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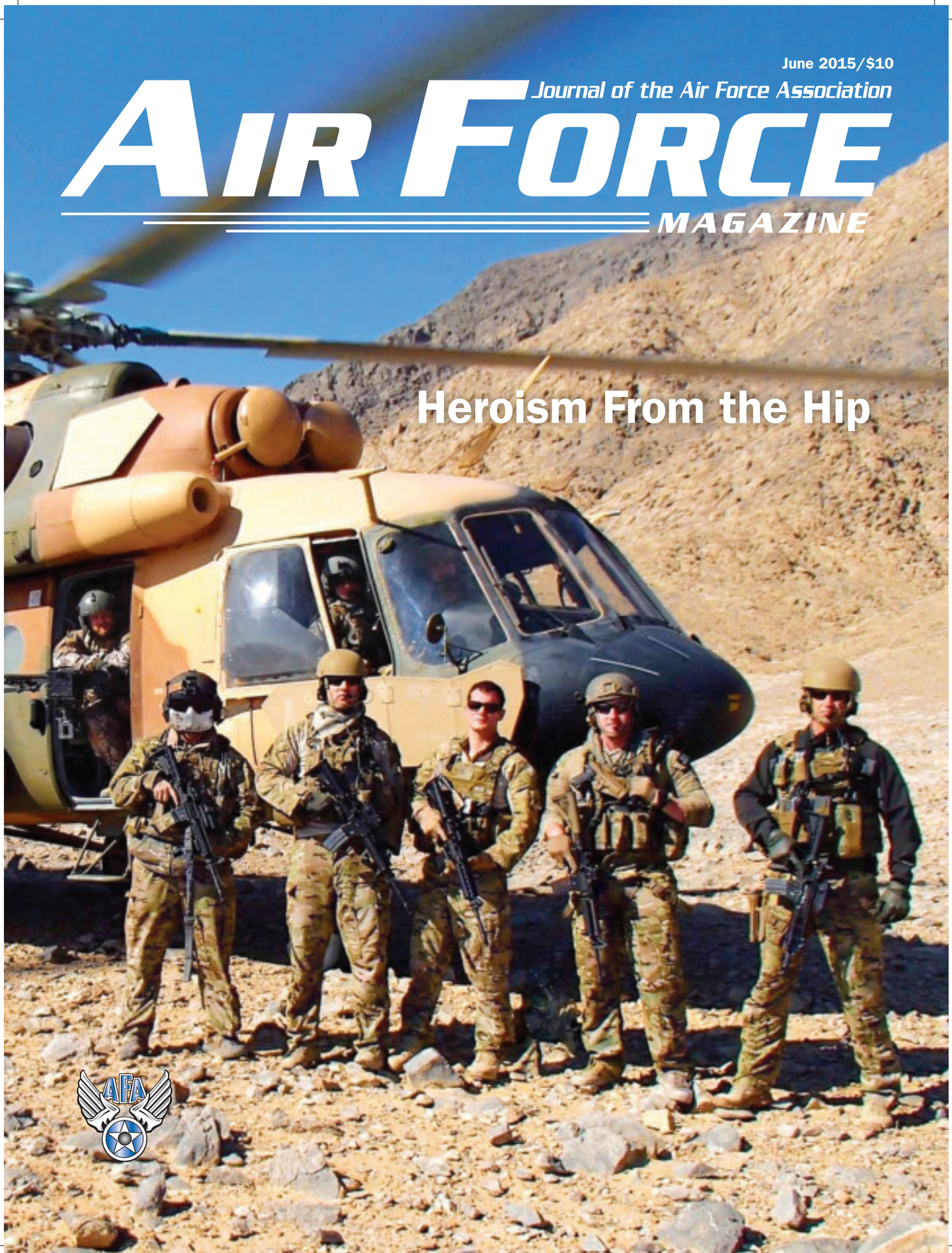
Journal of the Air Force Association

AIR FORCE MAGAZINE

Heroism From the Hip



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AIR FORCE MAGAZINE

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Editorial

By Adam J. Hebert, Editor in Chief

More Mission, Less Air Force

Just last year, there was hope among senior Air Force officials that drawdowns in Iraq and Afghanistan would allow USAF to catch its breath and rebuild its force. That has not panned out. The Air Force finds itself as busy and globally engaged today as ever.

At the start of 2014, few predicted the rise of the ISIS extremists in Syria and Iraq; President Obama himself referred to ISIS as "JV jihadists." Aircraft as diverse as the A-10 and F-22 have since gone to war to prevent ISIS fighters from sweeping almost unchecked through huge portions of the Middle East.

Meanwhile, during Fiscal 2014, the Air Force budget declined by 9 percent from the previous year.

More recently, USAF quickly responded with medical and disaster relief after devastating earthquakes in Nepal in April and May. "This was not what we originally came here to do," said TSgt. Honorata Fernandez, a medical technician, in a release about emergency medical relief missions. "I wasn't expecting another earthquake to hit after we got here."

The missions to Kathmandu and against ISIS prove the expression that flexibility is the key to airpower. But the Air Force is in danger of losing its ability to provide the very flexibility that makes it such a responsive asset for the nation and world.

USAF is dealing with familiar problems. "With the oldest inventory in history, battered by 17 years of continuous combat, the Air Force's ability to fulfill its missions is already being tested," wrote then-Chief of Staff Gen. T. Michael Moseley in a 2007 white paper.

The Air Force is still at war, now for 24 straight years. All the while, the force has gotten smaller, the inventory older still, and budgets are down significantly from eight years ago. What has not decreased is demand for Air Force airpower.

"Would-be adversaries … find maneuver space and sanctuary in dense urban areas, ungoverned hinterlands, and loosely regulated information and social networks," Moseley wrote in words that also fit ISIS. "Their operations are difficult to constrain with traditional force-on-force approaches."

And in a description applicable to China or Russia today, Moseley noted, "ascendant powers—flush with new wealth and hungry for resources and status—are posturing to contest US superiority."

Two Chiefs of Staff later, these challenges persist. Indeed, if they were easy to solve, they wouldn't be problems in the first place. But with a shrinking force, if the nation is called to fight a new war, it will be forced to pull combat forces from frontline operations somewhere else, as USAF has little in reserve. In 2004, the Air Force had 376,000 Active Duty airmen. By 2014, a force at war had declined 17 percent, losing 60,000 airmen. Plans called for the service to go down to 310,000 airmen.

USAF cannot succeed in ever-expanding missions with fewer airmen, less equipment, older airplanes, and curtailed training.

"People are worn down," said Gen. Larry O. Spencer, vice chief of staff, in May. "We were getting too small," so the Air Force set a new target for an Active Duty force of 317,000 airmen in 2016. This will allow the service to increase manning in priority areas such as search and rescue, maintenance, ISR, security forces, and nuclear operations.

The service has also cut aircraft. Across the Total Force, USAF today is flying 550 fewer airplanes than a decade ago. While the Air Force was busy buying Reapers for use in low-threat conflicts, it shed more than 500 fighters and manned attack aircraft.

There is a fundamental disconnect between the service's missions and the resources USAF is provided to perform those missions. Funding has not kept up with requirements, and this has compelled the Air Force to focus on the here-and-now.

The funding gap may get significantly worse. Adjusted for inflation, Budget Control Act funding for future years is still higher than the post-World War II average. In other words, the cuts may keep on coming.

For the Air Force, the drawdown was not preceded by a major modernization and the funding increases of the 2000s went directly to war expenses. Further, USAF cannot anticipate a peace dividend or lower future requirements.

What is the way out of this jam? There are three obvious ways to begin to balance requirements and resources, but none of them are without risk or controversy.

First, the nation could withdraw from some commitments. For example, the nation is fighting a very cautious and constrained war against ISIS. The US could decide ISIS is just not worth it, and cease that fight.

A second route is to increase resources. The Budget Control Act sets arbitrary spending limits that disproportionately affect DOD. The nation could, and should, repeal the BCA and properly fund defense.

A third option is for Congress to grant DOD greater flexibility. Personnel costs take an ever-larger share of defense spending—52 percent and rising—so compensation reform would help. USAF has far too much basing infrastructure, so a new base closure round is needed. And lawmakers continue to micromanage USAF's aircraft fleets, preventing the service from retiring lower-priority systems.

As Spencer noted, the US Air Force was the best in the world 10 years ago, and it is the best in the world today. The gap with other nations is closing however, and if the mismatch between missions and money is not fixed, the US will no longer have the Air Force it demands.

If nothing changes, what happens when requirements continue to outpace resources?

Look no further than to what happened during sequestration in 2013. Key training and development programs such as Red Flag and the Weapons School were shut down, eroding USAF's skill advantage over the rest of the world. International cooperation was curtailed. Seventeen Air Force combat squadrons were grounded, 10 more went to a bare-bones readiness status, and readiness plummeted.

Two years later, the Air Force still does not have enough units ready for full-spectrum combat operations. This is the Air Force the nation is paying for. It does not have to be this way. ✪

Action in Congress

By Megan Scully

Martha McSally's New Battle

Arizona's 2nd congressional district has become ground zero in the battle over the fate of the Air Force's fleet of venerable A-10 attack aircraft.

The Tucson-area swing district, which includes Davis-Monthan Air Force Base, is home to 93 Warthogs, more than any other base in the country. The fighters are central to life on and around the expansive base, and their retirement would undoubtedly be a blow to the local economy if Davis-Monthan did not immediately assume a new mission of comparable size.

That fact is not lost on Republicans, who are trying to maintain the congressional seat they gained in November when Air Force veteran—and former A-10 squadron leader—Martha McSally beat Democratic incumbent Ron Barber in the last House race called following the November elections.

The nail-biting race, a replay of the bruising 2012 campaign, came down to a difference of just 167 votes, automatically making McSally one of the most vulnerable GOP incumbents at the very outset of her congressional career.

It may not even be campaign season yet, but the stakes for the rookie Arizona Republican couldn't be higher.

Saving the A-10s, which the Air Force has sought to retire to save $4.2 billion over the next five years, does not guarantee victory for McSally, as Barber himself painfully learned in November.

But failure to keep them flying—particularly with her Air Force experience and her seat on the House Armed Services Committee—would deal a huge early blow to McSally's re-election hopes.

The first chapter in this political drama played out in late April during the House Armed Services Committee's debate on the Fiscal 2016 defense authorization bill, a sprawling measure that sets Pentagon policy and prescribes spending levels.

Many top Republicans on the panel—including now-Chairman Mac Thornberry (R-Texas)—voted last year against an amendment offered by Barber. It would have tapped war funds to save the A-10s from the Boneyard, coincidentally also located at Davis-Monthan. Thornberry now explains that his opposition to the Barber language, ultimately passed by the committee, stemmed from the spending offset, not to the fighters themselves.

And so Thornberry drafted an authorization bill that set aside $682.7 million for the A-10s next year. But in a bit of political posturing, he left it to McSally to introduce an amendment during the panel's 18-hour debate on the bill explicitly prohibiting the A-10's retirement, handing his GOP colleague a golden opportunity to claim a public—and decisive—victory.

Martha McSally flew A-10s and is fighting hard to keep them flying.

Flickr photo

Indeed, Thornberry teed it up for McSally just days before the markup, lauding her for being a "strong and persuasive advocate for the A-10" whose "relentless efforts helped to highlight the Administration's flawed reasoning and strongly informed our decision to continue its funding."

Late into the markup, McSally got her chance, calling the A-10s the Air Force's "most survivable close air support aircraft." In a shot at Barber's efforts last year, McSally also stressed that her amendment "does not cost a dime."

Democrats, however, mounted a rearguard action. Many had supported the Barber amendment last year—a fact that congressional sources now acknowledge was an effort to save one of their own.

But most other A-10 units reside in Republican districts, making efforts to save the airplane much less attractive to Democrats this year. Indeed, Democratic defense hawks believe the money could be better spent on other priorities, including the F-35.

In a face-saving move, Democrats turned to Marine Corps combat veteran Rep. Seth Moulton of Massachusetts to introduce a competing amendment. This one would have allowed the Air Force to retire half the airplanes. The decision, Moulton stressed, should come down to dollars and cents.

"In war, rarely are there enough resources. Regardless of whether the Department of Defense has a $10 budget or a $1 trillion dollar budget, our policy-making responsibility is the same: How do we protect our troops and maximize our military effectiveness?" Moulton wrote in a letter to Armed Services members. "Supporters of the A-10 are never able to address the issue with the tradeoffs necessary to keep the aircraft in service."

Moulton's amendment got the support of all but one Democrat on the panel, but that was not enough for it to pass. And as expected, McSally's language easily passed the committee on the backs of strong Republican support.

McSally wasted no time claiming victory—and pledging to continue her efforts as the bill works its way through Congress.

"As this bill moves to a vote in the full House, I'll continue to work with my colleagues to support the capabilities we need and ensure we're prioritizing the lives of American troops in harm's way," she said in an April 30 statement.

It is looking ever more likely that the Air Force's A-10 fleet will continue flying in 2016, despite the service's desire to spend its limited funds elsewhere. ✪

Megan Scully is a reporter for CQ Roll Call.

Letters

letters@afa.org

Setting It Straight

I have, for the past 15 years, attempted to correct misunderstanding of the targeting philosophy my staff and I advocated during Operation Allied Force. I have focused that effort on professional forums and in classrooms, combined, joint, and Air Force. I have intentionally avoided responding to the myriad of well-intentioned but misinformed articles appearing in this and other publications. The article that appeared in the April edition of *Air Force Magazine ["Watershed Air War," April, p. 58]* has, however, prompted me to make an attempt to set the record straight. My staff and I believed from the very beginning of Operation Allied Force that the desired end state could best be achieved by targeting the strategic center of gravity. Our analysis was that Milosevic and the men and women who suppported him constituted that strategic center of gravity. We did not wish to "target Belgrade" because "it would have been much easier to hit large fixed visible targets." We wished to strike a target set centered in and around Belgrade because we believed that affecting those targets would bring pressure to bear on Milosevic to a much greater degree than would striking tanks and armored vehicles in Kosovo. Military operations are conducted in order to have the desired effect on the adversary. The desired effect was to stop the killing in Kosovo, bring Milosevic to the table, and force him to accept NATO terms. I believed then and continue to believe now that airpower is most effective if applied against the strategic center of gravity from the beginning of a conflict. We had a purpose to our effort and it had nothing to do with the "ease" of attacking the targets. In fact, the risk involved in striking at the strategic center of gravity was much greater than the risk involved in striking tanks in Kosovo.

Just a couple of more corrections and I will allow my computer keys to cool. I served as the NATO CFACC because of my position as the Commander of Allied Air Forces Southern Europe, not because I happened to command 16th Air Force. The Air Force chest beating article fails to mention the joint contributions made by the aircrews of the *Teddy Roosevelt* Battle Group and USMC F-18 crews stationed in Hungary. I was honored to be trusted by the heroic airmen of 16 NATO nations to serve as their CFACC. Each contributing NATO nation gave us their best and we did our best to employ those contributions in a tactically sound approach to achieve the desired strategic end state. Finally, the author observes that "in fact, there were no NATO fatalities." That observation tragically overlooks the death of two US Army Apache helicopter crewmen who died in a mission rehearsal in the mountains of Albania. Commanding the NATO air effort in Operation Allied Force was the highlight of my career and I will be forever thankful to the thousands of men and women from the NATO contributing nations who placed their trust in me.

Lt. Gen. Michael C. Short,
USAF (Ret.)
Suffolk, Va.

I Just Can't Even. Floppy Disks?

I have for years felt that the Air Force leadership had placed the continuous update and modernization of our strategic offensive forces on the back burner. But, I was awestruck by the picture on p. 44 of the April 2015 edition of *Air Force Magazine ["Nuclear Force Improvement," p. 40].* A lieutenant loading strategic equipment software via a 5 1/4-inch floppy disk. Our strategic forces aren't just outdated, they are indeed, ancient. This one picture said a million words. Our land-based missile systems are based on early 1980s computer technology. The Air Force leaders who testify before Congress during budget hearings should show this picture and ask the members

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of Congress just how "safe" they feel with a major arm of strategic forces still using the very first generation of so-called modern computer age when Z-100 computers were first introduced. I have recently read a couple of articles of the current CNO that leads me to believe our strategic defensive submarines may be in a similar state. I hope Congress understands the vast need to modernize the strategic forces—and that they will provide the necessary additional funds to expeditiously accomplish that modernization.

Lt. Col. John Bredfeldt,
USAF (Ret.)
Dawsonville, Ga.

Talk about legacy systems! I was astonished to see the state-of-the-art in strategic missle operations today. When I was in SAC in the 1980s, we used 5 1/4-inch floppy disks in our new state-of-the-art computers. Apparently these are still the front line. I think I have an old box of unused floppies around somewhere in case USAF needs them. The 5 1/4" has been obsolete since the advent of Windows 95, two decades ago. Certainly Congress couldn't procure them as they are long out of production! Maybe Amazon can help.

Lt. Col. A. J. Parmet,
USAF (Ret.)
Kansas City, Mo.

No Strategic Change

A myth has grown up that the Doolittle Raid resulted in the Midway Campaign. Robert B. Kane's "The Raiders at Eglin" *[April, p. 70]* repeats this historical inaccuracy.

In actuality, the Japanese Imperial Headquarters issued the Midway-Aleutian Directive April 16, 1942, for the occupation of the Aleutians and Midway; the establishment of a defensive line from the Aleutians to Samoa, Fiji, and New Caledonia; and the destruction of the US Pacific Fleet. It came two days before the launch of the Doolittle Raid.

The Japanese had become overconfident following a six-month string of victories, but also realized they did not have the resources to fight a protracted war. By expanding their territory, occupying US outpost, and destroying the US Pacific Fleet, they hoped negotiate a treaty similar to the Portsmouth Treaty ending the Russo-Japanese War, where they confronted similar conditions.

The Japanese Research Division of the History Section, US Army Forces Far East, prepared Japanese Monograph No. 88, "Aleutian Naval Operations March 1942-February 1943," not dated. It provided a detail account of the planning for the Aleutian-Midway operation.

The US Army Forces in the Far East under General MacArthur had a very large history section manned by American and Japanese historians and scholars. They sought to document the Japanese side of the war through research of documents that had not been destroyed and oral history interviews with the principals.

Military Analysis Division, United States Strategic Bombing Survey (Pacific) Japanese Airpower, July 1946, also addressed the origins of the Aleutian-Midway operations. The Greenwood Press republished the strategic bombing survey in 1969. Chapter VI, "The Aleutian Campaign," by Capt. James S. Russell, USN, provides details on the Aleutian Campaign Kurile operations and the planning that went into it.

The Strategic Bombing Survey focused on the effect of American air and naval bombardments and the Japanese response. It also involved record searches and interviews.

Walter Lord, in his book *Incredible Vic*tory, Harper, New York, 1967, describes the planning that went into the Aleutian-Midway operations as does Hiroyuki Agawa, *The Reluctant Admiral, Yamamoto and the Imperial Navy,* Kodansha International, New York, 1979.

Despite all the overwhelming historical evidence, many still cling to the myth that the Doolittle Raid caused Midway. While it accomplished much, it did not change the Japanese strategy in the Pacific.

John Haile Cloe
Anchorage, Alaska
Melbourne, Fla.

Hey, What About Our Heyday?

I really enjoyed the article "SAC's Heyday" *[April, p. 50]*. However, there is one thing missing: the FB-111A bomber. For 20 years the 509th BMW (M) and the 380th BMW (M) did their part in the mission of SAC with no mention in this article. Is it because year after year these two wings won Bomb Comp, over and over again until the B-1 came on the scene and the B-52 avionics were upgraded? For a lot of us in SAC the word bomber meant FB-111A. For me, 509th BMW meant state-of-the-art as it does today in the B-2.

MSgt John H. Cressy Jr., USAF (Ret.)
Exeter, N.H.

