit elsewhere."

It was this officer who initially recommended Lewis for a Bronze Star with Valor. After reviewing Lewis' case, a higher, joint command later upgraded the recommendation to the Silver Star.

This process of putting Lewis up for the medal—especially for an upgrade—required more digging.

There were witness statements from the ground force commander and the team. The officer said, "Really, it was a task of piecing together this puzzle that was a 10-hour firefight and what exactly Chris did."

Once word came back that Lewis was to be considered for the medal, "that's when we kind of dug down a little deeper with Chris and forced him to tell us what exactly happened and what his role specifically was," said the officer. Multiple validations were required to document the action.



A KC-10 refuels a B-52 near Iraq in 2016. Lewis called in the heavy bombers and F-15Es during the firefight.

A C-130J about to unload logistical supplies at an airfield in Iraq during the fight for Mosul in October 2016.



The officer was surprised but thrilled with the upgrade. “More than anything, I believe it was deserved,” he said.

He explained that “what we were asking the guys to do—and by ‘we’ I mean what the military was asking those guys to do—was embed themselves within a total dangerous site that everyone knew was going to be difficult, and unlike other fights, there was really no coverage or public knowledge of what was going on.”

The Silver Star Medal “in my mind represents the best of all their actions across the joint environment” and recognizes “the danger they put themselves [in] and the sacrifices they made to break into Mosul.”

More broadly speaking, this officer pointed to the importance of the 23rd Special Tactics Squadron in overall military operations.

The 23rd STS was, at that time, dispersed across all areas of action in Afghanistan and Iraq. Within a couple of weeks of Lewis’ actions, another member of his unit received an Air Force Cross. SSgt. Richard Hunter, a special tactics combat controller, was among 10 who received medals from Air Force Secretary Heather Wilson for efforts during a fierce firefight in a village near Kunduz Province, Afghanistan, just a few weeks later, on Nov. 2, 2016.

Those two commendations demonstrate “the pervasive impact” the 23rd had on “all battlefields and all services and the ODAs [Green Beret Operational Detachment-Alphas] ... on a daily basis to the combined effort,” he said.

For his part, Lewis found this assignment different and more challenging in some ways than his previous two deployments, which had both been in Afghanistan.

Those tours, he said, were mainly “helicopter assault missions, where you spend about a day or two on the ground clearing through a village.”

The terrain there had been much more mountainous than in Iraq, where the landscape was much more open.

The biggest difference in Iraq, Lewis observed, came from the urban setting. It was an extremely hard fight, “as far as identifying where you’re actually taking contact from,” because ISIS had knocked “four-foot holes out of each wall in each building so they can maneuver through the whole city and only spend ... one second in an alleyway, going from building to building.”

In Iraq, ISIS had “extensive tunnel networks as well.” Later, coalition forces discovered from left-behind maps and documents that “they had entire cities mapped out, ... they labeled buildings down to the number, so they could command and control themselves very well.”

Overall, this created “much, much bigger problems and more difficulty targeting them than compared to previous deployments in Afghanistan,” Lewis said.

Lewis, who has been in the Air Force for just over eight years, said he didn’t ask for career guidance in high school. He “just knew” he wanted to “join and ... go fight, you know, like just how a young man feels.”

A family friend who’d had prior service in Army Special Forces heard about Lewis’ interest and “pointed me toward this job,” he said.

Lewis trusted the advice and “just went to the Air Force recruiter.”

He has no doubt when asked whether he made the right choice.

“Oh my God yeah, I think I have the best job there is, honestly,” he said.

The coalition battle to retake Mosul and its environs from ISIS lasted nine months. In December 2017, the Iraqi government finally declared ISIS defeated and driven from its territory. ★



Lewis, after receiving the Silver Star Medal at Hurlburt. Lewis’ team leader said that as one of the theater’s most experienced JTACs, Lewis was their “go-to guy,” the one they put in the toughest situations.

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INNOVATIONS LAUNCHED TODAY WILL DETERMINE USAF'S RELEVANCE FOR DECADES TO COME.

The US is facing a new age of “great power conflict.” Potential adversaries Russia and China are reaching or surpassing American military capabilities and are using this newfound strength to intimidate neighbors and circumvent the established world order. To stay in front and counter these threats, the Air Force needs to innovate and must rethink how it operates on the global stage.

This was the message from Chief of Staff Gen. David L. Goldfein and Air Force Secretary Heather Wilson at the Air Force Association’s Air Warfare Symposium in late February in Orlando. The event, which focused on the central theme of innovation, came shortly after the Pentagon released its National Defense Strategy, which warns of this possible conflict with Russia and China.

Wilson, kicking off the event, said the new strategy shows what “all of us for several years have been realizing,”—that there is a “more competitive and dangerous environment than we have seen in generations.”

The US currently does not “control the pace of innovation,” she said. While the US military still has a “powerful advantage,” rival nations

By Brian W. Everstine,
Pentagon Editor

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An MQ-9 Reaper armed with four GBU-38 JDAMs at Kandahar Airfield in Afghanistan. As the Air Force rethinks how battle management can be accomplished, Reapers, Global Hawks, and space-based assets may be equipped with more integrated sensors.

have repeatedly stolen the technology Americans have developed and used this to rapidly catch up.

“The National Defense Strategy directs us to be more lethal and a more ready force to strengthen alliances and partnerships, and to deliver a greater and more affordable performance in order to compete, to deter, and when called upon, to fight and win,” Goldfein said in his keynote address.

The Air Force for almost three decades has operated in permissive environments, targeting terrorists in areas where it had full control of the airspace. But in this new environment, air superiority cannot be assumed. The US has no “preordained right to victory on the battlefield,” Goldfein warned. Facing this reality requires new ways to address certain missions and creative changes in the way the service operates.

“We’re going to have to expect you as airmen to take mission orders and execute in an environment where command, control, and communication is not assured, and still prevail,” Wilson said. “That requires airmen who think, innovate, and get after the mission without being told how to do everything.”

Wilson highlighted one specific airframe and mission that needs to be reshaped. The Air Force’s airborne battle management airframe, the E-8C JSTARS, needs to be replaced. Until recently, the Air Force planned to buy another airframe to take over this mission. But as the need to operate in a denied environment has become more and more important, the Air Force’s thinking changed.

Instead of buying a new airframe, the service is rethinking how battle management can be accomplished. This may include additional ground-based operators, working with space-based assets and aircraft such as MQ-9 Reapers or RQ-4 Global Hawks, all equipped with more integrated sensors.

The service in its Fiscal 2019 budget request outlines this plan, but USAF will have to convince a skeptical Congress. The Air Force must prove its point because if it is forced to buy another big airplane, Wilson said that aircraft would not last long in contested airspace.

“If that’s the solution, it won’t survive, she said.

SHIFTING PARADIGMS

Private-sector companies have become increasingly nimble in recent years, while the military often has been constrained by cumbersome acquisition processes. The Air Force needs to strip away as many bureaucratic hurdles as possible and find new ways to quickly get advancements into the field. To that end, the service is using its Spark Tank innovation contest and its AFWERX startup to connect to a broader scientific enter-



An E-8C JSTARS aircraft evacuates to Tinker AFB, Okla., to escape the path of Hurricane Irma in September 2017. The JSTARS mission endures, but the Air Force no longer views a large aircraft as the best solution.

prise. These new approaches are “absolutely vital to our future,” Wilson said.

“From the lab bench to the flight line, it’s not just about who has the best ideas,” Goldfein said. “What matters for us is who can act on these ideas and deliver the lethality that outpaces our adversaries? And I would offer to you in today’s complex global security environment, victory goes not [to the] innovator, but to the rapid integrator of ideas.”

The Air Force must “push up the throttles” in finding “game-changers” in the lab and in new partnerships with academia and industry. Meanwhile, USAF must find a way to “untether” the professional acquisition workforce inside the service by pushing the decision authority down to program managers, Goldfein said.

Now is also a time of rapid space innovation. Companies such as SpaceX are launching new rockets more often and cheaper, and Amazon and Google are promising to soon create Internet-like options from space through the use of thousands of miniature satellites. These innovations need to be embraced and adopted by the Air Force as a way to get ahead of adversaries.

“For an airman, these are exciting technologies. Rocks in our sling,” Goldfein said. “If only we can think and act like David, like competitors in the ring. If we’re able to embrace the increasing speed of technological advancement and adapt faster than our adversaries.”

Space needs to be central in how the Air Force thinks, because its importance is only going to grow, Goldfein said.

“It is time for us, as a service, regardless of specialty badge, to embrace space superiority with the same passion and sense of ownership as we apply today to air superiority,” Goldfein said. Space needs to be more fully integrated with air and cyber operations in joint campaigns.

Going forward, the Air Force will push space integration from the very beginning of an airman’s development, Goldfein said. He directed Lt. Gen. Steven L. Kwast, commander of Air Education and Training Com

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AFWERX

The Air Force in July 2017 launched AFWERX, a program with offices in the Pentagon, outside Washington, D.C., and in a storefront in Las Vegas to act as a startup and incubator of new ideas. It will bring together the Air Force and private-sector “innovators and entrepreneurs,” USAF officials say. The Las Vegas storefront has a coworking space, 3-D printers, and a carbon fiber oven to help small companies and academia turn ideas into prototypes quickly and cheaply. Additional storefronts will open across the country, with the next one scheduled for early 2018 in Austin, Texas.



USAF Chief of Staff Gen. David Goldfein speaks on innovation at the Air Force Association's Air Warfare Symposium in Orlando, Fla., in February.