I really enjoyed the photos from "SAC's Heyday" in the April 2015 issue, but I looked in vain for any of the North American B-45 Tornado. Granted it was a stopgap between the B-29 and the arrival of the B-47, but it nonetheless was a frontline bomber in the 1950s. It racked up a number of firsts. According to Boeing, who absorbed North American, the Tornado was the first production jet bomber to enter service with the USAF, and the first four-engine jet to fly in the United States. It was also the first four-jet-engine aircraft to drop an atomic bomb, and the first to be refueled in midair.

Given the important role the B-45 played in the Air Force's transition into the jet age, it deserves to be remembered.

Larry Roth
Ravena, N.Y.

■ *For posterity, below are the B-45 and the FB-111 in glorious color.—THE EDITORS*

Kudos on continuing to provide us with a great magazine. However, in the article on SAC, p. 57, picture No. 3, you state that the B-52 pictured was on its way to Vietnam in late 1964.

The first combat mission for the BUFF was launched from Andersen on June 18, 1965, not 1964. I remember the date very well, I was the deputy commander of that mission.

Richard Ionata
Battle Ground, Wash.

Just Make the Dang Thing

I am confused by this whole topic and the problems that this country faces because we don't want to buy Russian RD-180 rocket engines *["Action in Congress," April, p. 11]*.

What has happened to this country and our past engineering and manufacturing excellence? What has happened to the companies that built the rocket engines for the Saturn rockets? If the RD-180 is such a great engine and we can't design a better one then why don't we do what the Russians did during World War II. They took three stolen or appropriated B-29s and reverse engineered them and built the Tu-4. Has all of this country's manufacturing and engineering excellence been so overwhelmed by OSHA, EPA, Dept of Labor, government rules and regulations and lawyers that we can't reverse engineer a rocket engine?

In 1940, North American Aviation took 102 days to go from contract signing to a flying prototype of the P-51 Mustang. We put men on the moon and now we are being told that we can't manufacture a rocket engine.

I'm sure I will be told that I do not understand something, but it just seems to be a basic question. Why can't we just make an engine?

Tom Daugherty
Clay, New York

The Smoking Gun(ner)

Great (& rare) close-in-trail frontal shot of a B-26 Marauder on p.19 of *Air Force Magazine ["Flashback: Close Up," April]*. But one is supposed to know his reportorial beat, particularly if he's dealing with the often arcane detail of military subjects. (At least so I was told in my time as a UPI photog long ago). Up in that distinctive greenhouse the captioned 'nose gunner sneaking a smoke' is in fact the bombardier/nav. And that's most likely the radioman/FE between the pilots, looking in from his radio rack just aft of the cockpit.

My dad, then-Lt. Russ Deever, flew Marauders over Europe in 9th Air Force's famed "Bridgebusters," the 394th BG/586th BS, 1944-45. His B/N, Lt. Mel Ott, was also the crew's tallest guy, which made it so much more tricky to shoehorn himself in behind a Norden bombsight *and* the manually fired forward .50 cal. (And boy did they all have fun now and again conning some new replacement in the squadron into believing Mel was *that* Mel Ott, of NY Giants fame!)

Howard "Huey" Deever
Omaha, Neb.

Fishy Fishbed Numbers

Two statements regarding MiG-21 claims need correcting *["Airpower Classic: MiG-21 Fishbed," April, p. 80]:* "In December 1972, [a MiG-21] scored first-ever air combat kill of a B-52 bomber, over Hanoi." There were 15 B-52s lost over NVN during Linebacker II in December; all were attributed to SAMs. According to historian Marshall Michel in "The 11 Days of Christmas," a MiG-21 pilot claimed a B-52 kill on 27 December 1972. "Post-war analysis indicates that the MiG-21 flown by [Maj. Pham] Tuan attacked Ivory cell ... but his two ATOLL missiles missed. ... Tuan broke off his attack as soon as he fired, so when he saw Cobalt 01 explode and catch fire after being hit by a SAM, Tuan quite reasonably thought his missiles had scored the kill." (p. 206). The second claim occurred on Dec. 28. "A MiG-21 flown by Vu Xuan Thieu pressed an attack [on] the B-52s, but before he was able to get close Thieu was shot down by two prowling F-4s. The North Vietnamese later claimed Thieu's MiG collided with the B-52 and both crashed, but no B-52s were lost that night." (p. 213).

The second erroneous statement was: "In December 1966, North Vietnamese [MiG-21] pilots downed 14 F-105s with no losses." There were five F-105 combat losses over North Vietnam in December 1966, only one of which was attributed to a MiG-21. On 14 December, Capt. Robert B. "Spade" Cooley from the 357 TFS flying as "Fosdick 03" in F-105D 60-0502 was hit by an ATOLL fired by a MiG-21D. He ejected and was rescued an hour later by "Jolly Green 36" piloted by Capt. James A. Hartwig. Interestingly, Cooley's rescue became part of an escape and evasion film called "Here There Are Tigers" that was shown to aircrews in the PACAF Jungle Survival School at Clark AB, Philippines.

Lt. Col. Wilfred H. Plunkett,
USAF (Ret.)
Albuquerque, N.M.

AETC Deserves That Star

The recent decision to increase the command rank from three to four stars in the Global Strike Command *["Nuclear Force Improvements," April, p. 40]* and decrease the rank of Air Eductation and Training Command (AETC) from four to three stars doesn't make sense. The Air Force explanation is 1: Global Strike Command is a combat command and as such requires a four-star commander. 2: The command had a number of security and morale problems and a four-star commander is required to address those problems.

Fine, it's a given, Global Strike Command required a four-star commander. But does it makes sense to take the star from AETC? The command is much larger in scope and responsibilities today than any time in its history. AETC is the second largest command in the Air Force and one of the largest in DOD, with nearly 70,000 personnel, 1,100 aircraft, and 25 bases and installations. The command has one of the most critical missions in the military—recruit, train, and educate people so they can operate and maintain the sophisticated weapons systems of this day.

My guess is that the Air Force is between a rock and a hard place, i.e., not enough four-star authorizations to go around. The Air Force is authorized 12 four-star generals. It's been that way for years. In order to increase the rank of the Global Strike Command, you must decrease the rank of one of the Air Force's 10 major commands. (Currently, three of the 10 are commanded by lieutenant generals.) You have seven to choose from. Five are combat or combat-related commands—you can't touch them. Two are noncombat command—AETC and Air Force Materiel Command. You can't touch AFMC because a woman was recently assigned there and all hell would break loose if you took that star away. There is no question that she and AFMC deserve the four-star rank. There is only one place to get the four-star—AETC.

So how do you get from under a rock and a hard place? Request the Senate Armed Services Committee to increase the number of four-star generals for the Air Force from 12 to 13. The request would probably fall on deaf ears for many reasons—too many generals, rank heavy, why so many generals when you are a third smaller than you were 15 years ago? The ratio of officers to enlisted personnel is too high, and on and on ad nauseum. It's worth a try!

The request must come from DOD. Global Strike Command (formerly Strategic Air Command) is in peacetime an Air Force command but in wartime comes under the operations control of a unified command (Strategic Command) and as such a rank change should be supported by DOD. In addition, the state of Texas has a very powerful member on the Senate Armed Services Committee (John Cornyn). It's not wise, politically, to lose a four-star rank in Texas. John Tower realized the implications in 1983 when an effort was made to decrease the command rank of Air Training Command.

My thoughts may be an oversimplification of the problem but I feel there must be a better way.

Gen. Andrew P. Iosue,
USAF (Ret.)
San Antonio

Verbatim

verbatim@afa.org

By Robert S. Dudney

Dumping on Dempsey

"One thing General Dempsey has proven is [that], if you don't want to intervene anywhere, in any country, you can invent reasons not to get involved. The military always errs on the side of caution, but not to the extent I see with General Dempsey's advice."***—Sen. John McCain (R-Ariz.), commenting on Gen. Martin E. Dempsey, outgoing Chairman of Joint Chiefs of Staff,*** **Wall Street Journal,** ***May 5.***

Low, Slow, Lethal

"The combination of 'armed,' 'precision,' [and] 'reconnaissance' has been one of the most dramatic innovations [of the War on Terror]. It has been a critical operational instrument in the successes we have had against core Al Qaeda, in particular."***—Undersecretary of Defense Michael G. Vickers, who retired in May, referring to emergence of USAF's armed remotely piloted aircraft,*** **New York Times,** ***May 1.***

Russia the Un-Resurgent

"Russia is not resurgent. They're running out of entrepreneurship, running out of democracy, running out of pluralism, running out of oil, running out of gas, running out of Russians—their birth rate is falling. I'm not worried about Russia in 10 to 15 years. I'm worried about Russia in zero to three years."***—Retired USAF Gen. Michael V. Hayden, former NSA and CIA Director, interview with*** **Newsweek,** ***April 30.***

The Mark 10 Cortex

"Having the human brain as a sensor in combat is still immensely important, in our view. The Air Force needs a number of platforms and in [the mid-term], manned platforms will be the most beneficial."***—Gen. Mark A. Welsh III, USAF Chief of Staff,*** **Defense One** ***briefing, Washington, D.C., April 22.***

But He was "On the Run"

"In the months before his death in May 2011, Osama bin Laden was discussing new gambits. ... Hunkered down in Abbottabad, bin Laden was utterly focused on striking the United States 'in its heartland.' He noted that the slow bleed wasn't working: Vietnam had been far more costly to America than Afghanistan; al Qaeda's allies would have to kill 100 times more people to equal the Vietnam death toll. What was needed, he said a few weeks before his death, was another 'large operation inside America [that] affects the security and nerves of 300 million Americans.'"***—Columnist David Ignatius, report based on declassified documents,*** **Washington Post,** ***May 5.***

Diversity, Still Elusive

"We value diversity. However, the statistics tell a different story. As a service we need to do better at achieving greater diversity of thought and experiences in leadership positions."***—Secretary of the Air Force Deborah Lee James,*** **USA Today,** ***May 3.***

Survival, Not Virgins

"Deterrence still works in Korea. ... The bit of good news on North Korea is that they are not al Qaeda, not suicidal [and] hoping for 72 virgins. The Kimster [Kim Jong Un] and friends value regime survival above all. They know that if they start any major conflict, the whole place will glow in the dark."***—Robert A. Manning, former Korean specialist at DOD, the State Department, Office of the Director of National Intelligence,*** **Newsweek,** ***April 30.***

Make the Kids Pay

"America has stopped paying for its wars. In the past, wars brought dedicated tax increases and the sharing of burdens broadly among citizens—taxpayers and voters as well as the soldiers in the fight—but the Global War on Terror instead gave Americans tax cuts, deficits, and borrowing on a massive scale. ... The costs of wars are passed to future generations, those not yet with a vote. This is not a good development."***—Harvey M. Sapolsky, former director of security studies at Massachusetts Institute of Technology,*** **Defense One,** ***May 6.***

Breedlove's Concern

"I would say that the security situation in Europe is less stable.... What worries me is Russia as a nation is now adopting an approach that says they can and will use military power to change international borders, or take over international states. That's what I truly worry about every day."***—USAF Gen. Philip M. Breedlove, NATO Supreme Allied Commander Europe, Senate testimony, April 30.***

Get the Noose

"Within weeks of the leaks [by NSA turncoat Edward Snowden], terrorist organizations around the world were already starting to modify their actions in light of what Snowden disclosed. Communications sources dried up, tactics were changed. ISIS was one of those terrorist groups that learned from Snowden, and it is clear that his actions played a role in the rise of ISIS."***—Michael J. Morrell, former deputy director of the CIA, excerpt from his new book*** **The Great War of Our Time: The CIA's Fight Against Terrorism From al Qaeda to ISIS,** ***quoted in*** **The Daily Beast,** ***May 6.***

Now That's Precision

"EXACTO has demonstrated what was once thought impossible: the continuous guidance of a small-caliber bullet to target. This live-fire demonstration from a standard rifle showed that EXACTO is able to hit moving and evading targets with extreme accuracy at sniper ranges unachievable with traditional rounds. Fitting EXACTO's guidance capabilities into a small .50-caliber size is a major breakthrough and opens the door to what could be possible in future guided projectiles across all calibers."***—Jerome Dunn, manager of Defense Advanced Research Projects Agency's EXACTO program, created to develop a "self-steering" bullet, DARPA statement, April 30.***

Your Marine Corps

"When I was in Afghanistan, my tattoos never stopped me from shooting anyone, and they never made me more of a target. They never stopped me from keeping Marines safe. On patrol, nothing ever happened because of my tattoos. ... They didn't have an issue meritoriously promoting me when I had a tattoo. I had never heard anything about my tattoos. Nothing was said until I went to the career planner."***—USMC Sgt. Daniel Knapp, decorated infantryman denied re-enlistment because he ran afoul of the Corp's tattoo policy,*** **Marine Corps Times,** ***April 20.***

CORPORATE MEMBER SPOTLIGHT

The AFA Corporate Membership Program recognizes companies that support the Air Force Association's mission, people, and events. These businesses play a vital role in making AFA the most powerful advocate for every member of the Air Force family. This month we highlight selected corporate tier members. For more information on the Corporate Membership Program, please visit www.afa.org/CM.

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Aperture

By Marc V. Schanz, Senior Editor

Hoog's Airpower Optimism … Stillion's "Bigger Airplane" Solution … Navy Intelligence On PLA Weapons ….

COME, BUT CASH IN HAND

Just over a year ago, the Air Force was primed to take advantage of an "orderly transition" of the Afghanistan drawdown in order to focus on what Assistant Vice Chief of Staff Lt. Gen. Stephen L. Hoog labeled "the three Rs"—regroup, reset, and retrain. However, Hoog said the "rapid succession" of the Crimea crisis, the ISIS offensive into Iraq, and the Ebola breakout in late summer of 2014 upended these plans. Nevertheless, USAF airmen and allied partners responded to all three events fluidly, Hoog said, and in doing so have solidified airpower's perceived importance to the joint force at a critical time.

"Last year, everyone was ... asking for more Air Force, but with the expectation that the Air Force would bring its own checkbook as well," Hoog, who oversees the day-to-day operations of the Air Staff, said at an April 29 Air Force Association/Mitchell Institute for Aerospace Studies event.

USAF photo by Scott Ash

Focus on building international partnerships, says Lt. Gen. Stephen Hoog.

As the Fiscal 2016 budget plan took shape, "that's changed somewhat," he emphasized. "Everyone's starting to realize ... that American airpower is [simply] vital to the way that we fight and do our nation's business." This conventional wisdom is reflected in the 2016 budget submitted to Congress, Hoog said. "Quite honestly, … this FY '16 budget that was put forward by the President helped the Air Force in some key areas," such as the nuclear mission and needed investment in core space capabilities. Hoog called it a bit of a "sea change" as far as budgeters realizing what the Air Force is going to need in the years ahead to meet some of its growing requirements.

Still, USAF faces the return of sequestration and a historically low Active Duty force structure of 317,000 airmen. The service will see pressure on both readiness and modernization continue, just as the service attempts to bring many of its combat units back to "C1" and "C2" level readiness for full spectrum conflict.

To help keep the force potent, USAF needs to focus efforts in two key areas, he noted—maximizing the potential contribution of the reserve components and improving international cooperation where it can. Hoog drew attention to USAF efforts to implement proposals from the 2014 National Commission on the Structure of the Air Force, declaring that the Air Force will submit three more assessments to Congress during the next three years over how it will better integrate the Air National Guard and Air Force Reserve into Total Force operations.

With 200,000 fewer airmen on Active Duty today than in 1990 and an operations tempo that continues to rise, "we [need] the strengths of each component to help solve our nation's challenges," Hoog said.

USAF has built a methodology to compare the capability mix between components, and early analysis by the Air Staff shows that only one bin has excess capacity among all three components—the intratheater tactical airlift mission. "Every place else we've looked, we actually have more need than we have capacity," and USAF will be working hard to make trade-offs to get more capability in other mission sets in the coming years.

One of those mission sets is intelligence, surveillance, and reconnaissance. As combatant commanders clamor for more ISR, Hoog sees the Air Guard and Reserve as natural partners in that mission. The Guard and Reserve have leveraged their valuable combat experience in fighters in the remotely piloted aircraft mission, he pointed out. This preserves valuable combat capability in a new aircraft and helps shrink a potentially long training pipeline. "I think you're going to see more of it in the future," Hoog said of the expansion of RPA missions in the Guard and Reserve.

The other piece USAF needs to stay focused on is building long-term relationships with international partners, Hoog said. USAF has 400 cooperation agreements signed with foreign air arms, hosts 1,200 international airmen attending aircrew training in the US, and teaches 325 international students in its Air Force professional military education programs, among other efforts. From exercise cooperation in events such as Red Flag to foreign military sales agreements, many of USAF's partners share political objectives and security concerns with the United States, Hoog said, and these cooperation programs have paid off in interoperability in combat over Iraq and Syria with the broad Operation Inherent Resolve coalition.

A "BIGGER AIRPLANE" SOLUTION

The Air Force is studying intensely the future air superiority mission, announced service Chief of Staff Gen. Mark A. Welsh III earlier this year. A "capabilities collaboration

team" will tackle the issue of what air dominance should look like in 2030.

Airpower analyst John Stillion released a new study for the Center for Strategic and Budgetary Assessments as USAF moves out on the project. Stillion argues that the air superiority mission—as USAF has known it for decades—may require some radical rethinking to ensure success in the 2030s and beyond.

"The nation is at a point right now where we are beginning to think about what comes after F-35," Stillion said at a presentation of his study to AFA's Mitchell Institute in April. "What does sixth generation [air combat] look like?"

In "Trends in Air-to-Air Combat: Implications for Future Air Superiority," Stillion, a senior fellow at CSBA, says that air combat has changed significantly since the onset of the "missile era" of the 1960s. Superior situational awareness remains the vital element to success in the air, but its importance only will grow as technology and weapons become even more capable and lethal.

From World War I until the missile era, "the airplane was the weapon," Stillion said, placing great importance on the skill of the pilot to maneuver within visual range to engage with guns and cannons. In this environment, speed and maneuverability were crucial factors in victory. Even in the first years of the missile era, as first generation air-to-air missiles were primarily heat-seeking weapons, pilots needed to properly position their aircraft.

In his study, Stillion researched and documented all confirmed aerial wins in the "missile era" of air combat, from 1965 through 2013, adding up to some 1,467 confirmed victories over fixed wing aircraft in conflicts worldwide.

Over time, an overwhelming trend emerged: As long-range friend or foe identification improves (especially with the advent of the airborne warning and control, or AWACS, aircraft) close-in air combat all but disappears, replaced with kills via long-range air-to-air weapons. Since the end of the Yom Kippur War in 1973, 88 percent of aerial victories have been credited to missiles, with the last gun kill recorded in the Iran-Iraq War in 1988.

Agility's importance decreases when fighting against beyond-visual-range weapons. Sensors, stealth, and better networks have now become the key ingredients of situational awareness, taking the place of traditional aerial combat attributes such as speed and maneuverability.

Taken together, these trends mean a future air-to-air solution may not look like an F-22. It may call for a "bigger airplane," having the size and the space to host better sensors, longer range air-to-air weapons, and ability to network with smaller unmanned combat air vehicles. These would serve as "airborne pickets," providing both firepower and early warning capabilities.

"What you may want [are] bigger sensors, bigger weapons, better network access," Stillion said, if beyond visual range becomes the prevailing form of aerial combat. A larger aircraft could host more "multiphenomenology" sensors, as future aerial combat will increasingly hinge on maintaining robust data links to let aircraft pass information back and forth.

Stillion admits there are key assumptions to this scenario, and a large warplane would be heavily dependent on the linkages in combat networks to succeed in wartime.

While USAF and the Navy are slated to acquire scores of stealthy and maneuverable fighter aircraft over the next 20 years—and these would be an effective hedge against any countering trend in beyond-visual-range air combat—there is a great deal of evidence that in two decades the "future may be quite different for air superiority," he said.