SPARK TANK

The Air Force's Spark Tank competition, announced by Secretary Wilson at AFA's Air, Space & Cyber Conference in September 2017, called on airmen to pitch ideas on ways to creatively fix the problems they face on the flight line and in offices across the service. The winning ideas were showcased before Air Force senior leaders at AWS18 and received funding to more broadly adopt them across the force. Unlike the AFW-ERX private-sector focus, Spark Tank was limited to airmen and government employees. For more on Spark Tank, see "Safer KC-135 Boomer Platform Wins USAF's Spark Tank Cup," in this issue.

mand, to "revolutionize" how the service trains its officers and NCOs to conduct space operations.

This is needed, Goldfein said, because a war in space is coming.

"I believe we're going to be fighting from space in a matter of years, and we're the service that must lead joint war fighting in this new contested domain," Goldfein said. "It's what the nation demands."

This isn't the first time the service has been in a similar situation.

In 1945, Gen. Henry H. "Hap" Arnold, the morning after the victory over Japan in World War II, proclaimed that the next war "may be fought by airplanes with no men in them at all. ... Take everything you've learned about aviation and throw it out the window. It will be different than anything the world has ever seen," Goldfein quoted Arnold, saying this was a visionary look at what the US military would face decades later.

Goldfein similarly sees a "vastly different future for our Air Force in 2045." Unlike the period from 1945-1990, this will be in a world where the private sector often takes the lead in rapidly accelerating, militarily useful technology.

And unlike the period from 1990-2014, USAF in 2045 is expected to face great power competition.

"So the billion-dollar question is: Are we as an airman-industry team postured to thrive in this revolution? Or will we be consumed by it?" Goldfein asked.

"I've got to tell you, I have never been more optimistic or excited about our future because this is our 1945 moment," he said. "We've been here before. And so perhaps it's time to return to our youth as we follow the path before and prepare for our future." ★



A Russian RS-24 Yars mobile nuclear missile system is prepared for a military parade in Red Square, Moscow, on Feb 27. USAF says potential adversaries Russia and China are bolstering military strength to intimidate their neighbors.



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THRIVING AND SURVIVING



Second Lt. Madeline Schmitz, a student pilot, prepares to “take off” in the T-6 Texan II flight simulator at Columbus AFB, Miss.

THROUGH TRAINING

USAF’S TRAINING COMMUNITY VIEWS ARTIFICIAL INTELLIGENCE AND VIRTUAL REALITY AS KEYS TO AN AFFORDABLE, LETHAL FORCE.

The Air Force is aggressively seeking new technologies that will be affordable and can be rapidly fielded to help the force become more lethal. When it comes to training, artificial intelligence and virtual reality are keys to making this a certainty.

Lt. Gen. Steven L. Kwast, head of Air Education and Training Command, said the service is in the “nascent” stages of adopting virtual and augmented reality. USAF is still trying to understand exactly what impact this technology has on the human brain, how it can be utilized to make the force more effective, and how much it costs, he told reporters at AFA’s Air Warfare Symposium in Orlando, Fla.

Researchers have already discovered that humans learn visceral things, such as how to get in a cockpit and start up a jet, “pretty quickly,” said Kwast. It’s when they have to fuse various pieces of information together in a complex environment—as in a combat scenario where

By Amy McCullough,
News Editor

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Developing Innovators



another human or machine is trying to kill them—that more training is required.

Student researchers attending USAF's Air Command and Staff College recently conducted an adaptive flight training study at Columbus AFB, Miss., to help determine how a virtual environment can help adults learn. The students stood up three test groups, which included a range of experience levels, and asked them to fly a T-6 Texan II simulator without any prior T-6 flying time.

Each test group flew multiple simulated missions in a virtual environment before taking a ride in the T-6 simulator. The targeted learning system measured a person's performance and ability to learn in a virtual environment, according to a USAF news release. The study is one of many the Air Force is using to determine how such technology can be implemented into its training curriculum.

"When we find the data that really tells us what makes us good at this, then we will know how much virtual and augmented reality might play in future techniques for not only teaching people how to be good in this business, but accentuating their effectiveness at doing the job," Kwast said at AWS18.

Virtual and augmented reality are "fundamentally different" than they were just a few years ago, he said.

As technology continues to advance, Kwast says he can see a time when the simulator for the new pilot trainer, now known as T-X, transitions from the bulky piece of equipment it is today, anchored in place, to a virtual environment that allows airmen to take it back to their dorm rooms for more practice if desired. The service isn't there yet.

But Brig. Gen. James R. Sears, AETC's operations director, said the Air Force isn't waiting for the T-X to come online to start implementing this new technology.

"The continuum of learning and force development that we're instituting is going to allow us to bring the tinkering into the system as it allows us to train better, faster, and cheaper for what we need," Sears told reporters.

For example, using virtual and augmented reality, the Air Force can teach a maintainer how to change the tire on an aircraft even when the aircraft is not physically present. An artificial intelligence coach can show the airman "where the bolt is and how many pounds of torque

Lt. Gen. Steven Kwast speaks at the Developing Innovators panel at AFA's Air Warfare Symposium on Feb. 22. Kwast says USAF is in the "nascent" stages of adopting virtual and augmented reality technologies for use in training.



An F-15E—imaged in 3-D—by Charles River Analytics for the Air Force. The Cambridge, Mass., company is working with AETC to ensure the virtual trainer meets requirements to efficiently train aircraft maintainers.



Second Lt. Kenneth Soyars takes off during a virtual reality flight simulation at Columbus AFB, Miss.

you need on that,” noted Kwast.

The Air Force awarded Massachusetts-based technology company Charles River Analytics a contract in August 2017 to build a deployable F-15E Strike Eagle game-based virtual environment trainer. The company is collaborating with the 365th Training Squadron at Sheppard AFB, Texas, and Sheppard’s Instructional Technology Unit on the project, which also is sponsored by the Air Force Research Laboratory. The virtual training system is slated for delivery in “late-spring 2019,” according to the Air Force.

“If we could have a virtual trainer, where you have your students all doing the operational check at the same time, under the supervision of an instructor in the virtual world, monitoring what’s going on, you can get a lot of work done really quick,” said Steven Canham, an F-15 avionics instructor at the 365th TRS, in the release. “It doesn’t necessarily mean that we can revert to solely teaching without a real aircraft, because you still have to understand that these students need to have dexterity and coordination and things like that.”

Air Force Special Operations Command is also at the “leading edge” of virtual reality and autonomous learning. AFSOC Commander Lt.

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Intel Shooting Star drones lit up the sky during halftime of the 2017 Super Bowl. An algorithm directed the drone swarm to create pictures such as this American Flag.

Gen. Brad Webb said he was inspired by Lady Gaga's 2017 Super Bowl halftime performance, in which she worked with Intel to create a spectacular light show using 300 quadcopters.

"That really is eye-opening," Webb told reporters at AWS18. "Imagine the potential of this—that can be applied—if we did some automated learning that could provide sensor inputs, etc. That's the kind of advancements I want to look at."

The drones used algorithms to automate "the animation creation process by using a reference image, quickly calculating the number of drones needed, determining where drones should be placed, and formulating the fastest path to create the image in the sky," according to geekwire.com.

Webb added that artificial intelligence "holds great promise," and said AFSOC already has done a series of tests, and it plans to do more.

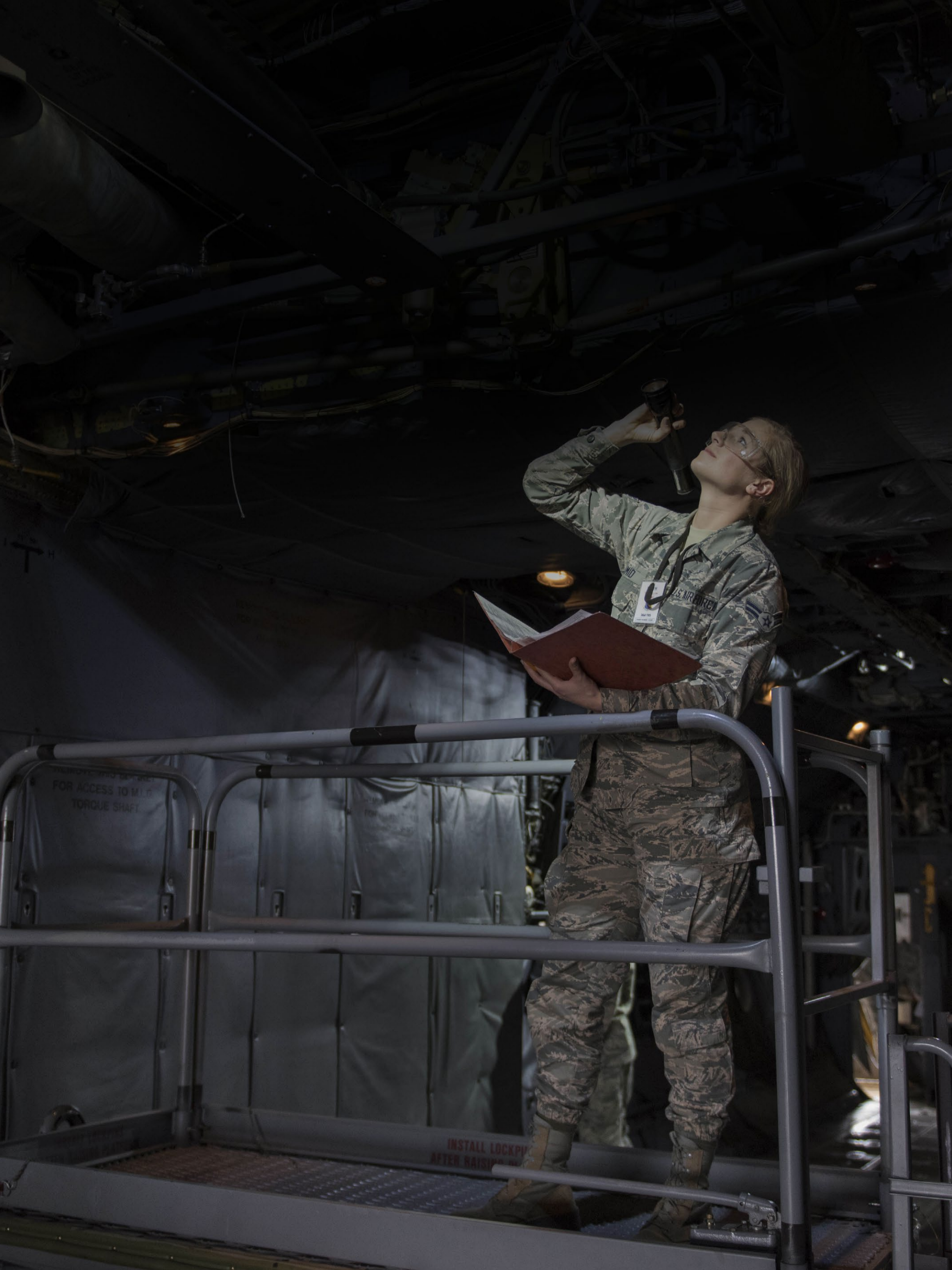
Advancing technology is paying new dividends for the command. CMSgt. Gregory A. Smith, AFSOC's command chief, said it used to take "14 flights to qualify a back-ender to do airdrops" from legacy MC-130s, but with the new J-model, it only takes two or three flights. "Everything else is done through the simulator or virtual reality," he said.

The command also uses virtual reality goggles to place its CV-22 tail flight engineers and special mission aviators anywhere in the world, including hostile environments. The algorithms track the air commando's decision-making and reaction to stressful situations. Artificial intelligence then takes that information and adjusts the scenarios.

"As you tie it into assessment and selection and the ability to rapidly make decisions in complex austere environments that's where we're really starting to learn," said Smith. After practicing in the virtual environment, "we're seeing significant [improvements] in their reaction time in the real environment," he added.

Smith called the training scenarios "unwinnable situations," saying the command has noticed "the computers will beat humans 99 percent of the time," he said. It's something the younger generation is responding to well. His generation grew up playing Atari video games, but new recruits coming into the service today are used to highly realistic video games, such as Call of Duty, so it makes sense to use that technology for training.


"Ultimately, civilizations that thrive and survive are civilizations that learn faster and with more humility, meaning they are willing to change in order to do things better," Kwast said. "That's the journey we're on." 🌐



FOR ACCESS TO M.I.D.
TORQUE SHAFT

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AFTER RAISING

THE STATUS QUO



Maj. Earl Arnold runs a pre-flight check on a T-6 Texan using an electronic flight bag. A tablet-like flight bag is part of 12th Operations Group's move to enhance training, efficiency, and accuracy in data recall.

NEEDS TO GO

READING THIS ARTICLE ON YOUR TABLET IS ADAPTATION. EMBRACING ITS MAIN POINTS DURING BASIC TRAINING IS INNOVATION.

When Defense Department leaders talk about the need for military innovation, they commonly recognize the armed services should be more open to trying things even if they may not succeed.

"It's time to take risks," Air Force Secretary Heather Wilson said during AFA's 2018 Air Warfare Symposium. "It's time to productively fail."

During the same conference, however, an executive for Alphabet—the umbrella company owning Google—bluntly challenged that notion. The Air Force, argued Milo S. Medin, takes far more risk than any commercial entity ever would.

"This is anything but a risk-averse culture," Medin said on stage as one of AWS18's keynote speakers. Being risk averse is not the problem—airmen put their lives on the line in dangerous situations every day. The problem has been a lack of technological innovation. "There's a price to be paid for lagging behind on innovation, it's just that the price is not usually paid by the same people who settle for the status quo. That price is going to be paid, nonetheless."

Medin has most recently been working for Alphabet as vice president of its access services. He has focused on increasing the speed at which networks are fielded and their infrastructural integrity and

By Gideon Grudo,
Digital Platforms Editor

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speeds. Medin is especially peeved with DOD's requirements-driven strategy, saying it's "more than inefficient, it's become dangerous."

To improve decision-making, USAF has to instill a culture of innovation in airmen from the very beginning. According to Air Education and Training Command boss Lt. Gen. Steven L. Kwast, that culture is "essential" to the success of any society or organization.

Human nature, at large, is innovation's biggest challenge, Kwast argued. Any systemic endeavor in that direction, therefore, is prone to bump up against risk aversion and bureaucracy, a reality of any organization.

"Everything that prevents us from being creative is rooted in human nature," Kwast said. "Bureaucracy is an extension of the human condition. The more people, the more bureaucracy."

By design, organizations will have a violent reaction to disruption since it could mean the end of what its leaders hold foundational. To deny or abuse innovation is "a visceral survival mechanism." Such innovation threatens the "values, the heritages, the hero system, the honor, and the dignity" of its current stakeholders.

Kwast argued that the only way to really push this cultural shift is with a major disruption, one unhampered by the very processes it attempts to cut. Kwast laid out what he thinks is one way to work around the various obstacles—present and inherent—in the Air Force's current culture. Basically, he

said the service has to throw some people outside of its current culture and let them come up with disruptive innovation.

"You don't ask the pig to slaughter itself," Kwast put forth. You take a handful of innovators and "hide them from the bureaucracy," giving them money, freedom, and authority. These are people who yearn to improve processes, who aren't tied to old ones, who constantly want to figure out new ways to do old things. You give them top cover, knowing

L-r: Chuck Louisell, strategic programs manager at Cisco, Lani Kass, senior vice president at CACI, Lance Spencer, director of global defense at AT&T, and Todd Stiefler, general manager of defense at GE Aviation Digital, participate in a digital transformation panel discussion at AFA's symposium in Orlando, Fla.



Lt. Gen. Steven Kwast, AETC commander, speaks to the media at the Air Force Association's Air Warfare Symposium in February.

"Speed is Life" Time and the Risk of Innovation

Milo Medin



Milo Medin, vice president of Access Service at Alphabet, Inc., says USAF is not a risk-averse culture. To the contrary—the problem is a lack of innovation.

if current stakeholders sniff the initiative, they'll try to "kill it." And you do this several times over, with different groups of people. Nine out of 10 such initiatives will fail, Kwast allowed.

"But the one that brings you the idea that's transformational will pay for all the other failures," he said. After all, Kwast also recognized the Air Force doesn't teach its airmen any of this at present. But it should, he argued.

Both SECAF Wilson and Chief of Staff Gen. David L. Goldfein have reiterated again and again their backing of an innovative spirit within the service. But thinking outside the box is harder closer to the ground, according to some. This is especially true in an environment rife with high demand and scant resources.

Just ask Chief Master Sergeant of the Air Force Kaleth O. Wright.

For him, one question from airmen stood out during his first year on the job: "Chief, how can we do more with less?" Speaking at the symposium, Wright said he thinks there's a better question: How can USAF do less, better, faster, and be more efficient and lethal?

The answer is innovation, he said, adding that culture must be "unleashed." But innovation has to be unleashed with intention.

Up until now, the Air Force has been ingrained with a culture gyrating between adaptation and innovation, Wright argued. Affixing mirrors to cover a driver's blind spot is adaptation, he said. Replacing the driver with artificial intelligence, in contrast, is innovation. Ordering detergent from Amazon on a handheld device is adaptation. Walking into one of the company's new Amazon Go stores and walking out without ever speaking to a cashier—or anyone—is innovation.

"Adaptation is about the current fight," he added. "Innovation is about the future."

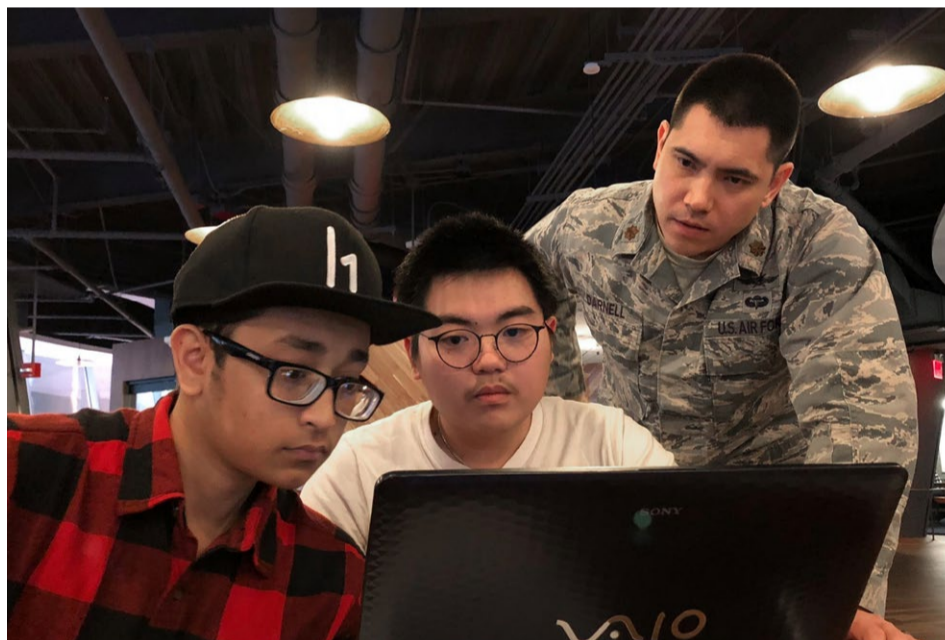
Wright said USAF has to train better than the adversary does, and that has to happen now because of advances near-peer adversaries are making. Today's airmen may have to take the service under construction today to war in 10 or 15 years. To get the most out of these airmen, the service must allow them to fail, he said.