CHINA'S GROWING REACH

As US officials have raised alarm about Chinese military construction projects in the South China Sea, the Office of Naval Intelligence released in early April its first unclassified assessment of China's naval forces and weapons since 2009. It provides new insight into Chinese efforts to develop anti-access and area-denial weapons.

The detailed 50-page report, entitled "The PLA Navy: New Capabilities and Missions for the 21st Century," lays out a picture of numerous maturing naval power projection capabilities, an assessment of the People's Liberation Army (Navy) organization and training efforts, and a wide profile of Chinese equipment and capabilities. Overall, China's modernization efforts have focused on improving forces and replacing older, outmoded ships and aircraft with modern, multimission platforms and more effective weapons. This gives its navy an "increasing capability to undertake missions far from China."

Though much of the report discusses the PLAN's fleet buildup, it contains new intelligence assessments about China's power projection weapons, such as sea-going air defense and anti-ship missiles. "In recent years, shipboard air defense is arguably the most notable area of improvement on PLA(N) surface ships," the report states. Newer ships entering service are equipped with medium- to long-range area air defense missiles such as the HHQ-9 surface-to-air, with a range of around 55 nautical miles (63 miles), and the new Luyang III-class destroyer now carries an extended range variant of the HHQ-9, able to range upward of 80 nautical miles (92 miles), according to the ONI assessment. These weapons are controlled and guided with modernized combat systems and air surveillance sensors that allow the PLA(N) to operate "with increased confidence outside of shore-based air defense systems."

Despite its weapons development programs, China still has to further mature a network of command and control capabilities to give these systems credibility. China is seeking to develop and employ more advanced maritime command, control, computers, communication and intelligence, surveillance, and reconnaissance capabilities.

The ranges of modern anti-ship cruise missiles extend beyond that of a ship's sensors, and weapons such as the DF-21D Anti-Ship Ballistic Missile (having a range greater than 810 nautical miles or 932 miles) "are even more dependent on remote targeting," ONI states, and thus must be effectively targeted via air- and sea-based sensors. This is a "formidable challenge" for China, because to track activity in areas such as the South China Sea, it would need to build ISR coverage of an area some 1.5 million square nautical miles (1.9 million square miles) of sea and airspace to include the Philippine Sea. This is one of the reasons China is developing a wide array of sensors on aircraft and at sea, as this network can provide the most detailed and reliable information—but is limited.

China is also investing in long-range radar programs and a growing reconnaissance satellite fleet. Should the requisite C4ISR systems be developed, China will be more able to expand its combat capabilities "further into the Philippine and South China Seas," the report states.

In the coming decade, provided China's economic health can bankroll double-digit increases in defense spending, the fielding and introduction of capable carrier aircraft, ballistic missile submarines, and other elements could fundamentally alter how the force "operates and is viewed by the world." ✪

Air Force World

Dunford, Selva Nominated for Top Joint Chiefs Spots

President Obama on May 5 nominated Marine Corps Commandant Gen. Joseph F. Dunford Jr. to replace Army Gen. Martin E. Dempsey as the next Chairman of the Joint Chiefs of Staff and Air Force Gen. Paul J. Selva to replace Adm. James A. "Sandy" Winnefeld Jr. as vice chairman.

Throughout his nearly 40 years in uniform, Dunford has held command positions at every level. He led marines during the initial invasion of Iraq, and he led American and coalition forces in Afghanistan as combat operations came to a close.

"I have been extraordinarily impressed by Joe," said Obama. "He's already proven his ability to give me his unvarnished military advice based on his experience on the ground."

Selva brings 35 years of military experience as both a pilot and commander. "As leader of Air Mobility Command, he earned a reputation as a force for change and innovation," said Obama. As head of US Transportation Command, "he's been committed to the partnerships that are a core principle of our national security strategy," Obama added.

The Senate must still approve the nominations.

Nepal Disaster Relief Continues

US Pacific Command continued to support Nepal in the aftermath of a devastating earthquake, even as a second powerful tremor struck the country May 11.

The May 7.3-magnitude earthquake followed the 7.8-magnitude quake on April 25 that took the lives of some 8,000 people and injured thousands more in the Asian nation.

"The US Air Force's role is to expedite the arrival of aid and responders into Nepal by using strategic and intertheater

05.08.2015

Four vintage World War II P-51 Mustangs fly in formation as part of the Arsenal of Democracy flyover in Washington, D.C., commemorating the 70th anniversary of Victory in Europe day. Dozens of warbirds took part, including P-40s, B-25s, A-26s, and P-38s, among many others. **Fifi,** ***the only flying B-29 in existence, also participated. This photograph was taken from the roof of the James H. Doolittle Building, headquarters of the Air Force Association in Rosslyn, Va.***

airlifts," said Lt. Col. Glenn Rineheart, commander of the 36th Mobility Readiness Squadron at Andersen AFB, Guam.

A joint humanitarian assistance survey team deployed from Kadena AB, Japan, to Nepal on April 29 to assist with relief efforts. Kadena-based airmen loaded the 20-plus members and gear on a Marine Corps C-130, tasked with supporting a US Agency for International Development Office of US Foreign Disaster Assistance response team in Nepal.

US Pacific Command's Joint Task Force 505 grew to include some 300 personnel by mid-May, when airmen worked with Nepalese personnel to repair the damaged runway at the Tribhuvan International Airport in Kathmandu, Nepal's capital.

"This airfield is Nepal's lifeline for relief supplies and for international travel, so these repairs will help the airfield keep pace with the aid coming in," said Capt. Ryan White of the 36th Contingency Response Group.

The 36th CRG helped the Nepalese army download four million pounds of relief materials from 80 aircraft since arriving May 5, according to a May 18 release.

Goldfein Nominated for USAF Vice Chief

President Obama nominated Lt. Gen. David L. Goldfein for a fourth star and appointment as Air Force vice chief of staff, service officials announced on April 21.

Goldfein, the Joint Staff's director since August 2013, would succeed Gen. Larry O. Spencer, who has been vice chief since July 2012. Spencer is retiring from the Air Force after more than 35 years in uniform and will become the Air Force Association's next president.

screenshot

Staff photo by Heather Lewis

Longer Live the Raptor

The Air Force now plans to retain the F-22 Raptor fleet into the 2040s, the service said in response to a question from *Air Force Magazine.* "Based upon current projected fleet flying hour programs and actual aircraft usage, the predicted service life of the Raptor fleet goes into the 2040s without a SLEP [service life extension program] of the airframe," USAF spokesman Ed Gulick said.

While the design life of the F-22 is 8,000 hours—roughly equating to a service life of about 22 years, at 360 hours of flying per year—each aircraft has data recorders measuring every stress and strain on the jet aircraft. These data are "used by the F-22 Aircraft Structural Integrity Program [ASIP] to apply a Fatigue Severity Ratio factor to actual aircraft hours and determine equivalent flight hours," he said.

Analytical models and engineering analysis of the data, taken along with "the Raptor's projected flying hour program," yielded the service life projection.

Air Combat Command started substituting more simulator hours for actual flying hours on the F-22 a few years ago as a way to husband the asset, and future Red Flag exercises also will be predominantly virtual, buying more F-22 airframe hours.

Previous service estimates forecast the F-22 would have to start to retire in the mid-2030s.

—John A. Tirpak

Goldfein is a command pilot with more than 4,200 flying hours in airplanes including the F-16, F-117, and MC-12.

As vice chief, he would assist the Chief of Staff organizing, training, and equipping airmen and Air Force civilian employees. He would also preside over the Air Staff and represent the Air Force on the Pentagon's Joint Requirements Oversight Council and Deputy Advisory Working Group.

Russian Fighter Antics Prompt Complaint

A Russian fighter passed dangerously close to an RC-135 intelligence-gathering aircraft over the Baltic Sea, sparking a US diplomatic protest in April, according to US military officials.

"On the morning of April 7th, a US RC-135U flying a routine route in international airspace was intercepted by a Russian Su-27 Flanker in an unsafe and unprofessional manner" north of Poland, said Pentagon spokeswoman Eileen M. Lainez, according to a *Washington Free Beacon* report.

"The United States is raising this incident with Russia in the appropriate diplomatic and official channels," she said.

A Russian military spokesman claimed Russian radar detected the RC-135 "making steady progress toward [Russia's] national border," alleging the aircrew was not employing the aircraft's transponder.

US European Command officials denied that claim, asserting that the aircraft was operating in accordance with International Civil Aviation Organization flight rules.

The RC-135U is primarily equipped to detect, analyze, and gather technical data on foreign air defense radar systems. An RC-135U was involved in a similar incident with a Russian fighter north of Japan last year.

Texan Time-out

Air Education and Training Command officials briefly grounded the T-6A trainer fleet as a precaution before returning the bulk of the aircraft to flying status in April, command officials said.

The precautionary grounding began on April 10 following indications of an engine oil line malfunction. This prompted an inspection of all 445 T-6s in the fleet to determine the follow-up actions required. All T-6As that passed inspection and didn't require further action were to immediately return to flying status.

"Safety of airmen is a top priority of the Air Force, and the stand-down gave maintainers the opportunity to verify proper function of the oil line on every T-6A," said spokesman Capt. Jason Smith.

AETC operates T-6s at Columbus AFB, Miss.; JBSA-Randolph, Texas; Laughlin AFB, Texas; Sheppard AFB, Texas; and Vance AFB, Okla. The Air Force uses T-6s for training students in basic flying skills common to all Air Force pilots.

Pegasus' Reserve Options

Grissom ARB, Ind.; Seymour Johnson AFB, N.C.; Tinker AFB, Okla.; and Westover ARB, Mass., are the candidates to be the first Air Force Reserve Command-led KC-46A main operating location, announced Air Force officials.

Air Mobility Command and Air Force Reserve Command will soon survey each site and develop cost estimates for bedding down the new KC-46 tankers at each location.

Armed with that data, they will brief the Air Force leadership, leading to the announcement of the preferred site and reasonable alternatives this summer, officials stated. The base that wins out is expected to receive its KC-46s starting in Fiscal 2019, according to a release.

Already, the Air Force has identified McConnell AFB, Kan., as the first Active Duty-led KC-46 main operating base, Pease ANGB, N.H., as the first Air National Guard-led base, and Altus AFB, Okla., as home to the KC-46 formal training unit.

Eielson Stays Aggressive

Eielson AFB, Alaska, will retain the 18th Aggressor Squadron and the unit's 18 F-16s that play the role of mock adversaries

Bone Transplant

The Air Force's B-1 fleet, along with the Long-Range Strike Bomber program, is moving from the oversight of Air Combat Command to Air Force Global Strike Command, effective Oct. 1, the service announced.

The 63 B-1s in the inventory and some 7,000 airmen will transfer to AFGSC under the move, joining the Air Force's nuclear-capable B-2A and B-52H fleets under the command, officials stated.

The B-1s deliver only conventional munitions and are primarily spread across the 7th Bomb Wing at Dyess AFB, Texas, and the 28th BW at Ellsworth AFB, S.D. "With a single command responsible for the Air Force's entire long-range strike fleet, the airmen in AFGSC will benefit from better coordination and increased sharing of expertise," said Chief of Staff Gen. Mark A. Welsh III.

The consolidation will also "help provide a unified voice to maintain the high standards necessary in stewardship" of the bombers, said Air Force Secretary Deborah Lee James.

When asked if the 7th BW and 28th BW would become part of 8th Air Force, AFGSC's organization that oversees the B-2 and B-52 forces, AFGSC spokeswoman Capt. Michele Rollins said the detailed planning surrounding the realignment is still in progress.

—Aaron M. U. Church

USAF photo by SrA. James Richardson

Bones in the Gulf: ***A B-1B Lancer takes off from Al Udeid AB, Qatar, a strategic coalition air base on the Arabian Peninsula, headed for combat operations on April 8. Al Udeid hosts thousands of military members and the airmen stationed there support more than 90 coalition aircraft. Qatar is a member of the Gulf Cooperation Council along with Bahrain, Kuwait, Oman, Saudi Arabia, and the United Arab Emirates.***

in air-to-air combat training exercises, announced Air Force officials.

"Keeping them at Eielson proved to be the most operationally sound option, as well as the most cost-effective," Mark A. Pohlmeier, the Air Force's acting deputy assistant secretary for installations, said in April.

When the Air Force last August named Eielson its preferred site for hosting 48 F-35A strike fighters in the Pacific area, service officials decided to study whether to keep the aggressor mission there, too.

JB Elmendorf-Richardson, Alaska, and Nellis AFB, Nev., were identified as alternative homes for the 18th AGRS, but Eielson prevailed. Its proximity to the Joint Pacific Alaska Range Complex is "optimum to support" Red Flag-Alaska and Distant Frontier exercises, said Pohlmeier.

Keesler Keeps On

The Air Force has abandoned plans to inactivate Air Force Reserve Command's 815th Airlift Squadron at Keesler AFB, Miss., members of the state's congressional delegation announced. As a result, the unit's 10 C-130J transports will continue to operate from the southern Mississippi base.

"Today's announcement is a major win for the future stability of Keesler Air Force Base as well as the many communities and businesses that depend on it," said Sen. Roger Wicker (R), in the joint release with Sen. Thad Cochran (R) and Rep. Steven Palazzo (R), April 14.

Wicker said he was grateful to Air Force Secretary Deborah Lee James and Chief of Staff Gen. Mark A. Welsh III "for recognizing the value that Keesler provides to the Air Force and the Gulf Coast."

The Air Force in February 2012 proposed relocating Keesler's C-130Js, a move the lawmakers opposed. In April 2014, the Air Force inactivated the 345th AS, the Active Duty associate unit that provided additional manpower for the C-130Js.

Next Gen AMRAAM Completes Testing

Raytheon, Air Force, and Navy testers recently completed operational test and evaluation of the latest Advanced Medium Range Air-to-Air Missile variant, paving the way for its initial operational capability, the company announced.

"The AIM-120D represents a significant improvement in air-to-air weapons capabilities and the technologies it brings

By the Numbers

700

The average number of live 750-pound general-purpose bombs dropped by B-52H bombers training during an average Continuous Bomber Presence rotation to Andersen AFB, Guam.

ANG photo by MSgt. Toby M. Valadie

How Bulgar: ***TSgt. Charles Fenton, an F-15 crew chief with the Louisiana Air National Guard, signals the pilot of an F-15C to throttle up and begin to taxi at Graf Ignatievo AB, Bulgaria, during a Thracian Eagle exercise in April. The exercise brought US airmen flying and supporting F-15s together with Bulgarian troops operating MiG-29s and Su-25 ground support aircraft. The aim of Thracian Eagle is to enhance interoperability, improve preparedness, and practice procedures for logistics support.***

to the battlefield," company program director Ron Krebs said in a release.

The missile performed outstandingly in a variety of challenging air-to-air scenarios across the spectrum of flight profiles, leading the Air Force to clear it for operational use, according to Raytheon.

The Navy already declared AIM-120D operational and plans to deploy the missile this year. The AIM-120D variant offers improved range, GPS-assisted guidance, updated data links, and jam resistance, in addition to greater lethality.

Operational testing resumed in 2013 after earlier software and hardware glitches were addressed.

F-15s Pick Up Icelandic Rotation

A deployment of USAF F-15Cs, a KC-135, and some 200 airmen recently began air surveillance and policing operations in Iceland, announced US Air Forces in Europe-Air Forces Africa officials.

Four F-15Cs from RAF Lakenheath, UK, deployed as part of the package, along with a KC-135 from RAF Mildenhall, UK, and some 200 airmen from various USAFE-AFA bases, kicking off 871st Air Expeditionary Squadron operations on April 17.

Since 2008, Keflavik Airport has hosted NATO partner nation aircraft for the Icelandic air security mission. The US removed its permanently stationed forces from the nation when it closed Naval Air Station Keflavik in 2006, but NATO has maintained its commitment to providing defense for Iceland by rotating air defense forces from its member states in the years since.

"It's an extremely important relationship, an extremely important partnership, and a very, very important mission we do," said 871st AES Commander Lt. Col. John Stratton.

Lightning's Day Out

The 56th Fighter Wing at Luke AFB, Ariz., conducted its first training deployment with the F-35A strike fighter, sending airmen and 10 of its jets to Nellis AFB, Nev., for two weeks.

The Luke F-35As flew training sorties alongside F-35s assigned to Nellis and Eglin AFB, Fla., over the Nevada Test and Training Range from April 4 to April 18, according to a release.

This exercise was an important indicator of the Air Force's state of progress toward having its first unit of combat-ready F-35As available around fall 2016, said officials.

"Until now, the Air Force F-35 program had not moved this many jets and conducted sustained operations at another base," stated Lt. Col. Michael Ebner, commander of Luke's 61st Fighter Squadron.

"Operating away from Luke has been a huge success for the wing, Team Nellis, and the F-35 program," said 56th FW Commander Brig. Gen. Scott L. Pleus. Luke, home to the F-35A schoolhouse, hosts 20 F-35As, including two Australian jets.

Commandos Down Under

Combat controllers from Kadena AB, Japan, along with MC-130J special-mission aircraft, conducted joint tactical training with their Australian counterparts at RAAF Richmond, northwest of Sydney, in April.

Two 17th Special Operations Squadron MC-130Js conducted tactical landings at nearby Warren Airfield in addition to airdropping special operators during the joint exercises April 15-17, according to the Royal Australian Air Force.

The War on Terrorism

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

Casualties

As of May 12, one American had died in Operation Freedom's Sentinel in Afghanistan, and four Americans had died in Operation Inherent Resolve in Iraq and Syria.

The total includes five troops and no Department of Defense civilians. Of these deaths, one was killed in action with the enemy, while four died in noncombat incidents.

There have been 22 troops wounded in action during Operation Freedom's Sentinel and one in Operation Inherent Resolve.

Michigan A-10s Take Up the Fight

A dozen A-10s and some 350 airmen from the Michigan Air National Guard's 127th Wing deployed to the Persian Gulf region to take over the fight against ISIS in Iraq and Syria, unit spokesman TSgt. Daniel Heaton told *Air Force Magazine.*

This expeditionary contingent left Selfridge Air National Guard Base, northeast of Detroit, in early April on a six-month rotation to support Operation Inherent Resolve, the US-led air campaign against ISIS, according to a wing release.

The Michigan contingent relieved an expeditionary squadron of A-10s and airmen from the Indiana ANG's 122nd Fighter Wing in Fort Wayne that deployed last November, marking the first A-10 anti-ISIS rotation.

The Michigan unit is likewise assigned to the 386th Air Expeditionary Wing while deployed. This rotation is the 127th Wing's longest large-scale movement since deploying to Kandahar Airfield, Afghanistan, in 2011, said unit officials.

—Aaron M. U. Church

Tikrit Template

The Iraqi offensive against ISIS in Tikrit, Iraq, showed that conventional and irregular Iraqi troops supported by US air strikes and advisors can roll back terrorist advances, Pentagon officials said.

Tikrit marked the first time all the various parties and elements came together in this manner to defeat ISIS, Joint Chiefs Chairman Army Gen. Martin E. Dempsey said during a Pentagon press briefing in April.

"We were able to support that and ... let that campaign reach a successful conclusion," said Dempsey. He said he agreed with Iraqi Prime Minister Haider al-Abadi's assessment that such operations could be a "model" to free other parts of Iraq under ISIS control.

Defense Secretary Ashton B. Carter said US forces at rear command centers assisted Iraqi forward air controllers to ensure "valid targets" were hit and that air strikes were "effective and precise."

—Marc V. Schanz

The Raptors Remain

F-22 Raptors continued to lend their unique capabilities to the fight against ISIS since the campaign's opening days, Air Force Chief of Staff Gen. Mark A. Welsh III said.

The Raptor is called on when the "scenarios and targets" call for its unique capabilities, he said in Washington, D.C., April 22.

The F-22 has been lauded by senior USAF officials for its ability to coordinate and improve the combat effectiveness of strike packages in Operation Inherent Resolve.