Echoing the danger to be found in the status quo was another industry executive, Lani Kass of CACI, a Washington, D.C.,-based informa-

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SSgt. Joshua Tobin uses a tablet to scan a barcode at Holloman AFB, N. M. The tablets are in the implementation stage. They enable airmen to input data in real time, significantly cutting down job times.



Maj. Barret Darnell assists high school students with hacking challenges at a Hack the Air Force 2.0 event coordinated with the nonprofit organization Code.org. The program revealed 106 Air Force vulnerabilities reported by 27 “hackers” in Belgium, Canada, Latvia, the Netherlands, Sweden, the UK, and the US.

tion systems and solutions outfit with particular focus on national security clients. Speaking on a panel on transforming digital landscapes within the Pentagon, Kass said she became even more concerned by the “things we don’t know” after the Russians “mucked up” the US election process. Kass currently works as CACI’s senior vice president and corporate strategic advisor.

In the information domain, Kass said she’s unsure the “perfectly clear” picture USAF sees and acts upon is actually accurate. Does it reflect the truth—or the whims and fancies of an operator who adjusted data to get others to modify their behavior? Despite USAF’s drive to connect all of its nodes and sensors into one holistic pool of information, Kass argues it’s ultimately down to a human operator to act upon data. Even if the military is able to completely lift the fog of war, it comes down to “what humans do with what the machines provide.”

Alphabet’s Medin—who also serves on the Defense Innovation Board—said the pace of global technological innovation is “increasing and more disruption is on the way.”

To really prepare for that potential threat, he said, the Air Force should not be “tolerating the status quo anymore.” That, he concluded, “would be a good start.”

F-117 Nighthawks fly a sortie in 2007. The Air Force's first stealth fighter, the Nighthawk went from contract to first flight in two years.



BETTER.

INFINITE.

**IN THE COLD WAR, USAF OPERATED WITHIN FINITE BOUNDS.
THE FUTURE HOLDS NO SUCH CERTAINTY.**

It is almost inevitable that the Air Force will be outbuilt and outspent by adversaries, most notably China, in the decades to come. This means USAF will have to rapidly introduce disruptive capabilities to stay ahead of its enemies in what could be an infinite game of “great power competition,” top combat commanders and industry advanced-technology leaders predicted at the Air Force Association’s Air Warfare Symposium in February.

In 50 years, China’s economy could well outstrip that of North America, Europe, and Africa combined, Air Combat Command chief Gen. James M. Holmes warned, and so the US itself will have to resort to asymmetric means to counter China’s power. It will be impossible to match China—which is building its own air force in emulation of USAF—plane for plane, he said.

The US “is coming to the end of the period where our joint force has dominated the landscape,” Holmes asserted, assessing that the “high-water mark” of US domination occurred at about the time of the 2003 invasion of Iraq. China is closing the technology gap swiftly, he said.

“We’re not going to win because we build more or better things,” Holmes said. The US will win these potential future conflicts, but it will be because of good ideas from the ranks. If “given the opportunity,” he said, airmen will come up with the ideas and operational concepts that will provide the edge. The new ideas—and new capabilities from industry, acquired through a much more streamlined procurement system—will allow the US to “stay in the game,” Holmes said.

By John A. Tirpak,
Editorial Director

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Gen James M. Holmes



“This is up to us,” he stated flatly.

In a speech concluding the symposium, which was focused on innovation in organization, technology, and creative thinking, Holmes said the US did not win the last big round of great power competition—the Cold War—so much as the other side “quit.” It was an example of a “finite game” where the players were well-known and the rules were mutually understood.

Already, the US is engaged in an “infinite game,” Holmes asserted, where not all the players are known, they shift frequently, and the rules are changing. Moreover, the criteria for winning are unclear, except when “everybody else quits,” an outcome he does not anticipate.

Holmes warned that “hubris kills,” and the US must not become complacent because it has been militarily successful for so long. Overestimating US capabilities—or underestimating those of an enemy—sets the nation up “for a fall.”

Industry and government leaders who specialize in quickly turning new ideas into advanced military assets said their model of developing technology may well become the norm in the coming years. Randall G. Walden, head of USAF’s Rapid Capabilities Office—which is developing the classified new B-21 bomber and also runs the secretive X-37B space-plane program—said the “secret sauce” in swiftly delivering leap-ahead technologies is culture. The successful technology organizational culture will have tightly focused goals, a short reporting chain, and managers with clearly defined responsibilities and the authority to make things happen, he said, adding that this model borrows from Lockheed Martin’s Skunk Works operation. The members of an organization have to “know what they’re doing” from long experience in high-tech endeavors, and they “have to do systems engineering right.”

When they fail, he said, they need to “fail forward” and have top cover from leadership to be allowed to learn from their mistakes, which are an inevitable part of inventing new technology. Moreover, if policies are presenting an unreasonable obstacle, there must be the courage to change them.

Gen. James Holmes, ACC commander, speaks at the conclusion of AFA’s AWS18 in Orlando, Fla. The new “game” is not finite, where the players were well-known and rules mutually understood. Addressing “infinite” war is going to take a new type of thinking and a change in the speed of delivering new technologies.



L-r: Maj. Jon Roe, Lt. Col. Patrick Schuldt, MSgt. Kevin Peterson, and Maj. Geoffrey Border review plans for the build up at Kandahar Airfield, Afghanistan, in February.

Walden noted that China does not have to observe the so-called “5000-series,” an onerous set of acquisition regulations, giving the Communist juggernaut an inherent speed advantage. For the US, sometimes the book will have to be thrown out to go fast, he said.

Robert F. Weiss, an executive vice president at Skunk Works, said a key element in succeeding quickly is to have a short time horizon in the first place, structuring a program for speed and making other considerations secondary if the need is urgent. He noted the P-80 fighter went from contract to first flight in 180 days; the U-2 spyplane was developed in nine months; the SR-71 spyplane in 32 months; and the F-117 in two years. “We’re doing that today,” he said of whatever secret projects Skunk Works is now developing. There needs to be “an urgency to get the job done,” an attitude that must be shared by government and industry, alike.

Asked, “How rapid is ‘rapid?’” Walden answered that advanced technology has a window of six months to a couple of years.

Air Commodore L. S. Taylor of the UK Royal Air Force said there also must be a constant effort to avoid becoming risk-averse, to “supercharge, not subvert” the process of invention. He advised that high-tech military organizations not “fear failure,” and “fail fast” to find solutions more

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A Chinese Chengdu J-20 stealth fighter in 2017. USAF says it is almost inevitable that the US Air Force will be outbuilt and outspent by adversaries such as China in the coming decades.



British Air Commodore L. S. Taylor (l), head of RAF's rapid capability office, and Mark Cherry, vice president of Boeing's Phantom Works, speak at AFA's Air Warfare Symposium on Feb. 22.

quickly. Taylor also said militaries should avoid trying to find exquisite solutions and instead accept constant spirals of improvement. Militaries need to be more accepting of "good enough for right now" if they want capabilities in the field before they become obsolete, he said.

A dissenting note was struck by Scott Winship, head of Northrop Grumman's Advanced Air Warfare Development unit. Also a veteran of Skunk Works, Winship said, "I don't like the 'fail often, fail quickly,'" idea. He prefers to "solve problems before they become big questions" as to whether a project is feasible.

Mark Cherry, head of Boeing's Phantom Works—the Chicago-based company's rapid development shop—advised attendees to "disrupt yourselves" and not wait to react to an external push to move toward revolutionary new systems. This will be key to "staying ahead of the other guys."

All the advanced development leaders said the No. 1 thing that government can do to grease the rails of technological innovation is to create a relationship of trust with their industry partners, instead of designing an adversarial system in which government assumes industry is trying to cheat. He said government should assume the contractor is doing his best to "protect the country" and shouldn't be presumed dishonest.

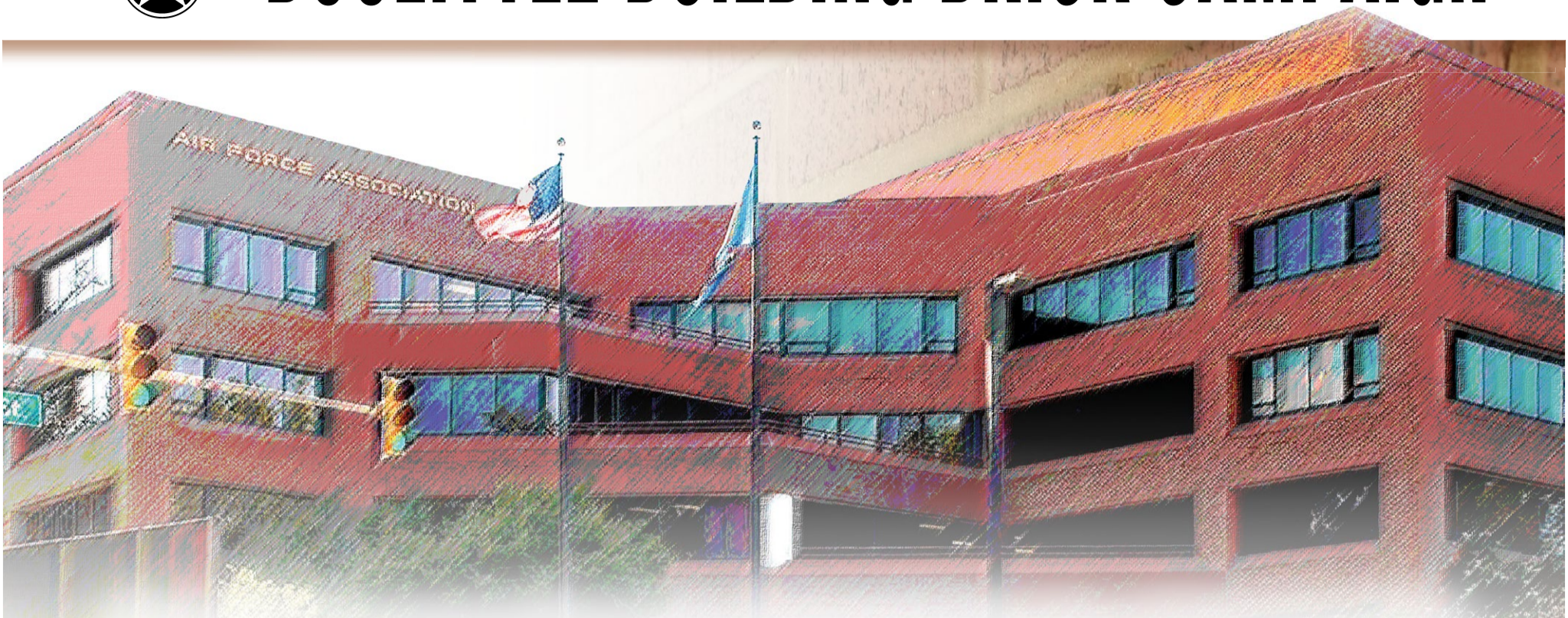
Weiss lamented that in the early days of Skunk Works, it took just half a day to write and sign a contract for a project such as the U-2. Getting back to a similar relationship of trust is something the government should aim for, he said. Cherry summed it up as "the speed of trust."

To help set the stage for a more rapid flow of new technology to front-line units, Holmes said the Air Force has created the Warfighting Integration Capability at the Pentagon, a hybrid of a study and permanent office aimed at anticipating the projects USAF should be investing in now to be ready for future threats and disruptions.

"What they're designed to do is think about how the Air Force will fight against a peer adversary in the future and then work backward about what capabilities will be required," he explained. While "individual projects" will flow from that process, "it won't happen overnight," he added. ★



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A KC-135 lands at McConnell AFB, Kan. A KC-135 boom instructor, MSgt. Bartek Bachleda, won the first USAF Spark Tank competition for a proposal to re-engineer the boom operator's position. Bachleda's design would offer a more stable and ergonomic platform to reduce neck and back injuries.



SAFER KC-135 BOOMER PLATFORM WINS USAF'S SPARK TANK CUP

SIX INNOVATIVE IDEAS ALL RECEIVE AIR FORCE FUNDING.

M

Sgt. Bartek Bachleda, a 22nd Air Refueling Wing aircraft boom instructor from McConnell AFB, Kan., is the Air Force's first-ever Spark Tank winner. Bachleda won the Spark Tank competition cup, USAF's innovation prize, at the Air Force Association's Air Warfare Symposium in Orlando, Fla., in February.

This first iteration of the new Spark Tank effort, to encourage innovation from the ranks, brought six finalists to AFA's symposium before awarding the first Spark Tank cup.

Bachleda presented a proposal to re-engineer the boom operator instructor's position for the entire KC-135 fleet and offer a more stable and ergonomic platform to reduce back and neck injuries, according to an Air Force news release.

"We were and are destroying airmen," he said. "We were getting neck and back injuries, and it's been happening since the 1950s."

Bachleda's design is intended to dramatically reduce injuries to KC-135 boom operators. The new design adds a new cushion, panel, and chin rest to help with back and neck issues. Bachleda says development included 13 months of work, including contributions from maintenance, air crew, hospital personnel, and others.

A panel of Air Force senior leaders, including Air Force Secretary Heather Wilson, Chief of Staff Gen. David L. Goldfein, and industry partners made the decision on the finalists. After hearing the idea

By Steve Hirsch,
Senior Editor

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proposed by Bachleda, Wilson gave firm direction to the service's acquisitions team.

"Before we leave tonight, I want you to talk to this guy, figure out his [System Programs Office], and get this to the airmen," she said.

Once fielded, Bachleda's design is projected to net the Air Force significant cost savings each year, lowering medical costs associated with current boom operators.

Next, they will work with MD5, the national security technology accelerator, to further develop the prototype and make sure it is designed well for manufacturability and safety.

Each of the six Spark Tank finalists is to receive various types of support—including financial support—for their efforts.

According to Capt. Joey Arora, community development director for the Air Force's AFWERX innovation hub, Bachleda's winning proposal will receive additional prototyping support for manufacturability.

The other Spark Tank finalists included three other individuals and two teams. They were:

- 1st Lt. James Eimers, 90th Munitions Squadron, F.E. Warren AFB, Wyo., whose "Brass to Bucks" proposal would use new spent-brass-sorting technology to recycle spent cartridge casings, pumping money back into military accounts;
- SrA. Christopher Caruso, 31st Aircraft Maintenance Squadron, Aviano AB, Italy, for a proposed mobile pod test stand;
- MSgt. Thomas Crider, 164th Airlift Wing Memphis ANGB, Tenn., for a proposal to use augmented reality in aircraft maintenance, operations, and training;
- The team of Col. Tri Trinh, Lt. Col. Mike Fellows, Capt. Liquat Ali, and SMSgt. Timm Huffman of Air Force Reserve Command for an Air Force Connect mobile app; and
- The team of John Figgins, Joseph Motowski, Jeffery Hopkins, and Micah Turner from Air Mobility Command, for a graphic display of airfield restrictions and limitations for use on electronic flight bags.

On Eimers' Brass-to-Bucks proposal, Arora said the proposed plan

MSgt. Bartek Bachleda holds up the Spark Tank trophy at AFA's Air Warfare Symposium on Feb. 22. He is surrounded by Spark Tank judges. To his right is CMSAF Kaleth Wright, behind Bachleda is Milo Medlin of Alphabet Inc., and at Bachleda's far left is Air Force Chief of Staff Gen. David Goldfein.



Air Force Secretary Heather Wilson tries out augmented reality goggles developed for aircraft maintenance by MSgt. Thomas Crider, a finalist in the Spark Tank competition.



TSgt. Chelsey Thornhill refuels a receiver aircraft in a KC-135.

is to purchase an automated sorting machine for Hill Air Force Base in Utah, which accounts for more than 80 percent of spent brass. The team is looking into how the proposal could be implemented across the Defense Department and how that would affect the plan. AFWERX is to coordinate with the team to ensure appropriate policy support for the plan and will invest in a second sorter after successfully recycling a first batch of brass.

Caruso's mobile pod test stand proposal allows maintainers to perform most maintenance on pods while they are on the test stand, instead of needing to mount them on an aircraft, aimed at achieving a substantial time savings. The mobile pod test stand will receive additional prototyping support for manufacturability. Officials will explore its possible use for the F-16, F-15, A-10, and B-1B units.

Crider's augmented-reality proposal team will visit Google to learn from the company's engineers about their progress in augmented reality and virtual reality. The Air Force will fund the next prototype.

The second version of the AFRC team's Air Force Connect mobile app is being developed. There will be an official launch in partnership with CyberWorx, USAF's public-private design center, focused on cyber capability.

Meanwhile, on the AMC team's proposal for a graphic display of airfield restrictions and limitations, there will be funding for a joint Air Force-National Geospatial-Intelligence Agency effort to incorporate this capability in the existing NGA tool.

Spark Tank concluded as Wilson and others stressed the importance of innovation, which was, in fact, one of the key aims of the effort. Wilson announced the competition last September during AFA's Air, Space & Cyber Conference, saying airmen would "be able to compete and pitch their ideas to increase the lethality of the force and to reduce the cost of bringing power to the fight."

Bachleda himself pointed to the importance of innovation.

"I didn't come here to win," he said. "I wanted senior leadership to

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see this problem in front of them and explain to them that we can save the Air Force all this money.”

In addition, “it doesn’t matter what rank you are, it’s innovation,” he said. “It’s either you got it or don’t. If you don’t ... learn it, and everyone can invent something.”

Bachleda’s 22nd Air Refueling Wing is part of Air Mobility Command, the only majcom with two finalists among the six selected for presentation at the Orlando conference.

AMC commander Gen. Carlton D. Everhart II lauded the role of innovation, calling it “central to our Air Force’s ability to apply airpower.”

“At a time when we are challenged with resource constraints, with no rest from our adversaries, we need to find more effective ways to continue as the world’s most dominant Air Force,” he said.

Lauren Knausenberger, director of Spark Tank and director of cyberspace innovation for the Air Force, pointed to the value of the competition.

Spark Tank, she explained in an email, provides “an amazing venue to celebrate our Air Force risk-takers and idea makers, innovation heroes who reject the status quo and develop their own solutions to an increasingly complex set of challenges.”

She called the degree of involvement by senior leadership “inspiring” to airmen, while bringing senior leaders’ attention to solutions to significant challenges and the obstacles to implementing them.

She said that the airmen among the finalists are able to act as “airman CEOs” to implement proposals, with AFWERX, Airmen Powered by Innovation (a program started by USAF in 2014 aimed at harnessing airmen’s creativity), and the greater Air Force community “as their advocates and investors.”

“We also hope this will inspire airmen to truly see what can be accomplished and to embolden them to solve problems at the grassroots level,” she said.