In addition to its ability to fly into defended airspace, its capabilities as a combat escort, its air tasking capabilities, and its significant sensor and dynamic targeting tools have exceeded expectations in the air campaign against ISIS, Air Combat Command's head, Gen. Herbert J. "Hawk" Carlisle, had noted in February.

Thirty-five combat controllers from the 320th Special Tactics Squadron and RAAF 4 Squadron parachuted onto a local farm and conducted both day and night tactical training in rural New South Wales.

Kadena's 17th SOS received its first MC-130J last December as part of an Air Force Special Operations Command-wide recapitalization.

After the United States and Australia signed and intensified a defense coordination agreement last year, the Air Force ramped up working with the Australians. This has included deploying aircraft for several Australian exercises and possibly establishing regular bomber rotations to the northern part of the country.

X-47B's Final First

The Navy's X-47B demonstrator completed the first independent, remotely piloted aircraft aerial refueling during a flight from NAS Patuxent River, Md., Northrop Grumman announced.

The X-47B refueled from a contract K-707 tanker over the Chesapeake Bay on April 22.

"Testing with the X-47B helps solidify the concept that future unmanned aircraft can perform standard missions like aerial refueling and operate seamlessly with manned aircraft," program manager Navy Capt. Beau Duarte said in a release.

The tanker trial concluded the service's Unmanned Combat Air System program to mature technology and concepts for integrating unmanned aircraft into a carrier air wing, according to Naval Air Systems Command.

The two X-47Bs achieved several milestones over the course of the four-and-a-half-year test program, including the first autonomous catapult launch and arrested-carrier landing from USS *George H. W. Bush* in 2013.

The Navy is looking to field a separate, operational follow-on under its Unmanned Carrier-Launched Airborne Surveillance and Strike program.

MALD-J Completes Operational Testing

The jammer variant of the Miniature Air Launched Decoy

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Senior Staff Changes

CONFIRMATIONS: To be Lieutenant General: Charles Q. **Brown Jr.,** Timothy M. **Ray. To be Brigadier General:** Kyle W. **Robinson. To be ANG Major General:** James C. **Balserak,** Steven J. **Berryhill,** Kevin W. **Bradley,** Peter J. **Byrne,** Gretchen S. **Dunkelberger,** Richard J. **Evans III,** Robert M. **Ginnetti,** Jeffrey W. **Hauser,** William O. **Hill,** Joseph K. **Kim,** Jerome P. **Limoge Jr.,** Paul C. **Maas,** John P. **McGoff,** Brian C. **Newby,** Marc H. **Sasseville,** Michael E. **Stencel,** Carol A. **Timmons.**

NOMINATIONS: To be General: David L. **Goldfein. To be Lieutenant General:** Jeffrey G. **Lofgren. To be Brigadier General:** William M. **Knight. To be AFRC Major General:** Robert N. **Polumbo.**

CHANGES: Maj. Gen. Warren D. **Berry,** from Dir., Log., AMC, Scott AFB, Ill., to Vice Cmdr., AFMC, Wright-Patterson AFB, Ohio … Brig. Gen. (sel.) Steven J. **Bleymaier,** from Dir. of Staff, AFMC, Wright-Patterson AFB, Ohio, to Cmdr., Ogden ALC, AFMC, Hill AFB, Utah … Lt. Gen. (sel.) Charles Q. **Brown Jr.,** from Dir., Ops., Strat. Deterrence & Nuclear Integration, USAFE, Ramstein AB, Germany, to Cmdr., AFCENT, ACC, Al Udeid, Qatar … Brig. Gen. Carl A. **Buhler,** from Cmdr., Ogden ALC, AFMC, Hill AFB, Utah, to Dir., Log., ACC, JB Langley-Eustis, Va. … Maj. Gen. (sel.) Clinton E. **Crosier,** from Dep. Dir., Global Ops., STRATCOM, Offutt AFB, Neb., to Dir., Plans & Policy, STRATCOM, Offutt AFB, Neb. … Maj. Gen. (sel.) Timothy G. **Fay,** from Dir., Current Ops., DCS, Ops., P&R, USAF, Pentagon, to Dir., Strat. Plans, DCS, Strat. P&P, USAF, Pentagon … Gen. (sel.) David L. **Goldfein,** from Dir., Jt. Staff, Pentagon, to Vice C/S, USAF, Pentagon … Maj. Gen. Jerry D. **Harris Jr.,** from Dir., Strat. Plans, DCS, Strat. P&P, USAF, Pentagon, to Vice Cmdr., ACC, JB Langley-Eustis, Va. … Brig. Gen. Darren E. **Hartford,** from Cmdr., 379th AEW, ACC, Southwest Asia, to Cmdr., Natl. War College, NDU, Fort McNair, Washington, D.C. … Brig. Gen. (sel.) William M. **Knight,** from Dep. Dir., Ops., AMC, Scott AFB, Ill., to Dep. Dir., Ops., Ops. Team Two, Natl. Jt. Ops. & Intel. Center, Jt. Staff, Pentagon … Lt. Gen. (sel.) Jeffrey G. **Lofgren,** from Dep. Cmdr., AFCENT, CENTCOM, Southwest Asia, to DCS, Capability Dev., Supreme Allied Command Transformation, Norfolk, Va. … Brig. Gen. Russell L. **Mack,** from Vice Cmdr., 7th AF, PACAF, Osan AB, South Korea, to IG, ACC, JB Langley-Eustis, Va. … Brig. Gen. Chad T. **Manske,** from Dir., CENTCOM Deployment & Distribution Ops. Center, CENTCOM, Southwest Asia, to Dep. Cmdr., Canadian NORAD Region, Winnipeg, Manitoba, Canada … Brig. Gen. Mary F. **O'Brien,** from Dep. to the DCS, Intel., Intl. Security Assistance Force, US Forces-Afghanistan, CENTCOM, Southwest Asia, to Spec. Asst. to the DCS, ISR, USAF, Pentagon … Brig. Gen. (sel.) Aaron M. **Prupas,** from Sr. Mil. Asst. to the USD, Intel., Office of the SECDEF, Pentagon, to Dep. to the DCS, Intel., Intl. Security Assistance Force, US Forces-Afghanistan, CENTCOM, Southwest Asia … Lt. Gen. (sel.) Timothy M. **Ray,** from Dir., Global Power Prgms., Office of the Asst. SECAF, Acq., Pentagon, to Cmdr., 3rd AF, USAFE, Ramstein AB, Germany … Brig. Gen. (sel.) Randall **Reed,** from Dir., SECAF/C/S of the AF Exec. Action Group, USAF, Pentagon, to Dep. Dir., Strat. Plans, Rqmts., & Prgms., AMC, Scott AFB, Ill. … Lt. Gen. Darryl L. **Roberson,** from Cmdr., 3rd AF, USAFE, Ramstein AB, Germany, to Cmdr., AETC, JBSA-Randolph, Texas … Brig. Gen. (sel.) Kyle W. **Robinson,** from Dir., C/S of AF Strat. Studies Gp., CSAF, USAF, Pentagon, to Vice Cmdr., 7th AF, PACAF, Osan AB, South Korea … Brig. Gen. Brian S. **Robinson,** from Vice Cmdr., 618th Air Ops. Center (Tanker Airlift Control Center), AMC, Scott AFB, Ill., to Cmdr., 618th Air Ops. Center (Tanker Airlift Control Center), AMC, Scott AFB, Ill. … Brig. Gen. (sel.) John E. **Shaw,** from Cmdr., 21st SW, AFSPC, Peterson AFB, Colo., to Dep. Dir., Global Ops., STRATCOM, Offutt AFB, Neb. … Maj. Gen. David D. **Thompson,** from Dir., Plans & Policy, STRATCOM, Offutt AFB, Neb., to Vice Cmdr., AFSPC, Peterson AFB, Colo. … Maj Gen. (sel.) Giovanni K. **Tuck,** from Dir., Ops. & Readiness, DCS, Ops., USAF, Pentagon, to Dir., Ops. & Plans, TRANSCOM, Scott AFB, Ill. … Brig. Gen. Christopher P. **Weggeman,** from Dep. Dir., Future Ops., USCYBERCOM, Fort Meade, Md., to Dir., Plans & Policy, USCYBERCOM, Fort Meade, Md. … Maj. Gen. Timothy M. **Zadalis,** from Cmdr., 618th Air Ops. Center (Tanker Airlift Control Center), AMC, Scott AFB, Ill., to Vice Cmdr., USAFE, Ramstein AB, Germany.

SENIOR EXECUTIVE SERVICE CHANGES: Joo Y. **Chung,** to Dir., Oversight & Compliance, Office of Dep. Chief Mgmt. Office, Washington, D.C. … Shirley L. **Reed,** to CIO (Financial Mgmt.), Office of the Asst. SECAF, Financial Mgmt., & Comptroller, JB Andrews, Md. … Kathryn J. **Sowers,** to Dir., Financial Mgmt., & Comptroller, AFLCMC, AFMC, Wright-Patterson AFB, Ohio. ✪

Women in Special Ops?

Approximately 200 Air Force male and female volunteers will undergo physical evaluations as part of the final stage of assessing whether to open to female airmen the remaining careers fields closed to them, announced service officials.

"This testing and evaluation phase will develop the final physical test components that best predict operational success for these specific career fields," said Brig. Gen. Brian T. Kelly, the Air Force's director of military force management policy, April 21. "This effort marks the most stringent process yet by which we are developing occupationally specific physical standards, scientifically measured against operational requirements to match mission needs."

The Air Force has already conducted observational studies and discussions to judge what would be required to open the final 4,300 combat billets to women, in compliance with the Pentagon's 2013 directive.

Air Force Secretary Deborah Lee James will consult with US Special Operations Command officials following the evaluation, before making her recommendation.

The Defense Department plans to announce in 2016 which of the remaining closed careers across the services will become open to women applicants, states the release.

The Marine Corps concluded a two-and-a-half-year trial period in April with a gender-integrated infantry officer course; no female candidates successfully completed it, reported *USA Today.*

—Aaron M. U. Church

cleared Air Force operational testing, the last major hurdle before the service may declare it ready for use in combat, announced manufacturer Raytheon.

"MALD-J's unique capabilities have been proven in 42 successful flight tests during the last two years and brought us closer to full-rate production," said Mike Jarrett, Raytheon's vice president of air warfare systems, in the company's April 14 release.

The Air Force recently tasked Raytheon with building 250 MALD-Js during the weapon's eighth production lot. The company began delivering the jammer variant to the Air Force in 2012.

MALD-J adds radar-jamming capability to the basic MALD platform that confuses enemy air defenses by duplicating the flight profiles and radar signatures of friendly aircraft. MALD is already available for combat. It is integrated on the B-52 and the F-16.

Mannerly Muscle

Four B-52 bombers flew simultaneous long-distance power-projection training flights over the Arctic and North Sea from Barksdale AFB, La., and Minot AFB, N.D., on April 2, Air Force Global Strike Command announced.

USAF photo by A1C Taylor Queen

Providing Aid: *USAF airmen offload relief supplies from a C-17 in Kathmandu, Nepal, on April 28. A massive earthquake on April 25 devastated the region, causing thousands of deaths and injuries and leaving many more thousands without food, water, or shelter. USAF has delivered supplies and scores of personnel to the city, including search and rescue teams, a disaster assistance response team, and working dogs to aid in the search for survivors. A second major quake shook the capitol city of Nepal on May 13.*

"Exercises and operations, such as these bomber flights, enable and enhance relationships with our allies and partners and allow others to understand what capabilities US Strategic Command brings to the equation," STRATCOM Commander Adm. Cecil D. Haney said in a release.

NATO aircraft, including British Typhoons, Canadian F-18s, and Dutch F-16s, practiced dissimilar air intercepts with the B-52s en route. Each of the B-52s operated in "compliance with national and international protocols and due regard for the safety of all aircraft sharing the airspace," Haney said.

Exercise Polar Growl afforded crews polar-navigation training and tested command and control of simultaneous deterrence sorties. B-52s also participated in several NATO exercises and deployments in and around Europe last year.

Ski-borne Sovereignty

A pair of New York Air National Guard LC-130 ski-equipped transports supported Operation Nunalivut, a Canadian Arctic exercise, for the second consecutive year, announced Air Guard officials.

In light of Russian belligerence toward NATO and increased military activity in the Arctic, "we feel that these exercises are ever-more important to exert our sovereignty and our ability to respond," said Canada's associate defense minister Julian Fantino, according to the Canadian *Nunatsiaq News.*

"We're looking to continue standing up against any threat to our sovereignty and stand ready at any moment to defend our people, land, and interests," he said.

The LC-130s practiced operating from ice runways and working with Canadian Forces during the exercise. It concluded on April 22.

Approximately 200 Canadian troops and 30 US airmen from the 109th Airlift Wing at Schenectady County Arpt., N.Y., took part.

California Trades Predator for Reaper

Members of the California Air National Guard's 163rd Reconnaissance Wing flew the unit's final mission with the MQ-1 Predator remotely piloted aircraft in April.

After more than eight years of consecutive Predator flights for US forces overseas and also helping civil authorities during wildfires and floods at home, these airmen are now flying MQ-9 Reapers in similar roles, states an April 16 release.

In July 2014, the wing conducted its first local Reaper flight, and 163rd RW Commander Col. Dana A. Hessheimer piloted the unit's final MQ-1 sortie on April 1.

The wing, headquartered at March Air Reserve Base in southern California, became the first Air Guard unit to operate the MQ-1 in August 2006.

"We are the most experienced wing in the world flying remotely piloted aircraft," said Hessheimer. "Our pilots fly combat air patrol missions and have both training and operational experience with over 6,500 sorties."

NORAD Requests F-16 AESA

US Northern Command recently issued an exigent request for F-16 active electronically scanned array radars to equip alert fighters defending the homeland.

"I actually submitted that urgent need today," NORAD-NORTHCOM Commander Adm. Bill Gortney said in an April 7 Pentagon briefing. "We have some boxes, we have the airplanes, and we should be able to marry them up."

District of Columbia Air National Guard alert F-16s, tasked with defending the National Capital Region from JB Andrews, Md., are slated for the first AESA upgrades, Gortney said. ✪

A photo illustration of the HH-60W rescue helicopter over rugged terrain. Initial testing will begin in 2019.

AFTER years of delay, the US Air Force is on track to field a new rescue helicopter into its fleet within a decade—the HH-60W combat rescue helicopter or CRH. The program started last June, when Sikorsky won a $1.28 billion contract to provide new helicopters for USAF's in-demand combat search and rescue (CSAR) forces. The HH-60W Whiskey is to replace the HH-60G Pave Hawk, first fielded in 1982.

The CRH's presence in USAF's modernization portfolio was not a foregone conclusion as recently as a year ago. Air Force budget officials revealed the program would be funded last March when it rolled out its Fiscal 2015 spending proposal, after suggesting just days before that they would delay the effort two more years.

Though the CRH comes in just behind the service's leading procurement priorities—the F-35, the KC-46 tanker, and the Long-Range Strike Bomber—USAF officials have noted the Air Force has a responsibility as the primary service to organize, train, equip, and provide forces for personnel recovery operations, and more specifically the capability to conduct theater combat search and rescue. The existing Pave Hawks have piled up hours and wear-and-tear and in many ways fail to meet mission standards. Despite past hiccups and cancellations, the Air Force cannot delay the program indefinitely.

The Air Force is "committed to ensuring our airmen are equipped to rescue America's warriors whenever and wherever necessary," Chief of Staff Gen. Mark A. Welsh III said of the contract announcement. "This contract secures that mission for many years to come."

Sikorsky photo illustration

At long last, the Air Force is buying a new rescue helicopter.

RESCUE'S Future

By Marc V. Schanz, Senior Editor

In late February, speaking before the House Appropriations subcommittee on defense, Air Force Secretary Deborah Lee James said the program holds high importance, and even if the service had to live with sequestration again, "our best advice would be, do not touch that program."

PROJECTED ARRIVAL DATES

The initial $1.28 billion covers early engineering, manufacturing, and development work, the procurement of the first four airframes, and seven aircrew and maintenance training systems. Should USAF exercise all options to buy 112 HH-60W helicopters, value of the contract could total some $7.9 billion over the duration of the effort, Sikorsky officials declared last year.

In early April, Air Combat Command officials said the systems requirements review for CRH was underway in order to verify and clarify its capabilities and components. By April 2016, the CRH is scheduled for a preliminary design review, to be followed a year later with a critical design review. If all goes well, according to Maj. Joel Soukup—the rotary wing branch chief in ACC's personnel recovery requirements division—initial testing of the first airframes will begin by Fiscal 2019. Test and production schedules aim for an initial operational capability declaration in 2021. By the time the production line hits its stride after initial testing, Soukup said, USAF anticipates "between 10 and 14" helicopters per year coming into the force to replace legacy Pave Hawks.

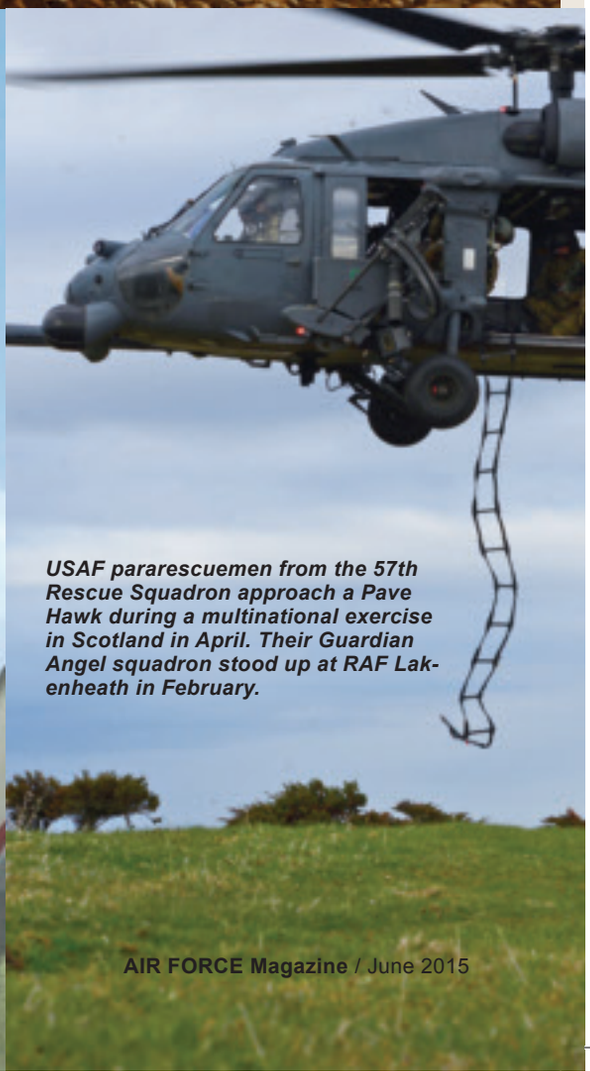
The CRH effort gets going at a time USAF is drawing back from a heavy footprint supporting operations for US Central Command and is reinvigorating

Capt. Nick Morgans protects a "casualty" from flying dirt as a Pave Hawk lands near Kandahar, Afghanistan, during a mass casualty scenario exercise in 2010. The HH-60's mission capable rate hovers at about 75 percent.

USAF photo by SSgt. Eric Harris

SrA. Ronald Hastings unfolds the tail rotor of a HH-60 Pave Hawk at Joint Base Balad in Iraq in 2010. Constant rotations to the Middle East and other areas for more than a decade have taken their toll on the helicopters and airmen.

USAF photo by SSgt. Phillip Butterfield



USAF pararescuemen from the 57th Rescue Squadron approach a Pave Hawk during a multinational exercise in Scotland in April. Their Guardian Angel squadron stood up at RAF Lakenheath in February.

training for rescue operations in "force-on-force" and contested environments. In these situations rescue airmen could be challenged by modern air defenses, hostile regular military forces, jamming, and electronic warfare. USAF is also modernizing other elements of USAF's rescue forces—such as its fleet of HC-130 specialized rescue tankers.