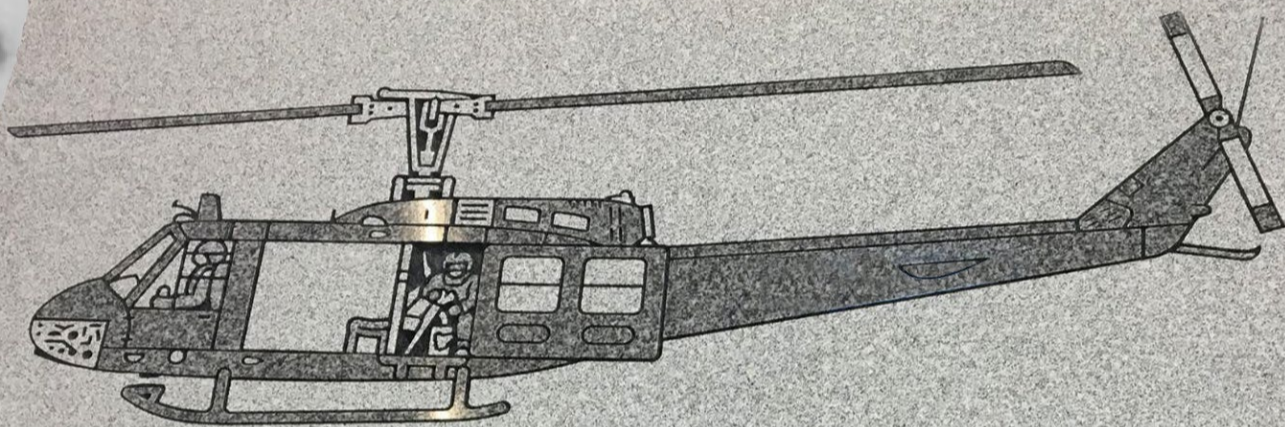
She said with the Feb. 23 announcement of the Squadron Innovation Fund, “we hope to see more localized versions of Spark Tank pop-up as a mechanism to vet projects in a fun way and to elevate some of the best ideas to the competitive arena.”

Whether there will be another Spark Tank competition next year is unclear. 

A mobile sensor test pod stand (r) developed by SrA. Christopher Caruso, seen next to a standard test pod stand. Caruso’s proposed unit allows maintainers to access panels underneath the sensors without first mounting it on the aircraft.

SAVE THE DATE:

VIETNAM HELICOPTER PILOT AND CREWMEMBER MONUMENT DEDICATION



1961 – 1975

IN HONORED MEMORY OF
THE HELICOPTER PILOTS AND CREWMEMBERS
WHO GAVE THE FULL MEASURE OF DEVOTION
TO THEIR NATION IN THE VIETNAM WAR



APRIL 18, 2018 AT 4:00 P.M.

ARLINGTON NATIONAL CEMETERY



FIGHTING THE CALIFORNIA FIRES

When things got hot, MAFFS-equipped airmen were there.

A C-130J-30 drops fire-retardant chemicals onto a ridge line above Santa Barbara, Calif., Dec. 13, 2017, as part of the effort to contain the Thomas Fire.

Photo: J. M. Eddins Jr./USAF

When the state of California faced its most devastating fire season ever in 2017, Air Force Guard and Reserve units were there, trained and ready to step in.

Nearly half of USAF's tactical airlift resources belong to Air National Guard units, including the C-130Js of California's 146th Airlift Wing. The 146th, out of the Channel Islands Air National Guard Station near Oxnard, Calif., can convert C-130s from transports to firefighters with the installation of MAFFS—the Modular Airborne Fire Fighting System—employing tanks and a huge spray nozzle mounted in a modified left jump door. The MAFFS II system now in use can carry 3,000 gallons of fire retardant in a pressurized container and pump it into the slipstream.

The Air Force Reserve, meanwhile, operates strictly as a federal asset. Some Reserve C-130s of the 302nd Airlift Wing at Peterson Air Force Base in Colorado are also MAFFS-capable. Both Reserve and ANG C-130s fought the exceptional California fires of 2017.

A full load of retardant can be released from a MAFFS aircraft in about five seconds, or it can be parceled out in multiple passes. A full swath from a MAFFS C-130 can cover a line a quarter-mile in length and 100 feet wide, providing vital protection until ground firefighters can establish permanent fire lines in the area.

Back at a reloading base, the MAFFS Hercs can be refilled for their next firefighting sortie in less than 12 minutes.

California wildfires burned over 1,266,224 acres in 2017. More than 250 fires in northern California in the summer and fall taxed the re

By Frederick A. Johnsen

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Maj. Danny Ariza pilots a C-130J and follows a US Forest Service lead plane preparing to drop fire retardant on the Pier Fire, southeast of Fresno, Calif., Aug. 29, 2017. Photo: TSgt. Jeff Allen

sources needed to fight them. Then in December, a rash of wind-whipped blazes struck southern California.

Modern wildland firefighting seeks balance as protection is given to people and structures, with some unpopulated areas allowed to burn. Firefighting resources are limited, and some undergrowth burning is a natural ecosystem renewal process. With California urgently battling killer fires last year, civilian air tanker assets were at times unable to keep up.

And that's when the calls went out to MAFFS-capable C-130 units. The US Forest Service, through the National Interagency Fire Center in Boise, Idaho, requests MAFFS assistance across state lines when needed.

With retardant-release altitudes sometimes less than 200 feet above ground in mountainous terrain with tricky winds and restricted visibility, aerial firefighting can be perilous. This was shown in July 2012 in South Dakota when a MAFFS-equipped C-130 crashed just after releasing retardant. Four crew members perished.

The 302nd got the call July 27, based on increased wildfire activity all over California, the Great Basin, the Northwest, and in the Northern Rockies. Three days later, the first MAFFS C-130 was on line in California.

When the Forest Service makes the call to US Northern Command, which activates MAFFS support, an Air Expeditionary Group taps four MAFFS-trained C-130 units to share the task. These are the Reserve 302nd and three trained ANG operators—the 146th, Nevada ANG's 152nd Airlift Wing, and Wyoming ANG's 153rd Airlift Wing.

The four MAFFS-qualified C-130 units share a total of eight MAFFS equipment sets owned by the Forest Service, which also supplies the requisite fire retardant. (The firefighting agency with jurisdiction over MAFFS during an operation also reimburses the military for costs involved.)

Fire managers move the various aerial assets at their disposal, as needed, during the season. The blue-suit MAFFS aircraft, both Reserve



A C-130J on the flight line at Channel Islands ANGS, Calif., as smoke from wildfires rises in the background. Photo: MSgt. Brian Ferguson

and ANG, concentrated on California's problems by attacking more than 24 fires in that state.

The MAFFS Air Expeditionary Group logged 293 sorties during the main 2017 season, releasing more than 820,000 gallons of retardant in 315 drops over California by September—when the season was first thought to be over. The 153rd brought MAFFS-equipped C-130Hs to the California wildfires that month, then quickly pivoted to provide hurricane relief missions.

Then the late-blooming Thomas Fire, north of Santa Barbara, was attacked by MAFFS C-130s at the request of the state of California. The 146th flew 71 sorties between Dec. 5 and Dec. 20, releasing 209,350 gallons of retardant. Nearly all of these sorties were directed against the Thomas Fire.

MAFFS has been a part of the national firefighting mix since 1971. It is an attractive addition to civilian air tankers because MAFFS aircraft and crews can bolster firefighting resources on short notice and then return to other duties.

The Thomas Fire was the exclamation point on what was the most destructive year on record for wildfires in California. According to *The Washington Post*, "nearly 9,000 wildfires tore through the state, burning 1.2 million acres of land," an area the size of Delaware. At least 46 people were killed in the fires, which destroyed more than 10,000 structures.

Without the quick response and high-volume retardant offered by MAFFS-equipped Air Force units, 2017's fire devastation would have been even worse. 🌟

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Technicians test the spray nozzle on a MAFFS-equipped C-130J at Channel Islands ANGB in Port Hueneme, Calif., in December.
Photo: J. M. Eddins Jr./USAF



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A CAL FIRE crew of prison inmates rests after clearing a fire break on a ridge above Santa Barbara, Calif., Dec. 11, 2017. Inmate crews and bulldozers dug up foliage along ridge lines in the Los Padres National Forest while C-130Js dropped fire-retardant chemicals to slow the advance of the Thomas Fire. Photo: J. M. Eddins Jr./USAF

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The Detwiler Fire burns in Mariposa County, Calif., as seen from the cockpit of a MAFFS C-130 from Channel Islands Air National Guard Station on July 21, 2017. Photo: Maj. Matthew Ringlein/California ANG

AFA NATIONAL REPORT

■ LANCE P. SIJAN CHAPTER

The Sijan chapter in Colorado Springs, Colo., masterminded and hosted a Multidomain Command and Control (MDC2) symposium at the Antlers Hotel in Colorado Springs in September 2017. Co-chairs Henry Baird and Kristen Christy and volunteers from the Sijan Chapter pulled together the symposium after months of planning.

The two-day event boasted an impressive roster of Air Force Active Duty and retired officers, industry leaders, and government experts participating in panel discussions.

Day One focused on professional development opportunities for enlisted members, and Day Two was oriented toward aerospace issues and Active Duty military.

The symposium was addressed by Brig. Gen. Chance Saltzman, director of current operations on the Air Staff, Gen. John W. Raymond, commander of US Space Command, and Gen. Gregory S. Martin, USAF (Ret.).

MDC2 is a high-value effort to look at the challenges facing the military as it creates an integrated tasking order similar to a traditional air tasking order, which assigns missions and schedules sorties for all aircraft in a theater of operations. An integrated tasking order would assign tasks to space and cyber forces, as well.