The CRH program, though, is a long-awaited sign of relief for USAF's HH-60 Pave Hawk crews, squeezed by near continuous combat since 2001. The pace of deployment pressures has steadily eaten away at Pave Hawk mission capable rates in this time. While the Air Force has purchased operational loss replacement aircraft, in the form of modified Army UH-60 Black Hawks, the bulk of the fleet is now more than three decades old.

After nonstop rotations to Iraq, Afghanistan, Djibouti, and other locations since 2001, the fleet is not only wearing out but also shrinking from operational and combat losses.

The arrival of the Whiskey will hopefully "offset many of the maintenance issues we've had with the aging [HH-60 Pave Hawk] fleet," said Soukup. As of April, the Pave Hawk mission capable rate hovers around 75 percent, and of USAF's available 98 Pave Hawk airframes, 59 percent are available for operations at any given time, according to Soukup. "That's an uptick over the last few years, but not by much," he said.

USAF has long recognized the need to modernize its rescue helicopters, but plans have come and gone. Soukup noted the first validated requirements for a Pave Hawk replacement go back to 1998 and have since gone through several iterations. The Air Force's first effort to modernize, the CSAR-X, was first awarded in November 2006. It aimed to put the first of 141 new helicopters on the ramp by 2012. It didn't happen.

KILL THE CSAR-X

In April 2009, then-Secretary of Defense Robert M. Gates killed CSAR-X for good, ordering USAF to scrub the requirements and criticizing it as a "single-service solution" for the personnel recovery mission.

Since then, ACC officials have worked to "downscale" the requirements from CSAR-X into what became the CRH, Soukup said. USAF tried to "hold on to what they could in that effort," he said, as on paper CSAR-X was a larger, more powerful aircraft with more capabilities, but also more costly and with more potential development risks. The initial winner in the 2006 competition was a Boeing variant of the CH-47 Chinook heavy lift helicopter. This award was later overturned after a protest by losing bidders Sikorsky and Lockheed Martin.

As part of the narrowed requirement, the CRH will be based on the Pave Hawk airframe—and will feature some enhancements to ensure better maintainability, interoperability with other systems, and increased modularity. The Pave Hawk fleet has been modernized over the years, but largely piecemeal, Soukup noted. This has resulted in a lot of "federated systems" on the helicopter that don't necessarily integrate with each other as well as operators would like.

The lack of a "new-build" developmental program for the airframe is one of the big reasons why ACC's programmers are feeling positive about the effort's time line. "We have a way forward, and there's nothing very technologically challenging in the way," said William Young, ACC's personnel recovery requirements division chief, in an April interview.

Several requirements still need to be "refined," but this has more to do with bridging the understanding gap between USAF's program needs and what the contractor can provide than any technical limitations. "It doesn't mean that the CRH will be the same aircraft as the HH-60. In fact it will be different in many ways," Young pointed out. Many aspects will be familiar to Pave Hawk crews, such as the T700-GE-701D engines and the Pave Hawk's .50-caliber and 7.62 mm crew-served weapons. It will also field with composite wide-chord main rotor blades and corrosion-resistant materials to improve maneuverability at high-altitude operations.

But the HH-60W will be a tougher, more modular aircraft. Already widely known as a "flying ambulance" by Pave Hawk crews, one of the most closely watched categories in the program will be payload and weight. A fully loaded HH-60, with patient, crew, armaments, defensive systems, air refueling boom, and other specialized equipment weighs in at 22,000 pounds, all but ensuring the necessity of air refueling on long-duration or high-altitude missions.

USAF photo by SrA. Erin O'Shea

USAF photo by SSgt. Jonathan Young

An HH-60, alongside a USMC CH-53, takes on fuel from an MC-130 for a Combined Joint Task Force-Horn of Africa familiarization flight. This is another area where Pave Hawks have been used extensively.

ACC programmers plan to field the HH-60W with an additional max gross weight capacity of about 500 pounds, Soukup said. This would allow the ability to pick up two patients simultaneously if needed. Depending on mission profile and factors such as loiter time, altitude, and availability of air refueling, crews must now balance weight and fuel loads versus patient capacity.

Hover performance is also a capability ACC wants to see improved in the HH-60W, to improve capabilities in so-called "higher, hotter hovers." This is a lesson Pave Hawk crews have gleaned from their experiences in high-altitude Afghanistan, where thin air and dusty, hot conditions combine to sap helicopter performance and contribute to maintenance backups on the ground.

CRH program officials will tweak capacity by decluttering the aircraft and consolidating avionics and subsystems that often have their own displays and take up more space than needed. "What the CRH will do is take a lot of those systems and more, such as Link 16, and get all that into a mission computer, which … will do a lot of that processing," Young explained. Instead of numerous control heads for separate systems, a flight data management system will streamline the information and give the crew access to it on a set of multifunction displays in the cockpit, giving the crew the ability to declutter information required as the mission evolves.

The CRH, in addition to "glass cockpit" displays and modern avionics, will get some upgraded defensive tools along with its improved data link and communications capabilities. The modernized helicopter will begin arriving in the Air Force inventory as the service is looking to take the extensive combat experience gained in CSAR and PR missions over the last 14 years and adapt it to future scenarios where rescues may take place in more access-limited and highly contested areas. More of the combat air force will have to participate in these scenarios. They will require both capable platforms and highly trained rescue airmen.

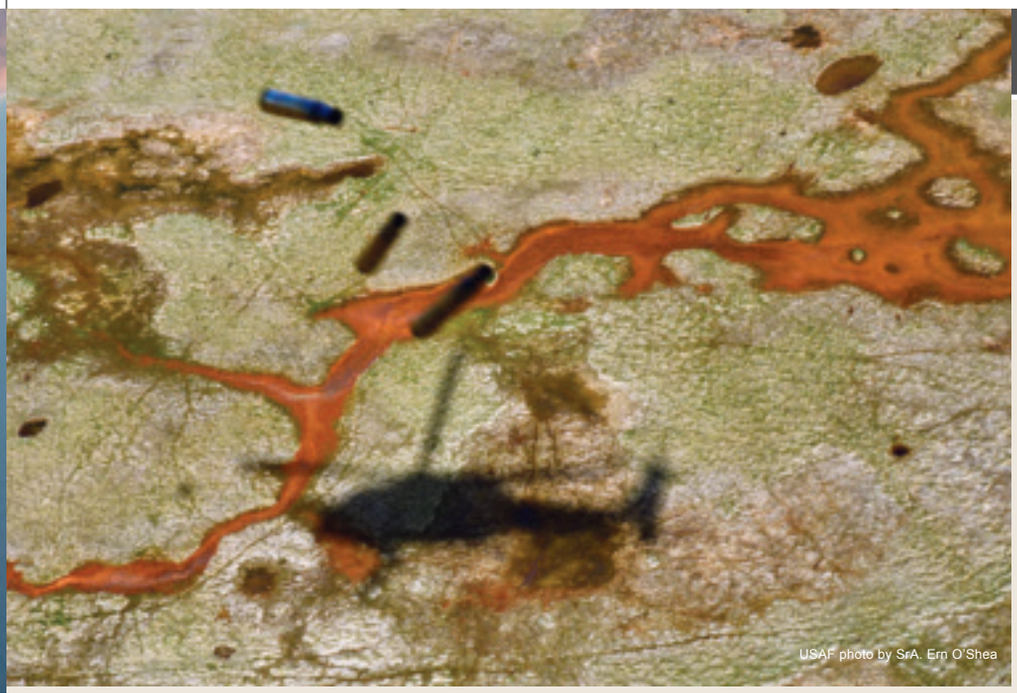
USAF photo by MSgt. Kevin Gruenwald

TSgt. Michael Vincent (l) and SSgt. Andrew Gibson (r) prepare to reload a .50-caliber machine gun on an HH-60 on the Nevada Test and Training range at the USAF Weapons School.

"I think what we're looking to do is refocus our efforts. I don't see it so much as an adaptation," said Maj. Michael Kingry, assistant director of operations for the 34th Weapons Squadron at Nellis AFB, Nev.—home of the USAF Weapons School's HH-60 weapons instructor course.

THE UNRELENTING DEMAND

Rescue airmen have trained for major combat operation rescues for years, figuring out how to survive surface-to-air missile threats or GPS jamming or electronic warfare threats, for example. But since 2001, "we've essentially had a generation of young rescue guys who are very used to doing [counterinsurgency warfare] but not doing a focus on [major combat operations] or force-on-force personnel recovery," Kingry said. "They've got four-to-eight deployments to Iraq or Afghanistan, and they know how to operate in those environments. ... We are refocusing those skills."



The shadow of a Pave Hawk against the Scottish countryside, as shell casings from its .50-caliber machine gun fall to the ground, during a training exercise.

Despite the drawdown from Afghanistan, Kingry noted, USAF's HH-60 crews and rescue airmen are still in high demand from the combatant commanders—one of the reasons USAF does not want to delay the CRH.

Speaking at a Washington, D.C., industry conference in March, Air Combat Command boss Gen. Herbert J. "Hawk" Carlisle highlighted the CRH as "something we have to do, and we have to get it right" because of the unrelenting demand for highly trained PR forces.

Carlisle also noted USAF is modernizing the other legs of the service's rescue mission—by replacing its HC-130 tankers with modern HC-130J Combat King IIs and also "evolving" how USAF organizes and deploys its pararescuemen (PJs), combat rescue officers, and survival, evasion, resistance, and escape specialists.

In February, USAF stood up its fifth Guardian Angel squadron at RAF Lakenheath, UK, the 57th Rescue Squadron. This process has unfolded since 2001 and splits PJs, CROs, and SERE specialists off from HH-60 squadrons and organizes them as their own entities.

Echoing Kingry's point, Carlisle noted the combat air force has to work on how it executes some of the more "challenging events" PR forces could be called into in the future. Personnel recovery in the US Pacific Command is different from in Iraq, or in Europe, or in Africa, Carlisle said.

In short, PR and CSAR will touch more of the Air Force in the future—from space forces to cyber to the traditional "triad" of the HC-130, the HH-60, and the Guardian Angel squadrons.

"The big solution is less the materiel ... but training for the larger ... air force on how to accomplish [challenged and denied PR]," Kingry said. This will involve improved offensive and defensive counterair coordination with PR forces, suppressing air defenses, building awareness on how to perform strikes on enemy forces in rescue scenarios, working out "on-scene commander" duties, and other aspects of the rescue mission.

In addition to replacing the Pave Hawk, the future of the A-10 poses a challenge—insofar as the Warthog has served as the go-to armed escort and forward observer aircraft, capable of long loiter times needed to recover downed aircrews. Carlisle noted the problem during his March remarks in Washington, D.C., adding that USAF has to get a future "Sandy" aircraft that will be an interoperable part of the Air Force's rescue capabilities.

With the possibility of the A-10 going away, HH-60 crews are training with more and varied aircraft from all services to accomplish the on-scene commander role, Kingry said. In the Weapons School course, this includes Pave Hawks themselves training in scenarios to take on the role, even working with multiple helicopters, such as with two- and four-ship Pave Hawk formations working with Army AH-64 Apaches or Marine Corps AH-1 Cobras.

Within USAF, at Nellis, there is ongoing testing with both F-15Es and F-16s to see what fighter could better handle Sandy duties if pressed into the task, Kingry noted, and soon the F-35 will be arriving in the Air Force and have to participate in rescue operations as well.

"I think we're evaluating that right now," Kingry said of the F-35's potential in rescue missions. "We may lose some capability, but we will gain some. It's a matter of finding out its strengths" in operations.

Kingry noted that several of the F-35 pilots now flying at the Weapons School are qualified A-10 pilots who have deep knowledge of on-scene commander operations in CSAR missions and are working to adapt those skills for the F-35 force. Broadly speaking, Kingry said, he and his fellow instructors at the Weapons School are "trying to raise the [combat air force's] level of expertise" in rescue operations.

STRATEGIC IMPLICATIONS

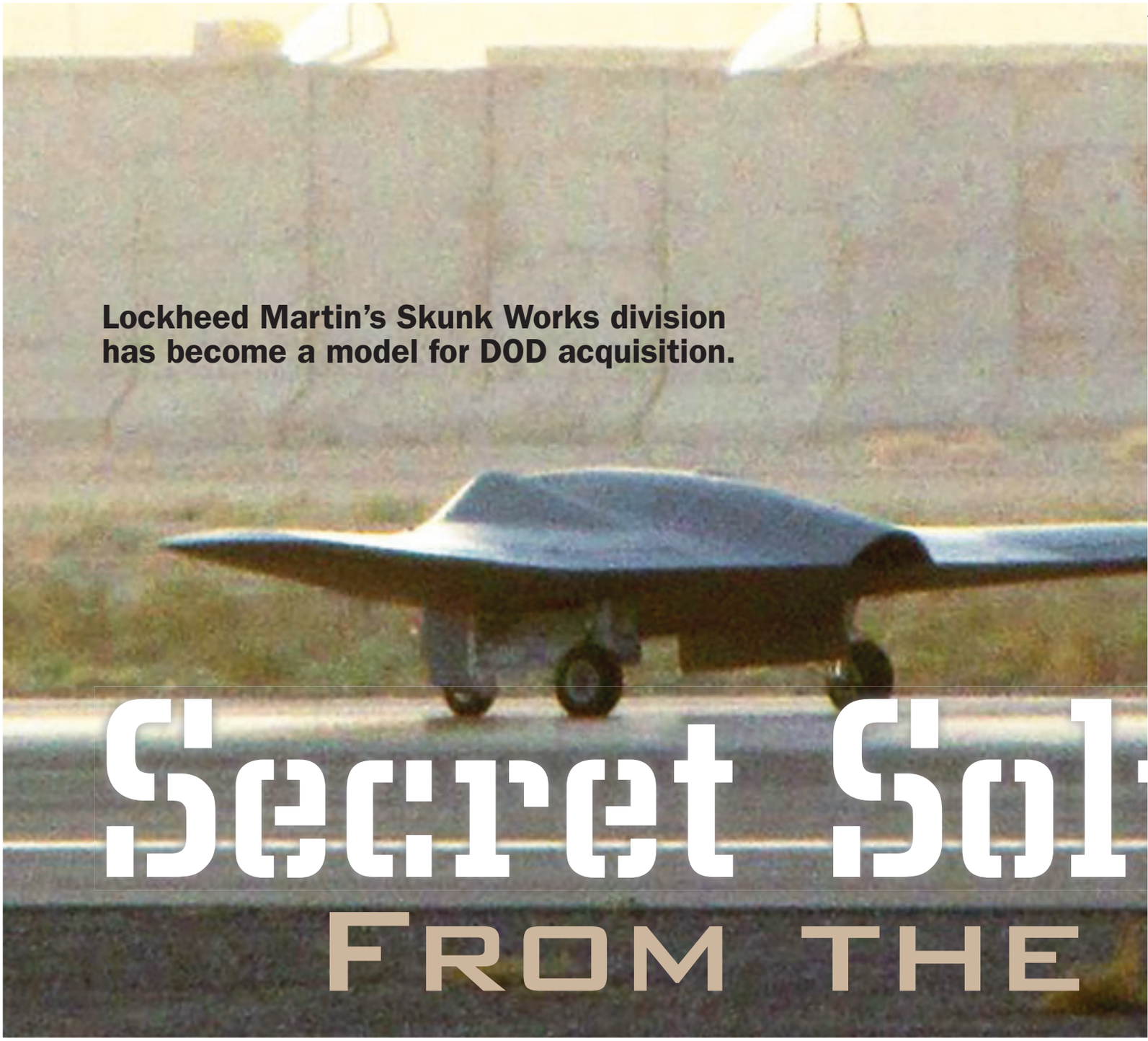
Mission planning for personnel recovery events, in the past, was often thought of as a subset or contingency mission in many corners of the Air Force, Kingry observed. But rescue has large and strategic implications for these events, he noted.

The capture and eventual murder of Royal Jordanian Air Force 1st Lt. Moaz al-Kasasbeh by ISIS forces, after his F-16 crashed near Raqqa, Syria, last December, is a bitter illustration of how these events can have enormous repercussions beyond just the immediate operation, he said.

Inside ACC's personnel recovery requirements shop, Young noted that Air Combat Command is not only keeping the CRH on track, but is responsible for making sure the CRH, the HC-130J, and the Guardian Angels are all able to execute their mission. "The path we are pursuing is not just interoperability" in the personnel recovery triad, but with the combat air forces as well, he said.

CRH is not CSAR-X Part II because the new helicopter will be more capable and better able to conduct operations with some of USAF's most advanced assets than any previous Air Force rotorcraft. "We recognize the CRH is not a revolutionary leap in technology," Young said. Still, when fielded, the HH-60W will be "evolutionary" and have more modularity than any of its predecessors.

"When it's fielded, it is going to ... most likely [be] the most modern rescue helicopter in the world, with a ton of capability that the Air Force has never had," he observed. ✪



Lockheed Martin's Skunk Works division has become a model for DOD acquisition.

Secret Sol

From the

Lockheed Martin's supersecret "Skunk Works" advanced development organization—producer of the U-2 and SR-71 spyplanes and the F-117 stealth jet aircraft, among a host of other highly classified projects—is starting to break its traditional silence. This is driven in part by plaudits from top Pentagon acquisition leaders and partly by a desire to be better understood by the public.

The special projects unit is at work on a flurry of next generation concepts, some of them discussed by leaders during a recent *Air Force Magazine* visit to the Skunk Works facility at Air Force Plant 42 in Palmdale, Calif.

Top Pentagon acquisition officials—Deputy Defense Secretary Robert O. Work and acquisition, technology, and logistics chief Frank Kendall, to name two—have made it a staple of recent speeches that industry and government alike should emulate the Skunk Works model. It's unusual praise from officials who ordinarily must be strictly agnostic in their comments about industry vendors.

Kendall started calling Skunk Works to the front of the class in his 2013 rollout of "Better Buying Power 2.0," the second installment of his improved guidelines for Pentagon procurement managers. In covering commentary, Kendall said acquisition reformers "have advocated a lean and less burdensome approach to managing programs and to making major acquisition decisions. One ... is the 'Skunk Works' approach, which dates to the 1960s. This approach involves small, highly competent government

Top: The most recent Skunk Works project to come out of the black was the RQ-170 Sentinel. Internet photos have shown it in Afghanistan, on Guam, and refueling from a tanker. Bottom: The Skunk Works facility in Palmdale, Calif.Two of its more famous successes—the P-80 jet fighter and F-117 attack jet—sit on poles outside the main building.

Internet photo

utions

Desert

By John A. Tirpak, Editorial Director

and industry teams working together on a new product development."

In speeches this year, Kendall and Work have further touted the Skunk Works method as a smart template for preserving the US military edge during a period of flat budgets, as adversaries close the technology gap. In their view, it will be crucial to rapidly prototype new systems and accelerate the pace that technology is refreshed on existing platforms. Speed, Kendall said, can be gained by reducing "non-value-added" oversight from the Pentagon and Congress, by clearly defining projects and desired outcomes, by keeping work groups small, and by using mature but not yet fielded technologies.

Today, Skunk Works is working on hypersonics, directed energy, a sixth generation fighter, future spyplanes, and various classified programs.

"We're being a little more public," said Rob Weiss, Skunk Works vice president and general manager, because "we think it's important that the nation recognizes that we're very relevant to ... the nation's defense needs ... and how we have the right model and culture to develop capability that's critical, and to develop it quickly and affordably."

Speaking in a reception and meeting area clearly geared to high-level visitors—access to work areas is tightly controlled—Weiss said the Skunk Works model can be summed up as "getting the requirements right up front, having a small number of requirements that you're really designing to, and holding those requirements through the development process." In addition, it's important to get "the right people on the government side, getting the right people on the industry side" with the right talents, establishing "trust between government

Photo by Paul Weatherman

CIA photo

A-12s—secret CIA spyplanes that were forerunners of the SR-71—under construction when Skunk Works was located in Burbank, Calif.

and industry, [and making] sure we're not adding people to the equation that don't really add any value. Small empowered teams [are] one of the keys to success" at Skunk Works.

Third, Weiss said the unit's success "is really having your arms around the risk side of the equation." Besides client and contractor both having a clear understanding of risk, Weiss said Skunk Works looks to drive it lower by "looking for a lot of reuse," such as hardware components and software already shown to work on other platforms. The Have Blue, for example—Skunk Works' proof-of-concept aircraft that led to the F-117—used engines, instruments, and an ejection seat from the F-5 fighter; landing gear from an A-10 attack airplane; and an F-16's fly-by-wire flight control system. The big innovation of the aircraft was its low radar cross section.

Skunk Works' founder, the legendary Clarence L. "Kelly" Johnson, once said the key to success was limiting invention to "one miracle" per project.

The list of the division's achievements is long, ranging from the P-80—the first practical US jet fighter—to the F-104, the U-2, the C-130, the SR-71 and its many variants, Have Blue and the F-117, and in later days, the F-22 and F-35 fighters. Skunk Works developed the Navy Sea Shadow stealth ship—whose lessons now echo in the slab-sided designs of modern Navy vessels—and the RQ-170 Sentinel, about which Lockheed Martin will add nothing to the Air Force's terse description that it is a stealthy remotely piloted vehicle, one having famously crashed in Iran.

Books have been written detailing other Skunk Works projects, not all having progressed to a fielded product, and not all successful.

The Skunk Works facility comprises several buildings at Palmdale. One houses the offices where analyses and design are done. Another serves as the home of programmed depot maintenance on the U-2. Still another is a large "clean room" housing an advanced tape-laying machine that can rapidly produce large complex aerodynamic shapes to extraordinary tolerances. On display are pieces of Skunk Works' "Polecat" stealth RPA demonstrator and the tooling used to make it.

The largest building on the site used to be the factory for the commercial L-1011 widebody tri-jet, Lockheed's last civilian airliner. It is now divided between two efforts. One is the giant P-791 Hybrid Airship, a proof-of-concept vehicle aimed at a future airlifter. It combines traditional lighter-than-air technology with an aerodynamic shape that will generate about 20 percent of the craft's lift when under power. Big as it is, the envisioned final version would be many times larger and deliver heavy payloads directly to the front, eliminating the need to move extremely heavy cargo by sea to ports and then transshipping it to forward areas by truck or rail.

Next to the airship is "The Great Wall," as employees call it. Undecorated and dozens of feet tall, it blocks a view of whatever secret projects Skunk Works is working on. Power tools as well as less-sophisticated saws and hammers can be heard on the other side. (It's worth noting that the original F-117 mock-up was made of wood.)

Weiss said much of the Skunk Works effort is in analysis. The division is always looking for business, trying to anticipate what the services will need before they know it themselves. During lean years, former Skunk Works general manager Ben Rich pitched the Air Force a significant upgrade to the U-2, with new engines, sensor payloads, and other improvements

that resulted in almost an all-new aircraft. Those aircraft, though modified many times since, are still in use today and are expected to serve at least until 2020.

Weiss offered observations on some of the futuristic technologies where Skunk Works is heading.

SIXTH GENERATION FIGHTER

Skunk Works is spending the time to "fully understand the requirements" of what will be necessary to "maintain quantitative advantage over our adversaries" and secure future air dominance when the F-22 and F-35 fighters are no longer considered state-of-the-art. The Air Force is already inside the typical development time line to begin work on what would ultimately become a sixth generation fighter.

Understanding of the requirements is needed to avoid sending industry "down a bunch of paths that are ultimately not what the nation needs. We are willing to make substantial investments over a period of time, but we don't want to make those investments in the wrong areas."

Toward that understanding, Weiss said his shop is studying the capabilities now deployed and the best way to fully exploit them by making "air, surface, subsurface" truly collaborative.

Next will be an analysis of the modernization paths for all existing platforms, not just Lockheed's. Weiss said Lockheed Martin might compete for upgrades on "competitor airplanes" but the analysis is really meant to discover "where are the ... gaps" in capability 20 years hence—"And you can't do that unless you look across all the systems out there."

Last comes "where do you need to insert a new capability," and "what is the range of [specific] solutions" needed to fill that gap? There's "definitely a possibility that there could be a new platform in the equation," he said, noting that Kendall has already "identified ... X-plane concepts that he wants to initiate ... and there are certain technologies you're going to want to mature." Those include "broad areas of survivability."

THE U-2

"We've been asked about unmanned versions of the U-2 and we've responded accordingly," Weiss said, but although "technologically, it's very achievable," he wonders if this is "something the Air Force and the nation really would want."

There are "reasonable roadmaps"—both on the Skunk Works side and the Air Force side—to add capability that would keep the U-2 "very viable" for many years to come. The U-2's high operating altitude has given it sanctuary from threats in all but a few heavily defended areas. However, Weiss characterized the U-2 and RQ-4 Global Hawk as intelligence, surveillance, and reconnaissance platforms useful only for the "uncontested environment."

ISR AND HYPERSONICS

Asked if the Air Force needs to go back to a high-speed ISR platform in the class of the SR-71—something survivable in the densest area-denial situations that would be more responsive than a satellite—Weiss said, "Those are all analyses that we are currently doing."

Speed, he said, "has always been a key part of the survivability equation, as well as enabling timely collection and dissemination of information. So we are analyzing the real value of that speed."

However, the cost of speed is a big factor in how useful such an approach can be, he said. Hypersonic technology—the ability to fly at more than five times the speed of sound—is not yet mature enough for the company "to say that's an absolute requirement that the Air Force ought to sign up" for, Weiss said.

Nevertheless, "we're pretty optimistic about it, we think it could be a real game changer, but it's going to be a ways in the future before we would propose that as a direction we think is absolutely critical to the nation."

THE VALUE OF STEALTH

Speed is "one way to achieve survivability," Weiss said, but effective passive signature management—stealth—makes it possible to safely obtain intelligence in other ways that are "more persistent." If an aircraft can loiter, undetected, near an area of interest, it can soak up valuable information for an extended period.

Weiss stridently disagrees with some senior Navy officials who have discounted the value of stealth. "No question, stealth will continue to be foundational for [combat] airplane design," he asserted. "At the same time, there are other techniques that we're adding to the equation that will continue to make platforms and vehicles survivable into the future against advanced threats. But all these designs start with basic passive signature capability. And there's a lot that can be done to passive signature

Lockheed Martin photo

Photo via USAF

Through the Have Blue demonstrator program, Skunk Works proved modern stealth technology worked, leading directly to the F-117. Both photos were taken in the 1970s and '80s.

Lockheed Martin photo by Denny Lombard

today, both on new vehicles and existing vehicles."

DIRECTED ENERGY

"We are getting a lot closer" to having directed energy weapons with kinetic effects, Weiss said. Lockheed Martin is bringing together its Space Systems & Missions Systems with Skunk Works to develop near-term capabilities, to "mature [and] demonstrate" the feasibility of DE weapons—known in general parlance as lasers.

Weiss noted a requirement from Air Force Special Operations Command to put a directed energy weapon on a C-130 "in the 2017 time frame ... with an actual airborne demonstration."

The size of the required host platform has shrunk from a 747 to a C-130, "and now the goal is to get it to a tactical capability that could be on the roadmap to F-35 upgrades in the future."

A directed energy capability is not yet in the official list of planned upgrades for the F-35 fighter.

Lockheed Martin photo

LONG-RANGE STRIKE BOMBER

Lockheed Martin's partnership with Boeing on the Long-Range Strike Bomber (LRS-B) is "extremely effective," Weiss said, a "complementary arrangement" with each company bringing "inherent capability [that], … when packaged together, provides tremendous capability" for the Air Force.

"We're not redundant, we're not fighting about who gets what work, it's just a very naturally occurring team that, frankly, you wouldn't recognize what facility you're at or what badge anybody's wearing as the team operates."

He said the teaming arrangement is no different from working with another Lockheed Martin division.

Weiss declined to comment on how Skunk Works can cooperate with Boeing on the LRS-B but keep its best tricks for itself, given that the two will compete for future projects.

FUTURE NUMBERS

The Air Force facilitized to build 132 B-2s but ultimately only bought 20. It created a factory to make 750 F-22s but only got 187. Is the future of combat aircraft in short production runs segueing rapidly into successor systems?

"I think there'll be a combination" of high-volume systems as well as short-run projects, Weiss predicted. In cases where there will be "substantial investments made by government and industry" in developing platforms with "a long-term payoff," amenable to "a series of upgrades that occur over the life cycle of the … system, … I think you'll definitely see some long-run production."

At the same time, he sees a need for "systems that have a rapid cycle time associated with it. It can be developed quickly, fielded quickly, and produced over a relatively short period of time and then we move on to the next one. So I don't think … it's an either-or answer. I think it's going to be a combination of both. And we need to get better at both," in industry and in government.

Weiss said he's optimistic that can happen, especially given the push among the current DOD leadership to bring industry into capabilities talks early. "Having more frequent, more candid conversations, … more sharing of common views of where industry's going, where government wants us to go, … those are all things that are going to build the trust and success as we chart a path forward," he said.

Air Force Secretary Deborah Lee James has talked about the need to radically shrink the cost of new systems, and Weiss said, "We've been on a path to reduce the cost of manufacturing for decades," with some "recent breakthroughs" that he said were proprietary.

But Lockheed Martin has also made cost breakthroughs "in partnership—I'll just leave it at that—with other industry members," Weiss said. Skunk Works may be the highest-profile example of its kind, but other companies have rapid prototyping arms of their own, such as Boeing's Phantom Works. The Air Force need for faster, lower-cost solutions means a bright future for small teams making big advancements. ✪

Top: The P-791, shown here at its 2005 rollout, is a development platform for a potential future airlifter that would be many times larger. Called a Hybrid Airship, it's a lighter-than-air craft that also derives lift from its shape. Left: Skunk Works Executive Vice President and General Manager Rob Weiss.

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Airpower Against Ships

By Rebecca Grant

USAF is developing the tactics and technology needed for operations against targets in the vast Pacific.

At Dyess Air Force Base in Texas, armorers loaded a B-1 bomber from the 337th Test and Evaluation Squadron. Tucked in the bomb bay on Feb. 4 was a weapon prototype ready for its third in-flight test: a Long-Range Anti-ship Missile, built to scourge hostile naval vessels, at long range, and in the midst of enemy jamming and electronic clutter.

The B-1 crew released the weapon over the cold seas of the Navy's Pacific test range off Point Mugu, Calif. The LRASM guided to several waypoints receiving updates from a data link in flight, and skimmed past obstacles at low altitude.

Think bombers testing anti-ship weapons are on the fringe of airpower? Not so. The mission is a natural, according to Dyess crews that've participated in testing over the last two years. "We can not only carry more of this weapon than any other platform, but our versatile speeds that have proven useful in the past decade in Afghanistan will also prove useful in the vast maritime environment," explained Capt. Alicia Datzman, LRASM project officer, after one such test. "With our loitering and refueling capability we can hang out for a while waiting on a specific target set or sprint to where we need to deliver these weapons," she said in a press release.

What's the goal? Maritime domain awareness and options for maritime strike have become a critical part of maintaining the global commons. The Pacific rebalance, daily operations around the Persian Gulf, and the 2014 Third Offset strategy all rely on watching what's moving on the seas and responding when needed. Peers like China with new destroyers, cruisers, and carriers may be targets if they act aggressively—and so may be terrorists and pirates. Either way, USAF airpower contributes long-range punch in surveillance and strike.

SHIP HUNTING

B-52s participated in maritime exercises in the Baltics in 2014. The B-52 has also been fitted with a Dragon Eye AN/ASQ-236 active electronically scanned array radar pod in part to improve search for maritime targets. And with an arsenal of new weapons and tactics, airmen are honing skills for maritime search and strike.

Finding and sinking ships were important components in the maturation of airpower, from the sinking of SS *Ostfriesland* to B-25s skip-bombing in the Pacific.

Then there was the Cold War. The Soviet navy grew into a formidable adversary. Two other jolts came 15 years apart and announced the shift from bombs and torpedoes to missiles as the weapons of choice. In 1967, Egypt used patrol boats and cumbersome Styx missiles to sink the Israeli destroyer *Eilat.* Then in 1982, sea-skimming Argentine fighters guided by a P-2 Neptune fatally damaged HMS *Sheffield* during the Falklands War.

Consequently, maritime operations re-emerged as a major mission area for USAF in the 1980s. "As the Falklands conflict demonstrated, airpower is a critically important part of successful maritime operations. We will be putting more emphasis on such collateral roles as sea-lane protection, aerial minelaying, and ship attack," stated Air Force Chief of Staff Gen. Charles A. Gabriel, according to a 1982 *Air Force Magazine* article.

As a result, the B-52s were modified to carry the Harpoon missile. This 1,145-pound weapon boasted a penetrating warhead, radar guidance, and a range better than 60 miles.

USAF photo by TSgt. Richard Freeland

Here: USS* Schenectady, *a decommissioned tank landing ship, lists after being struck by JDAMs during exercise Resultant Fury off the coast of Kauai, Hawaii, in 2004. Below left: Gen. Mark Welsh III, Chief of Staff, spoke of the importance of joint systems and procedures to connect ships and fifth generation aircraft. Below right: Then-PACAF commander Gen. Hawk Carlisle said some Pacific region allies are doing a good job of developing airpower to contribute to maritime defense and security.

Actually sinking ships was not the top priority. Knocking them out was the first step. The idea for Harpoon was to obtain a "mission kill" on a naval vessel. Once damaged, the ship was no longer as high a threat, and aircraft could return later with direct attack bombs to destroy it as needed. A Harpoon strike mission kill might disable the target ship's defenses or eliminate its ability to see the battlespace.

The US Navy's maritime strategy as articulated by service Secretary John F. Lehman Jr. in the 1980s called for aggressive use of carriers and surface action groups against the Soviet navy. The B-52G armed with Harpoon stood ready to take up several different roles in this air-sea battle.

On perimeter defense, the B-52Gs could roam with tanker support and surveillance by AWACS and Navy systems. B-52Gs could strike Soviet navy targets on the flanks of the US carrier battle groups, leaving them free to concentrate on offensive strikes against Soviet surface combatants.

"As the E-3A located distant enemy forces, it would vector both the carrier aircraft and the B-52s into the target range. With an Air Force KC-10 tanker tasked to provide fuel, this air armada could remain aloft for long periods. If Harpoon-equipped B-52s were joined by B-52s carrying mines, the force's versatility would increase considerably. Mine-capable B-52s could establish mine fields in significant enemy approaches, such as harbors and choke points. Minefields would force the enemy fleet to disperse, making individual ships more vulnerable to Harpoon attack," wrote Donald D. Chipman and Maj. David Lay in 1986 in *Air University Review.*

The key determinant at the time was the 200-mile-range missiles carried by Soviet Backfire bombers. Added to that, Soviet surface ships carried missiles with a range of 250 miles. Soviet doctrine called for the fleet to

USAF photo by SSgt. Evelyn Chavez

USAF photo by 2nd Lt. Jake Bailey

USAF photo by A1C Damon Kasberg

disperse when under attack. Single Soviet navy ships could roam the edges of the battlespace, posing potentially lethal threats to US ships and aircraft. Adding the B-52Gs to the mix extended sea superiority in both range and time.

The Air Force based a squadron of B-52s with Harpoons on Guam and another at Loring Air Force Base in Maine. Backed with weapons, concepts, and tests, the B-52 was at a peak phase as a sea power weapon. This was dangerous, close-in work, but analysis showed a powerful combat and deterrence payoff. The ideal of course was for patrolling B-52s to lurk over a choke point like the Kurile Islands in the Pacific or the Greenland-Iceland-United Kingdom gap and threaten to plink off Soviet navy vessels.

Toward the end of the Cold War doubts crept in about whether Harpoon would correctly identify the "red" or enemy target. In December 1988, an F/A-18 from USS *Constellation* launched a Harpoon missile during an exercise off Kauai, Hawaii, en route to a Western Pacific deployment. The missile accidentally acquired the Indian freighter *Jagvivek,* which had strayed onto the range. The Harpoon carried an inert warhead, but one Indian crew member was killed. Concerns lingered about the use of Harpoon with allied or neutral shipping in the area, but soon the importance placed on anti-ship tactics receded with the demise of the Soviet navy.

It has been the recent expansion and modernization of China's navy that has caused airmen to dust off options for finding and attacking ships.

In 2004, Pacific Air Forces Commander Gen. Paul V. Hester put together an exercise combining bombers, JSTARS, and the GPS guided Joint Direct Attack Munitions (JDAMs). Their target? A decommissioned US Navy ship USS *Schenectady.*

"The capability for airmen to rapidly respond anywhere in the Pacific to sink naval vessels in all weather, day or night, is crucial for the Pacific Command. Resultant Fury is designed to demonstrate the capability to engage and disable ships under way, … thus providing the combatant commander an airpower ability to rapidly conduct maritime interdiction against enemy combatants," Hester said in November 2004, according to a website about the exercise.

Nine JDAMs and four GBU-10s successfully hit USS *Schenectady.*

"The only sustained capability that Navy and Air Force aircraft currently have to engage multiple moving maritime targets is inhibited by bad weather," said then-Maj. Gen. David A. Deptula, at the time PACAF's director of air and space operations. "Using satellite guided bombs allows the combatant commander the ability to use aircraft to conduct maritime interdiction in all weather environments. When matched with long-range aircraft, like bombers, that gives the [commander] the ability to conduct maritime interdiction with minimum warning anywhere in the Pacific," in hours, Deptula told Air Force News. He is now head of the Air Force Association's Mitchell Institute for Aerospace Studies.

On the plus side, Resultant Fury demonstrated an all-weather attack capability. However, the JDAM was not an optimal weapon for striking ships. Various issues from fusing to guidance made clear that the Air Force and Navy

needed better capabilities, beginning with surveillance and tracking for maritime domain awareness.

AirSea Battle captured the urgency. Air Force Chief of Staff Gen. Mark A. Welsh III and Chief of Naval Operations Adm. Jonathan W. Greenert wrote of the importance of improving "systems and procedures for Joint Tactical Networking to connect today's aircraft and ships with new fifth generation aircraft such as the F-35 and F-22."

The threat has changed and grown. According to the US-China Economic and Security Review Commission, China's navy is heading for 351 ships by the year 2020. China commissioned 17 warships in 2013, and if trends hold, that navy will become the biggest in the Pacific.

"Given China's growing navy and the US Navy's planned decline in the size of its fleet, the balance of power

Far left: MSgt. Troy Drasher inspects a Long-Range Anti-ship Missile before it is loaded onto a B-1 at Dyess. Above: A black circle added to the photo shows where a LRASM pierced a 260-foot mobile ship target during DARPA testing in August 2013. Left: A B-1 launches the LRASM. The missiles are designed to be launched from both airplanes and ships.

and presence in the region is shifting in China's favor," the commission stated.

Commanders need a variety of options for responding. Hostile ships may be patroling, posturing, "scraping paint," or launching hostilities. Those options begin with establishing maritime domain awareness. Surveillance and detection over a large ocean area are crucial, too.

The arsenals of guided missiles depend on initial surveillance and tracking. USAF's RQ-4 Global Hawk unmanned surveillance aircraft and U-2s in the Pacific Theater aren't only monitoring land targets. They are capable of wide-area surveillance over the ocean as well.

Global Hawk began flights out of Misawa AB, Japan, in summer 2014. Operating from Japan's northern tip puts Global Hawks in position to patrol areas including the East China Sea.

With Dragon Eye, the B-52 is better equipped for maritime search, too. The radar in the pod produces high resolution mapping, "enables target detection, tracking, and subsequent engagement in situations where existing electro-optical targeting pods cannot," Air Force Global Strike Command spokesman Maj. Brett Plummer said in a press release.