Gen. John Raymond, head of Air Force Space Command, offers comments on the way ahead for MDC2 at a symposium sponsored by the Lance P. Sijan Chapter in Colorado Springs, Colo.



Mitzi Morrison at the Donnelly Chapter's STEM booth at JB Andrews, Md.

■ DONNELLY CHAPTER

The Donnelly Chapter in Wichita Falls, Texas, hosted an information booth in the STEM hangar at JB Andrews, Md., at the base's open house Sept. 15-17, 2017.

Former Donnelly Chapter Teacher of the Year Mitzi Morrison manned the booth, which drew a large number of visitors during the family-oriented event. Air Force Secretary Heather Wilson and Air Force Chief of Staff Gen. David L. Goldfein also stopped by the booth, thanking Morrison and the Texas-area chapter for their STEM efforts.

Donnelly's primary focus is supporting the airmen at nearby Sheppard AFB, Texas, but the active members have increasingly worked on promoting STEM educational efforts in rural West Texas communities.

■ MICHIGAN STATE AFA

The Michigan State Air Force Association presented a leadership seminar to the Michigan State University AFROTC Det. 380 in February.

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State President Randy Whitmire spoke to attendees comprising cadets and ROTC staff members on the Top Ten Leadership Traits.

More seminars are in the planning stages with Western Michigan University AFROTC and Arnold Aviation Society cadet leaders. Whitmire hopes to begin presenting the seminars in the spring of this year, with topics including his own address on Human Trafficking (from a law enforcement perspective including warning signs, getting help for victims, and prosecuting perpetrators) and a presentation on Suicide Prevention lead by State Vice President Eliza Zimmerman. The coming presentations will be open to the general public.



Bryan Graddy, Richard I. Bong Chapter president, presents a Teacher of the Year 2017 certificate to Mrs. Elisabeth Kersting-Peterson of Homecroft Elementary School in October.

■ RICHARD I. BONG CHAPTER

The Richard I. Bong Chapter, Minn., recognized its National Teacher of the Year for 2017 at a meeting in October. Mrs. Elisabeth Kersting-Peterson. Peterson is a second grade teacher at Homecroft Elementary School in Duluth, Minn. Chapter president Bryan Graddy said Peterson has shown tireless dedication to instilling in young children the desire for lifelong learning and sparking curiosity in science, technology, engineering, and math.



MSgt. Steven Ebbs (l) state president of the Air Force Sergeant's Association, Col. Arnie Franklin (c), and Gene McManaway, Dougherty Chapter President, at Franklin's presentation on the T-33 displayed at the Aviation Heritage Park in Bowling Green, Ky.

■ GEN. RUSSELL E. DOUGHERTY CHAPTER

In a celebration of USAF's 70th anniversary, the Dougherty Chapter, in a co-meeting with a local Air Force Sergeant's Association Chapter, hosted a presentation by the director emeritus of the Aviation Heritage Park in Bowling Green, Ky. Col. Arnie Franklin spoke about the T-33 representing the career of Gen. Russell Dougherty, which is on display at the museum. Franklin was the tactical leader of the F-111 portion of the strike on Libya during Operation El Dorado Canyon in 1986.

■ PAUL REVERE CHAPTER

The Paul Revere Chapter in Boston held its 8th annual Veteran's Fun Run at Hanscom AFB, Mass. Kicked off by Chapter President Bud Vazquez, the run boasted 57 runners and 30 volunteers—Active Duty

Participants in the Paul Revere Chapter's Veteran's Fun Run attempt to stay warm in the frigid weather before the race begins.



members, cadets, Lowell High School JROTC, and University of Lowell ROTC Det. 345 members. Seven companies—Boeing, Hanscom Federal Credit Union, Leidos, Lockheed Martin, Northrop Grumman, Oasis, and Odyssey Systems—provided support. In 2016, Revere provided nearly \$40,000 in support to the local Air Force community, including scholarships, veterans support, and hosting educational events and community initiatives.

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■ LOUIS E. LYLE CHAPTER

The Lyle chapter in Hot Springs, Ark., hosted as speaker retired Army Col. Anita Deason, who served in the National Guard for 33 years and currently works as military and Veterans Affairs liaison in the Little Rock office of Sen. John Boozman (R-Ark.). She assists veterans and their families in obtaining lost service medals and records, helps with funeral and burial arrangements, medical claims and appeals, and with legislation concerning veterans.

Deason spoke about the Library of Congress Veteran's History Project, which collects and preserves personal narratives, correspondence, and visual materials—including drawings and photographs—from America's war veterans. The authorizing legislation creating the vast project was signed into law in 2000.



■ FAIRBANKS MIDNIGHT SUN CHAPTER

Members of the Fairbanks, Alaska, Midnight Sun Chapter, along with state AFA leadership, attended a community showcase event at Eielson Air Force Base in October. Eielson is in the midst of an upgrade to ready the base, which is slated to receive 54 F-35s by the end of 2020.

An F-35 Lightning II (pictured) is currently at Eielson undergoing cold-weather testing.

Representatives from AFA, Community Partners, and Stellar Explorers/CyberPatriot visit an F-35 in the hangar at Eielson AFB, Alaska. L-r: Steve Lundgren, Jeff Putnam, Jennifer Imus, Luke Hopkins, Nicole Stewart, Jake Loud, and Mike Rauenhorst.



Buffalo Soldier re-enactors at the Colorado State Convention.

■ MEL HARMON CHAPTER

The Colorado AFA State Convention, hosted by the Mel Harmon Chapter in Pueblo, Colo., was jam-packed with events in August. The City Council of Pueblo presented AFA a certificate of appreciation and a commendation for “sustained involvement in supporting Pueblo as a destination, assisting and entertaining Pueblo’s outstanding veterans, and for their participation in the many events that bring an understanding of the Air Force mission.”

Attendees visited the Center for American Values on the Pueblo Riverwalk, rode a riverboat to the Veterans Bridge where they enjoyed a tribute ceremony and a flyover by Doss Aviation, and visited the Weisbrod Aircraft Museum, where they dined, enjoyed a demonstration by the Buffalo Soldiers of the American West Mounted Cavalry Drill Team, a performance by the Omawari Folkloric Dance Group, and the Air Force Band Wind Ensemble.

The keynote speaker was former astronaut and Undersecretary of the Air Force Ronald M. Sega.

■ EVERETT R. COOK CHAPTER

The Cook Chapter of Memphis, Tenn., welcomed Gen. Charles A. Horner, commander of US and allied air forces during Operations Desert Shield and Desert Storm, to address a chapter meeting in September.



Horner spoke about the lead-up to Desert Storm. He credited Gen. Wilbur Creech, then commander of Tactical Air Command, for improvements in morale, discipline, and training and the Reagan administration for the improved military budgets that allowed USAF to address aircraft and equipment problems.

Members of the 164th Airlift Wing, Tennessee Air National Guard, presented Horner with the Tennessee AFA coin, and the Cook Chapter donated \$1,000 in Horner’s honor to the Voluntary Service Office at the Memphis VA Medical Center as thanks for his support.

L-r: SMSgt. Dan McMahon, CMSgt. Kenneth Simmons, USAF Gen. Chuck Horner (Ret.), SMSgt. David Joachim, and A1C Evan Thompson. A Tennessee AFA coin was presented to Horner at the Cook Chapter meeting.

■ SHOOTING STAR CHAPTER

Morris Plains, N.J.'s Shooting Star Chapter hosted Arthur L. Snyder, a Korean War-era pilot, who presented a two-part program about his time in the service. Part one was in September, part two in October.

Snyder flew 36 interdiction missions in the B-26 and B-29—largely on covert CIA flights. Snyder's oral history is recorded in the Rutgers University School of Arts and Science's Oral History archive.

■ LEXINGTON BLUEGRASS CHAPTER

The Lexington Bluegrass Chapter in Lexington, Ky., annually sponsors two scholarships for students to attend the Aviation Museum of Kentucky's Aviation Summer Camp.

Last year's recipients were Jordan Greer of Kings Mountain, Ky., and David Edmonds of Lexington, Ky.

David Edmonds, a student sponsored by the Lexington Bluegrass Chapter, attended the Aviation Museum of Kentucky's Aviation Summer Camp.



Jordan Greer was one of two students sponsored by the Kentucky chapter to attend the summer camp.

The museum's aviation summer camp presents 10- to 15-year-olds a hands-on introduction to flight. They study the history of aviation, investigate the principles of flight, study flight technology, practice on a flight simulator, and help plan and conduct their own flights over Kentucky in a four-seat aircraft piloted by an FAA-approved pilot.

Gen. Carl A. Spatz Chapter President, David Ribbe (r), and David Lieber, CEO of RamaPost, celebrate AFA-Community Partnership in Almont, N.Y.



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Dave Carrell, Emily Cordeiro, Danielle Reagan, Juan Mulvena, Stephanie Paine from Chick-fil-A, and Marie Lankford and Vickie Jo Ryder from AFA Chapter 105 wait to serve breakfast to those attending the 2018 Heritage Flight Training Conference.

■ AFA TUCSON AND COCHISE CHAPTERS

The two Arizona chapters participated in the 2018 Heritage Flight Training Conference hosted each year by Davis-Monthan AFB, Ariz. The event, held March 1-4, showcased vintage aircraft such as the venerable P-51 Mustang, P-47 Thunderbolt, P-40 Warhawk, P-38 Lightning, and F-86 Sabre flying with current US Air Force aircraft, namely the A-10 Thunderbolt II, F-16 Viper, F-22 Raptor, and F-35 Lightning II. Spectators were allowed to view the participating aircraft on the flight line before the day of flying began.