Dragon Eye's capacity "leverages the existing tremendous range, loiter time, and communication capabilities of the B-52 airframe in support of our Maritime Domain Awareness mission," said Col. Danny Wolf, Pacific Air Forces' chief of Integrated Air and Missile Defense and Warfighter Integration, in a June 2014 news release. "Because of the enormous size of the PACOM [US Pacific Command] area of responsibility, the MDA mission is a significant challenge for the combatant commander."

FORWARD TARGETING

Most desired in the current doctrine for holding ship targets at risk is a broad set of capabilities that add up to forward targeting. Fleets disperse; forward targeting enables aircraft, unmanned platforms, and even weapons to extend their accuracy and range to counter dispersal techniques and protect friendly forces. Identifying belligerent naval vessels in the midst of fishing fleets and friendly navies calls for impeccable discrimination.

What's in the quiver? Several years of quiet development and testing have delivered a growing arsenal of weapons and tactics for anti-ship operations. Many of the new capabilities are old stalwarts with upgrades enabling in-flight retargeting.

One of the first was the Tactical Tomahawk. Ironically, the Navy retired most of its original variant of anti-ship Tomahawks in the 1990s.

Welsh and Greenert gave the example of how "an Air Force F-22 provided updated targeting information to a Navy submarine-launched Tomahawk missile." Credit first the improvements in turning the Tomahawk from a weapon that required days of preplanning of its route to the Block IV version with GPS capability and a two-way satellite data link. The links enable controllers to flex the Tactical Tomahawk by incorporating updated location information on moving targets. Forward targeting allows advanced aircraft—those with sensors and the right data links—to pass targeting information from one platform to another. More improvements in the sensor could support advanced ship targeting techniques.

Rapid in-flight retargeting is becoming the gold standard for long-range attacks against ship targets. Recently, the Navy demonstrated the process using an F/A-18 to relay updated location information to a Tomahawk cruise missile.

In January 2015, the destroyer USS *Kidd* fired the Block IV Tomahawk at a moving ship target on an ocean test range off California. An F/A-18E in flight sent updated target location information to the missile.

USAF photo by MSgt. Greg Steele

A B-52 with an AN/ASQ-236 radar pod under its wing takes off from Barksdale AFB, La., in April 2014 during the first test flight of the pod on a B-52.

Deputy Secretary of Defense Robert O. Work praised the developments as a way forward: "What happens if we take another step and just make an advanced seeker on the Tomahawk, rather than building a new missile?" In his US Naval Institute speech in San Diego in February, he continued, "We believe if we make decisions like that, that we will be able to outturn potential adversaries and maintain our technological superiority."

Harpoon Block II is also in the line-up. The current Harpoon Block II is a more sophisticated missile with GPS guidance and a range advertised at more than 74 miles. But it's the endgame that matters. Harpoon remains a subsonic missile, and its necessary size limits the number of weapons that land- and sea-based fighters carry. Improvements make Harpoon Block II capable of anti-ship strikes "even in crowded ports," according to manufacturer Boeing.

Close in, the Advanced Anti-radiation Guided Missile (AARGM) that will be carried by F-35s has interesting applications against ships. Designed as the follow-on to the High-speed, Anti-radiation Missile (HARM), the AARGM can engage relocatable targets even if operators shut down the radars. An internal broadcast receiver delivers information to the missile and allows sharing of data to confirm targets and conduct other situation awareness tasks, and those capabilities apply to naval warships emitting as well.

Other Pacific friends and allies are extending what their fighters can do in maritime targeting. "Singapore is doing very innovative things with their F-15s, notably in evolving the capabilities of the aircraft to contribute to maritime defense and security. We are looking very carefully at their innovations and can leverage their approach and thinking as well," said then-PACAF Commander Gen. Herbert J. "Hawk" Carlisle in a *Breaking Defense* interview at AFA's Pacific Forum in December 2013.

DISCRIMINATING MISSILE

And so, back to LRASM.

"LRASM needed the ability to engage a heavily defended moving target over long ranges, with or without a data link or GPS in the target area," said Walt Bowen, in a March 2014 press release. He was project manager of a Johns Hopkins Applied Physics Lab team assisting with the requirements. These capabilities were needed "while also having the ability to autonomously discriminate the desired target from other ships."

To proceed quickly, the LRASM was based on the Joint Air-to-Surface Standoff Missile-Extended Range (JASSM-ER) airframe, allowing rapid integration with the B-1. Flight tests in 2013 led to the live fire test with a B-1 this February.

"Once operational, LRASM would play a significant role in ensuring military access to operate in open ocean/blue waters and the littorals due to its enhanced ability to discriminate and conduct tactical engagements from extended ranges," noted a Feb. 9 DARPA announcement.

It was a technology advance for the maritime domain, too. "Unlike the JASSM's fire-and-forget mentality, this new technology gives you the chance to fire and change your mind," said Maj. Shane Garner, 337th TES, in a press release. "Because of the standoff feature these weapons possess, they tend to be airborne for some time, and for us to be able to change their coordinates in-flight provides us with a large range of flexibility."

"We are very pleased with how LRASM performed today," summed up Navy Capt. Jaime Engdahl for the DARPA press release after the February test. "We have a clear mission, to deliver game-changing capability to our warfighters in theater as quickly as possible."

Requirements don't stop there. What if jamming and other attacks disrupt satellite communications and positioning, targeting, and navigation data? That's a real prospect in the maritime environment. The next frontier in sinking ships is dynamic terminal autonomy. Cruise missiles, combat aircraft, and unmanned vehicles in the area could talk to each other via local, line-of-sight links. Weapons might be able to check target position and identification autonomously to complete guidance during the final moments of a strike.

Keeping the lid on rivalries in the South China Sea could well involve all US forces. In the South China Sea, China has overlaid claims to 80 percent of the sea surface. Those claims conflict with the maritime rights of the Philippines, Brunei, Malaysia, and Vietnam.

Even at "Phase 0" steady state operations, the potential for posturing and the need for deterrence make tracking maritime targets a necessary task. Also among those ships of interest will be Russian navy vessels. Although the Far East fleet is a "pale imitation of the Soviet navy in its 1980s heyday," Russia is "intent on a return to classic geopolitics backed up by naval power," wrote Greg Austin in *The Diplomat* in March.

Count on innovations in maritime surveillance and targeting to continue. The shifting balances of power in the Pacific and other regions will once again call for airmen to master this unique domain. Airpower is uniquely well-suited to deliver the military effects needed in the Pacific. ✪

Rebecca Grant is president of IRIS Independent Research. Her most recent article for Air Force Magazine *was "The Silicon Offset" in February.*

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Luke AFB, Ariz., is the future home of 144 F-35A Lightning IIs. Some have already arrived.

Lightning Over Luke

Photography by Jim Haseltine
Text by Gideon Grudo

The Arizona skies, long home to F-16s, now also host USAF F-35A pilots and those from other nations. F-35A Lightning II fighters and the pilots and maintainers who operate them are at Luke AFB, Ariz., and not necessarily working with airframes from their own countries. A Dutch pilot may well train on an Australian fighter, for instance. Of the 22 F-35As already assigned to the base, two belong to the Royal Australian Air Force. Eventually, Luke will have 144 F-35As for six squadrons.

At left, a four-ship of 61st Fighter Squadron F-35As fly in formation over the south rim of the Grand Canyon. Two of them belong to USAF and the other two to RAAF.

|1| A 61st Fighter Squadron pilot works with the maintenance crew to prepare and start the aircraft. Eglin AFB, Fla., has been training F-35A pilots from all three services. Luke will train USAF and international F-35 pilots. |2| Capt. Nick Rallo performs a preflight check on an aircraft before a mission. |3| An F-35 and an F-16 fly in formation during the F-35's delivery flight to Luke in March 2014. Luke will host F-16 pilot training for some time to come. |4| SSgt. Jermaine Brandon (left) and SSgt. Mark Abad, avionics technicians with the 61st Aircraft Maintenance Unit review technical data on their Portable Maintenance Aid.

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|1| *An F-35 maneuvers during a training mission over the Barry M. Goldwater Range Complex in southern Arizona.* ***|2|*** *An F-35A two-ship from the 56th Fighter Wing flies in formation.* ***|3|*** *The first F-35A for Luke—the 100th built—on final approach from the Lockheed Martin factory in Fort Worth, Texas, in March 2014. Notice the shadow of the F-16 chase ship.* ***|4|*** *A Lightning II lifts off for another mission out of Luke. While the F-35A—the Air Force variant—is a conventional takeoff and landing airplane, the Marine variant, the F-35B, has short takeoff and vertical landing capabilities. The Navy's F-35C variant has larger wings and control surfaces to allow for aircraft carrier landings.*

*|**1**| Maj. Jon Pitts and Rallo, both F-35A instructor pilots from the 61st FS, walk back to the squadron for debriefing. |**2**| Rallo and a maintenance crew power up for another sortie. |**3**| The first F-35A destined for Luke escorted by an F-16 as they fly over the southern part of the base. |**4**| An F-35A and an F-16 fly in close formation as they come up on Luke. The Lightning will eventually supplant the Viper in USAF and many partner air forces.*


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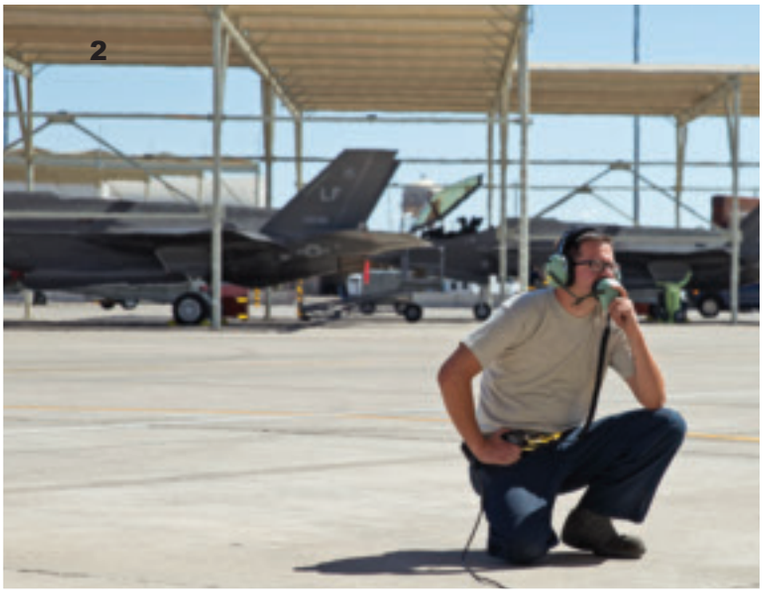
|1| A lineup of F-35As sit under sun shades on the ramp. The 61st is the first Luke squadron to fly the F-35A. |2| SSgt. Michael Seymour performs postflight checks on a helmet-mounted display system. Though there were problems with early batches of the helmet, F-35 Program Executive Officer Lt. Gen. Christopher Bogdan says those issues were resolved in 2014. |3| A pair of F-35 pilots practice formation flying. |4| The 61st FS flagship. To allow radar to see the stealthy F-35 in practice, radar reflectors are mounted ahead of the verticals.

*|**1**| A two-ship over the Grand Canyon. There are no two-seat F-35As, so a pilot's first flight is also his first solo. No antennas protrude from the aircraft's surfaces but are embedded in the surfaces of the aircraft to reduce the radar signature and yield a wide, deep, and precise picture of the battlespace. |**2**| Pitts performs checks on the electro-optical targeting system on an F-35 during a preflight walkaround. The EOTS is like a built-in Sniper pod, with more capability. |**3**| The 61st flagship heads to runway No. 3. |**4**| Lt. Col. Greg Frana, the 61st FS director of operations, briefs a group of pilots. Foreign pilots will be part of the training cadre at Luke.*



*|**1**| An F-35A accelerates into the night sky in full afterburner, showing the power of the Pratt & Whitney F135 engine. While using afterburner, however, the F-35A is noisier than its predecessors, as it generates 43,000 pounds of thrust. |**2**| Crew Chief SSgt. Andrew Hensen goes through a startup with an F-35 pilot. |**3**| Luke was chosen for the advanced training mission because of its good flying weather and access to many nearby ranges. |**4**| The first F-35A at Luke breaks left in the overhead pattern coming in to land at the base. More than 2,500 F-35s are planned—1,763 for USAF—and are expected fly for 40 years or more, meaning Luke will be generating pilots well into the 2060s.* ✪

Teeing Up the T-X

By John A. Tirpak, Editorial Director

The Air Force is finally moving forward with a program to replace the venerable T-38.

If all goes as planned, the T-38 Talon—stalwart of advanced pilot training since 1961—will be replaced starting in 2023 and depart the inventory for good in 2029. While it was once a good bet the next generation trainer would be derived from a foreign aircraft, there's now a good chance it will be a brand-new, home-grown design aimed at a large and growing world pilot training market.

The Air Force issued its formal requirements for the T-X trainer in March, after years of on-again, off-again efforts to replace the graceful Talon. The T-38 was ahead of its time when it debuted as a supersonic trainer in 1961, but is now unable to deliver the performance USAF needs.

The T-38 can't perform "12 of 18 tasks" required for advanced pilot training today, according to Brig. Gen. Dawn M. Dunlop, Air Education and Training Command's director of plans, programs, and requirements. Developed in an era when the Air Force fielded "Century Series" second generation fighters such as the F-100 and was getting ready to introduce third generation F-4s, the T-38 is out of its element training pilots for fifth generation F-22s and F-35s, she said.

The tasks it can't teach have to be learned at operational squadrons in frontline aircraft, at a far higher cost than USAF thinks would be the case with a new trainer. Those include managing various sensors in high-G turns and the ability to simulate release of modern weapons.

Moreover, despite several updates, the T-38 is increasingly maintenance-intensive, ready for duty less than 60 percent of the time vs. AETC's standard of 75 percent, Dunlop said. Part of that is due to its age and growing obsolescence while some is due to the "vanishing vendor" syndrome: Parts are hard to get. Modern trainers in partner air forces have demonstrated "the ability to easily exceed 80 percent" mission readiness, she said, and this figure is a key performance parameter of the T-X. The jet is expected to fly about 360 hours a year.

The plan is to replace 431 T-38s with 350 T-Xs. That number of aircraft will support production of about 1,100 pilots per year "for the foreseeable future," said Gen. Robin Rand, head of Air Education and Training Command, in a February press conference. The figure does not, however, include replacing the T-38s used as companion trainers for several types of aircraft, such as the B-2 bomber, nor does it include "aggressor" dogfight exercise opponents or foreign military sales trainers—all missions performed now or at some point by the T-38.

Dunlop said requirements have been optimized for AETC's advanced pilot training mission, but "we hope that we have designed enough margin and agility into our requirements … to allow growth for the next 20 years" both in pilot training and "future derivative mission sets" such as Red Air aggressors. She said USAF is confident the T-X will meet those training needs, should those aircraft also be replaced.

There was collaboration with all major commands that use companion trainers in developing T-X requirements, she noted. There is $40 million across the Future Years Defense Program in a separate account to ac-

USAF photo by Sgt. Jeffrey Allen

USAF T-38C Talons, such as these, are expected to be out of the inventory by 2029.

commodate additional development of T-X options.

Twice in the last five years, the Air Force conducted an analysis of alternatives to determine how it could affordably replace the venerable Talon and avoid yet another round of structural enhancements and avionics upgrades to extend its service life. The first AOA went stale after the service couldn't find the money to fund the project. Now it's in the Air Force's 10-year plan—modestly at first, with about $12 million in each of the next two years. The figure swells to $262.8 million by Fiscal Year 2019 and $275.9 million the year after that. The Air Force expects to spend about $20 billion over 20 years to buy, fly, and maintain the T-X and its associated training system and simulators. In a February interview, Air Force Chief of Staff Gen. Mark A. Welsh III said the T-X is an "existential" need for the service.

"It's time we do this," he said. Funding remains precarious, however, as long as the threat of a return to sequestration haunts the Air Force budget.

Early in the AOA process it seemed likely that, to avoid development costs and get a trainer quickly enough to avoid another T-38 service life extension program, the Air Force would ask for an off-the-shelf design—i.e., an in-production aircraft that could be tweaked to USAF requirements at affordable cost.

American contractors quickly teamed up with foreign partners, aiming to offer a variety of jets already in service.

Northrop Grumman partnered with BAE Systems on yet another new variant of the venerable British Hawk that in one version serves in the US Navy as the T-45 and in many other countries as an advanced trainer.

Lockheed Martin teamed with Korean Aerospace Industries to offer the T-50 that Lockheed helped design. It resembles the Air Force's F-16.

General Dynamics partnered with Alenia Aermacchi offering the M-346, renamed the T-100 for the USAF competition.

DRIVING COSTS DOWN

Boeing said it would buck the trend and offer a "clean sheet" design, but it still joined up with Sweden's Saab, presumably to base an aircraft on that company's JAS-39 Gripen, touted as a low-cost, easy-to-maintain fighter.

Textron also aimed to enter its privately developed Scorpion, promoted as able to do a number of USAF jobs at a fraction of the cost of traditional types.

"I don't know that there was ever a requirement to procure a nondevelopmental solution," Dunlop said, but that's how contractors interpreted the Air Force's budgetary and time line needs. The release of requirements in March seemed to have shaped the competitive field, though, mostly because of the requirement for sustained 7.5Gs.

Dunlop explained that a pilot who can manage a modern cockpit under this level of G-forces can probably do so under a 9G turn as well—a capability of all USAF fighters except the A-10.

Likely because of the G-loading requirement, Northrop Grumman abandoned the Hawk, though it retains BAE as a partner, and will now pursue a clean-sheet design of its own. General Dynamics dropped the M-346 and had not by early April said if it would compete using another platform. Alenia may still offer the jet, alone or with another US partner, perhaps Raytheon. Lockheed Martin revealed in February that it had a clean-sheet design—prepared by its "Skunk Works" division—ready to go if the T-50 did not meet USAF's needs. In April, the company declined to say if it was sticking with the T-50.

"Of course, there are some different risks" between a clean-sheet and a proven design, Dunlop said, "and we have to account for those in our source selection."

No particular engine was specified, and the Air Force left it to the contractors whether to offer two engines or one. Afterburner is not required, nor is supersonic capability.

Dunlop said that there was "robust engagement" with potential contractors during the run-up to release of the requirements, done about 10 months earlier than is usually the case. The idea—part of Air Force Secretary Deborah Lee James' "Bending the Cost Curve" initiative—is to give vendors as much of a head start as possible to work out the particulars and offer the most competitive possible package. The requirements were carefully winnowed to include only those deemed absolutely necessary, to avoid arbitrarily disqualifying any potential offerors.


Textron Airland photo

Textron aims to offer the privately developed Scorpion aircraft.


Saab photo

Boeing teamed with Saab to present a design possibly based on Saab's JAS-39 Gripen aircraft.

USN photo by Mass Comm. Spec. 2nd Class Josue L. Escobosa

***Northrop Grumman and BAE Systems originally offered a variant on the British Hawk aircraft. One version serves the US Navy as the T-45 trainer, shown here taking off from the deck of USS* John C. Stennis.**

Competition, Dunlop said, will ultimately drive the price lower and it will help ensure the capabilities needed.

There are about 100 requirements. Key among them, AETC officials said, are having a state-of-the-art simulator and associated training system. The Air Force wants high "visual acuity"—with the view in the simulator almost indistinguishable from a real-world scene—and the motion and physical cues of the simulator must also be of extremely high fidelity. This requirement grew, Dunlop said, out of extensive talks with industry about the art of the possible before requirements were formalized.

EASING THE TRANSITION

It was not originally a requirement that the T-X have a similar cockpit display as the single-panel flat-screen system in the F-35, but give-and-take with contractors convinced AETC that having something similar or identical would ease transition to the F-35, reduce unit costs by increasing volume, and simplify maintenance. It turned out to be "the lowest cost, most adaptable solution," Dunlop admitted.