The goal of the training conference is to certify the vintage aircraft to fly with their more modern brethren in air shows across the US. The commander of Air Combat Command—in 2018 Gen. Mike Holmes—attends the event so that he can certify the pilots at the end of the weekend.

Chapter member, Dave Carrell, owner of a local Chick-fil-A, treated chapter members and other visitors to breakfast after they toured the aircraft.

■ SAMUEL M. GARDNER

1929-2018

AFA National Director Emeritus Samuel M. Gardner of Amarillo, Texas, passed away on Jan. 20, 2018. He was 88 years old. He was in the USAF from 1947-1967 and served in the Korean War.

In 1970 he relocated to Kansas and retired from the National Weather Service in Garden City. He also served as the director of his local Red Cross for many years.

Gardner joined AFA in 1986 working with AFA's Aerospace Education Foundation. He served as an AFA Trustee and was involved on numerous boards and committees. His awards for service included AFA's Medal of Merit. Gardner served as National Vice President for the Midwest Region of AFA in 1996 and was a Life Member.



Samuel Gardner

■ HARRY A. TALBOT

1951-2018

Harry A. Talbot, 67, an AFA Life Member, passed away on Jan. 30, 2018, in Carpinteria, Calif. Harry was a veteran, joining the Army in 1970 and retiring from the Air Force Reserve in 2004.

He received a Bachelor of Arts degree in Political Science from San Jose State University, a Masters' in Public Policy from Claremont Graduate School in Claremont, Calif., and a Doctorate of Education from California Lutheran University. He began his career in education in 1990 and worked in K-12 education for 25 years.

Talbot was the linchpin of the Air Force Association's Aerospace Education reach into the Los Angeles Unified School District, serving as administrative coordinator. He became a key figure in Los Angeles' Beyond the Bell after school program and a leading advocate for LA USD's early adoption of AFA's Cyberpatriot National Youth Cyber Education program. Beyond the Bell carries the distinction of being named the first Cyberpatriot Center for Excellence.



AIR FORCE ASSOCIATION



2nd Annual
**Wounded Airmen
Cycling Challenge**

Fundraiser to support Wounded Airman Program

May 19, 2018

CycleBar | Premium Indoor Cycling | Arlington, VA



For corporate sponsorship opportunities contact

Fred Ullman | FULLman@afa.org | 703-247-5842

To Fundraise & Register for ride visit www.AFA.org/WACC





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4

KELLY

Destiny in Texas

The site of the famous old Texas air base was chosen on Nov. 21, 1916. At first it was Camp Kelly. Then it was Kelly Field. USAF called it Kelly Air Force Base until it closed in 2001. "Kelly" was arguably the best-known name in the entire service during those intervening 85 years. Who was Kelly?

He was a British subject who became an American citizen, an enlisted troop who became an officer, an artillery and infantry man who became an airman, and—not least—an historic fatality.

He was George Edward Maurice Kelly, born in London in 1878. The youthful Kelly attended the elite Bedford Modern School but did not go to college. Instead, at age 17, he emigrated to Montana.

When the Boer War began, Kelly tried to join the Canadian Mounted Rifles. No luck. Discovering that an enlisted man in the US Army could work to acquire a commission, Kelly—now a naturalized American—signed up for the Coast Artillery. He was 25.

In 1907, then-Sergeant Kelly won a commission as a second lieutenant of infantry. He spent two years in the Philippines and then transferred to San Francisco.

Here, fate intervened.

Kelly, on a dare, took a balloon ride and instantly got the flying bug.

He agitated for aviation duty and early in 1911 the Army sent him to San Diego for flight training. Lieutenants Kelly, Paul Beck, and John Walker trained on Curtiss Type IV "pusher" biplanes, one of which the Army had just acquired. In April 1911, the three were ordered to Fort Sam Houston, Texas, where the Army's Type IV awaited. It was called "Signal Corps No. 2"—S.C. No. 2 for short.

Walker, the first to fly it, nearly crashed. Next came Beck, who stalled on landing, drove the aircraft into the ground, and was knocked out cold. Repairs were undertaken, but never tested.

On May 10, at about 7:30 a.m., Kelly took off in S.C. No. 2 and circled the parade ground for about five minutes. His first landing attempt was too

1/ 2nd Lt. George E. M. Kelly. 2/ WWII mechanics at Kelly Field. 3/ Kelly aboard a pusher-type biplane. 4/ Port San Antonio today.

GEORGE EDWARD MAURICE KELLY

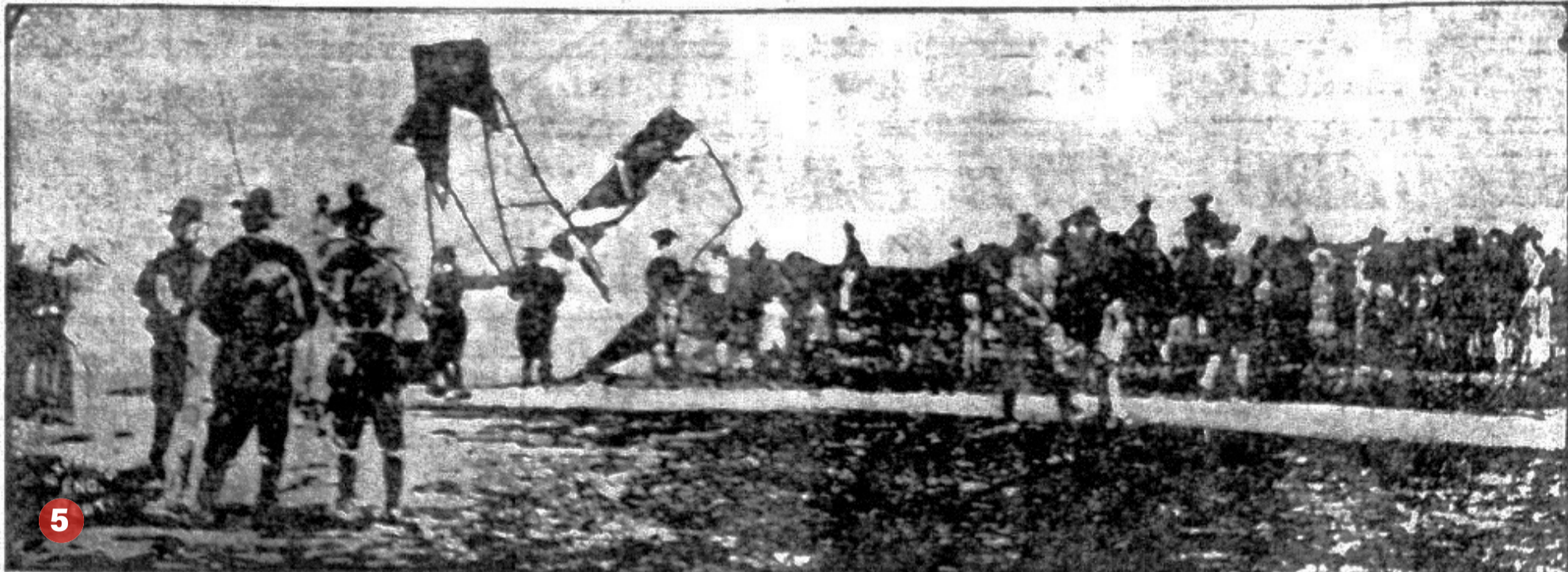
Born: Dec. 11, 1878, London
Died: May 10, 1911, Fort Sam Houston, Texas
Education: Bedford Modern School, England
Services: Army, Coast Artillery (1904-07); Army, Infantry (1907-11); Army, Aeronautical Division, Signal Corps (1911)
Occupation: US military officer
Main Era: Pre-World War I
Years Active: 1904-1911
Combat: Philippine Islands
Final Grade: Second Lieutenant

KELLY AIR FORCE BASE

State: Texas
Nearest City: San Antonio
Area of Main Base: 7.3 sq mi/4,660 acres
Status: Closed (by USAF) July 13, 2001
Designated as Base: Nov. 21, 1916
Opened as Camp Kelly: June 11, 1917
Renamed Kelly Field: July 30, 1917
Renamed Kelly AFB: Jan. 29, 1948
Current owner: Port San Antonio (State of Texas); Air Education and Training Command (Kelly Field Annex)
Former Owners: San Antonio Air Service Command; Air Materiel Command; Air Force Logistics Command; Air Force Materiel Command

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WRECK OF RUNAWAY AEROPLANE IN WHICH LIEUT. GEORGE E. M. KELLY MET DEATH



5



6

hot and steep. He hit hard and bounced. Kelly got the biplane back into the air and came around for a second try.

This time, Kelly got the speed and glide angle right but witnesses saw him frantically working the controls, which seemed to be broken. The stricken S.C. No. 2, engine roaring, headed for a tent camp. Perhaps Kelly steered the aircraft away, but S.C. No. 2 banked left, dragged its left wing tip, cartwheeled, and pitched the pilot some 100 feet forward into a head-first landing. Two hours later, he died of a fractured skull. He was 32.

Kelly was the first US military aviator killed while piloting an American military airplane. That is why, six years later, he was chosen to be the namesake of the nation's first permanent air base.

Kelly at first was a major training facility, producing thousands of pilots in the World Wars. From World War II onward, it was home to a massive aircraft repair depot. That depot is now the site of Texas-owned Port San Antonio. Use of its runway—now called Kelly Field Annex—is shared by Port San Antonio and flying units at adjoining JBSA-Lackland AFB, Texas. ☛

5/ *San Antonio Express* photo showing the wreckage of Kelly's aircraft.

6/ Preparation for the JBSA-Lackland, Texas, Air Show and Open House in 2017.