The new trainer must also be compatible with night vision goggles and other night vision devices and offer simulation of various sensors, data links, and the release of modern weapons.

Lockheed Skunk Works Vice President and General Manager Rob Weiss, in an April interview, said, "Given that the F-35 will be operated by our partner countries, clearly they have the same requirement" for a trainer. Consequently, the T-X market is far bigger than just the United States, he said. The company is looking at USAF's requirements, "trying to develop insight into what the Air Force is really looking for, in terms of the capability and the timeliness of [initial operational capability] of the aircraft."

Because T-X is now in competition, he—and others at other companies—declined to delve too deeply into what will be offered.

Like the Long-Range Strike Bomber, the Air Force almost certainly will impose a design-to-cost cap on the T-X, but has not yet stated that figure. It is also likely USAF will seek fixed pricing on the T-X, as it has with the LRS-B and KC-46 tanker.

The requirements released in March are not the last word. That will come when the final request for proposals is issued, at the end of Fiscal 2016, and there will be more discussions with industry in the meantime.

"We want their input" on whether threshold and objective requirements—acquisition-ese for minimum acceptable and preferred capability—are appropriate, given the capabilities available, Dunlop noted.

An award is planned for 2017, with first deliveries in 2023. Full operational capability is expected in 2031. ✪


Lockheed Martin photo

Clockwise from right: Lockheed Martin's T-50. Officials declined to say if the company is sticking with the design. Brig. Gen. Dawn Dunlop, AETC's director of plans, programs, and requirements, in the cockpit of an F-22. General Dynamics partnered with Alenia to offer the M-346, renamed the T-100, but may now have other plans.

Photo by MilbourneOne


USAF photo by David Henry

Jollies

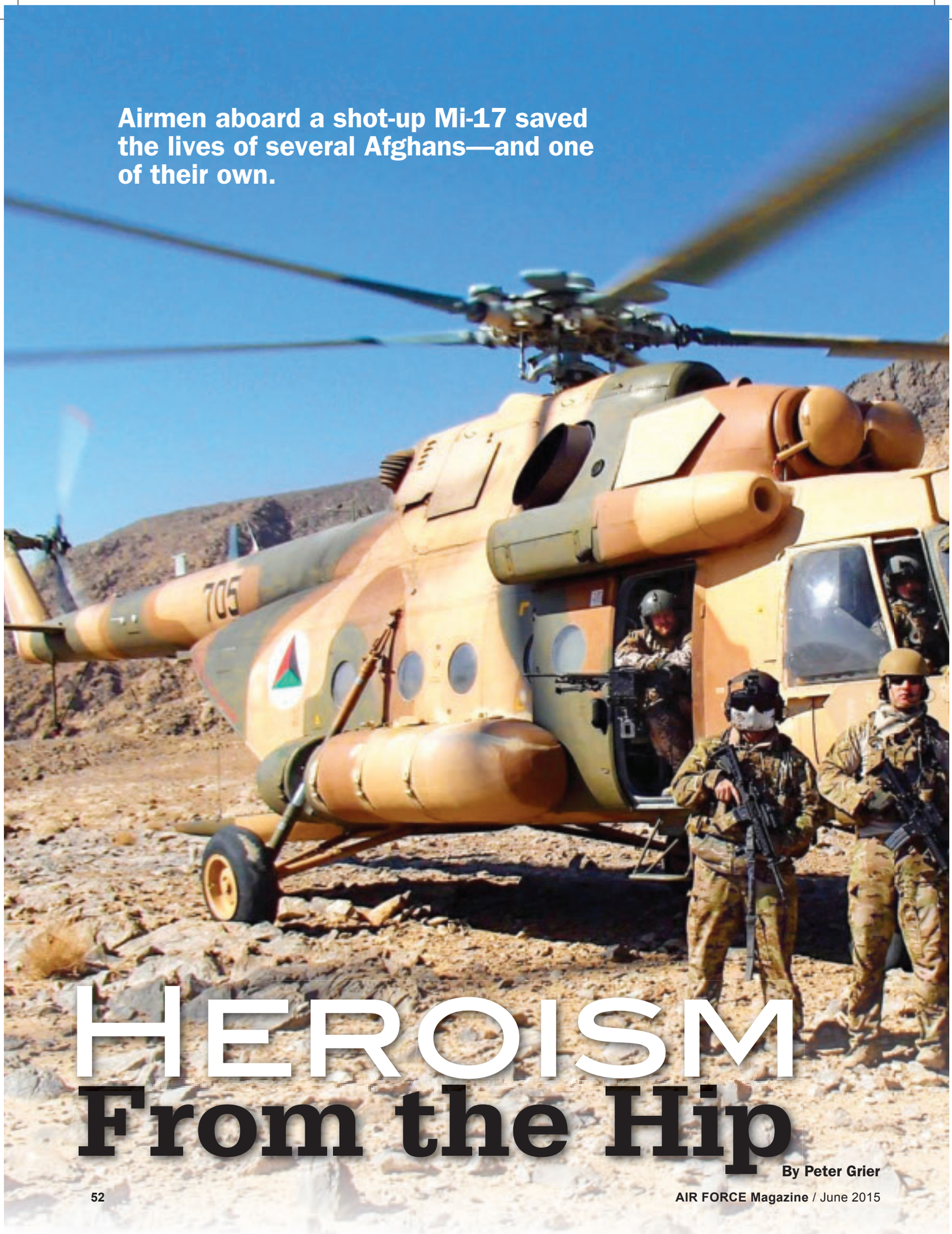
USAF photos

In the early 1960s, the "Jolly Green Giant"—trademark of the Green Giant vegetable company—was a well-known TV ad character. The moniker eventually was bestowed on a famed Vietnam War helicopter—USAF's HH-3E, used to rescue downed airmen. It was big, predominantly green, and ... anyway, Jolly Green was its call sign. In the late 1960s, the HH-3 was joined by the bigger HH-53, call sign Super Jolly Green. Here, a nine-foot-tall wooden Green Giant statue arrives at Udorn RTAB, Thailand, home of the 40th Aerospace Rescue and Recovery Squadron, which at the time operated both helicopters. The statue was displayed in the unit's officer bar to boost morale and build esprit de corps. The bottom left photo depicts an HH-3 rescuing a US pilot from the waters off Vietnam. In the bottom right photo, an HH-53 hoists a pilot from the jungle floor into the side door.

HH-3 Jolly

HH-53C Super Jolly

Airmen aboard a shot-up Mi-17 saved the lives of several Afghans—and one of their own.



HEROISM From the Hip

By Peter Grier

USAF photo by Capt. Tommy Shea

On Oct. 8, 2013, five US Air Force advisors climbed aboard an Afghan Mi-17 helicopter for what was supposed to be a routine mission. The flight ended as anything but, with the Air Force team racing against time to save the life of a grievously wounded colleague.

For their actions that day the US personnel involved were all submitted for the Distinguished Flying Cross with Valor.

Troop movement and resupply was the plan. Long flights over desert and rough terrain are common in Afghanistan, where forward operating bases are often scattered far from central depots, and that is what the operation that day entailed.

Two Mi-17s were to ferry Afghan National Army commandos from their central provincial base to a forward operating station in the lush Gizab valley. The number of troops involved meant that both helicopters would have to make two trips.

MEDEVAC MISSION

Their destination was a bowl-like location at a high altitude. In other words, it was a good place for a Taliban ambush.

Things went smoothly at the beginning. The helicopters made their first troop infiltration run without incident. Then they returned to Tarin Khowt Airfield in Uruzgan province for their second load of troops and more fuel.

Along the way they learned that some Afghan soldiers back at the drop zone had been wounded. One had received a gunshot through his cheek that was beginning to affect his vision.

One of the Russian-made aircraft had an Afghan crew. The other was flown by an Afghan pilot and carried the US advisors. "The way the crew members performed that day was pretty impressive," says Capt. Jeremy W. Powell, from JB Andrews, Md. He was the ranking member of the group that also included SSgt. Christopher D. Rector from Yokota AB, Japan, then-SSgt. Mark B. Cornett from Andrews, then-SSgt. Benjamin G. Jacobs from

Standing l-r: USAF advisors to the Afghan military—SSgt. Christopher Rector, TSgt. Mark Cornett, Capt. Jeremy Powell, TSgt. Ben Jacobs, and TSgt. James Juniper—in front of a Russian-made Mi-17 helicopter in Afghanistan. Juniper was gravely wounded during a mission there.

Jacobs (kneeling) and the crew of this Afghan helicopter were on what was supposed to be a routine resupply mission. It turned out to be anything but.

USAF photo by Capt. Anastasia Wasem

Davis-Monthan AFB, Ariz., and TSgt. James J. Juniper from Nellis AFB, Nev.

Powell was in the right seat. His Afghan counterpart was in the left. Flight Engineer Rector was sitting between them and slightly behind. They would have to hurry up for a medical evacuation following their second infiltration drop. "When we heard that, we kind of expedited our process on the ground," says Powell.

The Mi-17s headed back toward the Gizab valley. The Russian aircraft are sturdy but present challenges for US Air Force pilots. The rotors turn in the opposite direction from American helicopters.

The throttle controls are similarly backward, as far as the American military is concerned. Some of the older models have labels printed only in Cyrillic. Translators are essential when flying with Afghans who aren't completely proficient in English.

But these circumstances also represent opportunity for growth. Powell, a Nebraska native, 2006 graduate of the University of Nebraska at Omaha, and second generation member of the US military, says he found mentoring Afghan counterparts to be fulfilling. Constant resupply and transportation flights over the thinly settled country gave US instructors plenty of opportunity to teach their students how to handle different kinds of missions.

The goal of the US presence was—and is—self-sustainment, "so it's all Afghans-supporting-Afghans on the ground," says Powell.

On this day an Afghan flew while Powell observed. The aircraft climbed up the mountainside then began its descent into the rocky bowl of Gizab. They were to provide cover in the operation's initial stage, while the second helicopter dropped off its soldiers and picked up the wounded man. Next they would reverse places, with the Mi-17 that carried the US contingent off-loading its commandos.

Then events took over. As they approached the landing zone, shots rang out along the right side of the second aircraft. It was an ambush.

JUNIPER IS WOUNDED

"In this trade, you're always prepared to get shot at but there is still that initial surprise when the first bullet snaps by," said Jacobs, in a 2013 Air Force news release. "The sheer volume of fire immediately told me that this was different from a typical en route 'pop shot' style engagement."

To some of the Americans it sounded as if several rounds might have hit their fuselage. But the noise came primarily from the firing on the ground, not the rattle of metal on metal. The Afghan pilot turned in the direction of the threat.

At that moment Powell took control of the aircraft. He says he was concerned that the language barrier might hamper their response to a suddenly high-pressure situation.

Powell turned away from the gunshots and began evasive maneuvers. Meanwhile the helicopters' own gunners kept firing.

"We basically stayed in position to cover our wingman on the ground," says Powell.

The enemy firing continued. There were approximately a half-dozen main enemy positions, scattered around the landing site so that it was difficult if not impossible for the Mi-17 to turn safely away from the bullets. Rotor wash obscured the landing area with dust so fine it resembled talcum powder. At that point they were flying so low they could actually hear the rattle of the enemy's rifles over the sound of the helicopter.

"On top of that we could see individuals with weapons on the ground," says Powell.

After three or four rounds of gunshots Powell and his Afghan counterpart decided the zone was too hot for them to disembark their own troops. "Cornett and Jacobs returned fire when a second group of insurgents began shooting," Air Force officials wrote in a description of the team's mission in the service's annual "Portraits in Courage" collection. "After hearing rounds impacting the helicopter

Far-flung and isolated outposts and rough, inhospitable terrain make missions to resupply and ferry Afghan combat troops difficult.

USAF photo by TSgt. Justin Martin

the two advisors called a breakaway from the new threat and saw that Juniper had been severely wounded while manning the right-side M240 machine gun and was now lying unconscious on the floor of the aircraft's cabin."

It was hard for the US trainers to see Juniper's situation due to the load of Afghan commandos crammed one next to the other. But it appeared Juniper had taken an assault rifle round through the center of his neck. He was lying in a pool of blood.

The fog of war was already settling in. Some of the American trainers today say Juniper was unconscious when they spotted him. One thinks that in fact he was still conscious and trying to get their attention. According to Cornett, Juniper was reaching up with a bloody hand and trying to knock on the flight engineer's door.

"When I saw his hand, I knew then he wasn't dead, but I didn't know if he would survive," said Cornett later, according to a 2014 Air Force news release.

In any case, many things happened at once, or nearly so. The translator, nicknamed "Rocky," jumped on the radio to update their base about the situation. Jacobs and Cornett began moving toward their injured colleague Juniper. Powell turned the helicopter away from another burst of fire—this time a rocket-propelled grenade. He could see the telltale burst of smoke.

Jacobs almost fell out of the open rear ramp, where he'd been sitting. Fortunately someone grabbed him.

"As I'm turning away and Jacobs is unhooking, he starts to fall backward, and thanks to Cornett, he stops him," says Powell.

To reach Juniper, Cornett and Jacobs crawled over the Afghan commandos crammed in the cargo area. The two immediately applied direct pressure to the entry and exit wounds. That was crucial. Getting immediate first aid to such a serious wound can be a life saver.

OPERATIONAL CHAOS

Despite the hostile environment, the Mi-17 stayed overhead long enough to cover the evacuation of the wounded Afghan soldier. The other aircraft lifted off and the flight began a hasty exit from the valley. Along the way Powell and Rector saw the plume from another RPG round. The pilot maneuvered around the threat, while Rector, Cornett, and Jacobs stripped the wounded Juniper of his body armor and continued to supply aid to help stanch the flow of blood.

"We were flying as fast as a helicopter can fly," Powell says.

There was blood all over the floor and blood all over Juniper and the men rendering aid. But their efforts paid off. After about 15 minutes the blood flow slowed as Juniper's situation seemed to stabilize.

There was still an obstacle to surmount before he could reach medical professionals, however. On landing, the US airmen discovered operational chaos. They were not met by an ambulance poised to rush Juniper for treatment. No ambulance was coming. None were available.

USAF photo by TSgt. Joseph Cox

L-r: Powell, Rector, and Juniper, Jacobs, and Cornett during their tour as military advisors in Afghanistan.

USAF photo by TSgt. Mark Cornett

The view from the open rear ramp of the helicopter. During evasive maneuvers, Jacobs came close to falling out of the aircraft, but was saved by a quick grab from one of his crewmates.

Instead, Jacobs and Cornett ran out and stopped the first moving vehicle they encountered. Powell remembers it was a silver truck. The US airmen informed the driver, in essence, that they did not care what he was doing. They needed his services.

"The individual said, 'OK, sure,' and backed it up," says Powell.

Within minutes Juniper was getting full medical treatment. Jacobs and Cornett stayed with him at the hospital. There was no immediate word on the wounded man's prognosis. Powell, Rector, and Afghan crew members repositioned their helicopter and shut it down.

On assessing battle damage they discovered that the round that had hit Juniper had passed through the fuselage only about one-quarter of an inch from an important control tube.

"It's a pretty robust aircraft. The Russians developed it for extreme conditions. That one had been through a lot," says Powell.

After reporting in to their superiors, Powell and Rector went to the hospital to see how Juniper was doing.

Their Mi-17 needed work before it could fly again. Eventually another aircraft, with maintainers, flew in to carry out repairs.

On their return the US trainers experienced a moment that Powell says was the most emotional part of the ordeal, at least for him. They were greeted and thanked by top Afghan military commanders for their role in the rescue of wounded Afghans.

"I would say it was a combination of understanding what we'd been through, and at the same time a ... 'Thank you for doing this,'" says Powell.

CLOSE CALL

Juniper made a full recovery. He was stabilized and later medically evacuated to a NATO hospital. He was fortunate, as the bullet passed through his body just millimeters from a main artery and exited precariously close to his spine.

He had only been in Afghanistan two weeks before being wounded.

"I'd like to tell my crew thanks for saving my life," said Juniper, a native of Keota, Iowa, at a Purple Heart ceremony at Kandahar Airfield in 2013. "I owe them my life, and I wouldn't be here today if it wasn't for them."

"I still think the job we do is a very important one," said Juniper. "This wound won't deter me from getting back out there and getting the job done."

For his role in the incident Cornett in 2014 received the Vanguard Award of the Noncommissioned Officers Association of the US. The award annually honors one enlisted member from each of the armed services for actions saving a life or preventing serious injury.

Cornett—a Marylander who graduated from Baltimore County's Parkville High in 2003—at first thought it was a joke. When he read the email notifying him of the honor and saying he would receive a trip to Las Vegas for the award ceremony he "thought it was a scam," he told his local Maryland newspaper in 2014.

But it wasn't. It was real. Cornett was cited for his role in reacting to and alleviating Juniper's injury. The award also noted that throughout the time over the landing zone in the Gizab valley, Cornett called out enemy positions to help with evasive maneuvers while simultaneously carrying out suppressive fire with the Mi-17's machine gun.

"I feel very honored and proud to receive such a prestigious award, but I am more grateful that we all made it home," said Cornett on receiving the Vanguard citation last June. "I may be receiving this award, but I know that each person on my crew played a critical role in saving JJ's life as well as getting us out of there alive." ✪

Peter Grier, a Washington, D.C., editor for the Christian Science Monitor, *is a longtime contributor to* Air Force Magazine. *His most recent article, "Growing STEM Students Through CyberPatriot," appeared in March.*

Keeper File

keeper@afa.org

Birth of the Armed Predator

In mid-2003, Americans still had little knowledge of USAF's armed unmanned aerial vehicles (now known as RPAs, or remotely piloted aircraft). James G. Roche, the Secretary of the Air Force, decided to lift the veil a bit. Speaking to a UAV trade association, he gave a short version of how the armed Predator came into being and how it could transform the battlefield. His prediction has come true.

"Applying UAV Lessons"

Secretary of the Air Force James G. Roche
Address to Association of Unmanned Vehicle Systems International
Baltimore
July 15, 2003

Find the full text on the *Air Force Magazine's* website
www.airforcemag.com
"Keeper File"

This story comes from ... a battle fought near the top of a 10,000-foot peak in Afghanistan—now known to us as Roberts Ridge. On that day—March 4, 2002—an Air Force terminal attack controller and about two dozen others—Army Rangers and Air Force special operations forces—were engaged in a fierce fight for their lives with Taliban militiamen. Their disabled helicopter marked the spot where the Americans were pinned down—with little cover and fighting an entrenched, well-armed enemy. They were taking heavy, sustained, and accurate fire. ...

Worse still, they were running out of options. Two F-15E Strike Eagles and two F-16s had already strafed the enemy, and the F-16s had already dropped three 500-pound bombs—virtually on top of the friendly position—but still the enemy fought on. With snow up to their knees, open ground between the enemy and their position, and seemingly no other means available to take out their adversaries save frontal assault, they turned their fate over to a weapon system about which they were unfamiliar and one in which they had little confidence—the Predator unmanned aerial vehicle equipped with two Hellfire missiles.

After calling for a test shot into the side of the mountain—in fact, at a particular tree—to confirm the accuracy of the weapon, our skeptical combatant commandos allowed the Predator pilot to fire his missile into the enemy position, less than 50 meters from their location. Just as the operator promised over the radio, he hit the target with deadly accuracy, destroying the enemy position and turning the battle for survival in favor of the Americans. ...

The system that saved the lives of [the US] team—the Hellfire-equipped Predator A—was developed by warfighters for warfighters. It was delivered in record time using innovative new approaches to acquisition, training, and employment. ...

But that is not to say we haven't experienced obstacles to change. My partner in leading the Air Force, our outstanding Chief of Staff General John Jumper, frequently tells the story of the challenges he faced in evolving the Predator from reconnaissance aircraft into a system that could help us in many other ways.

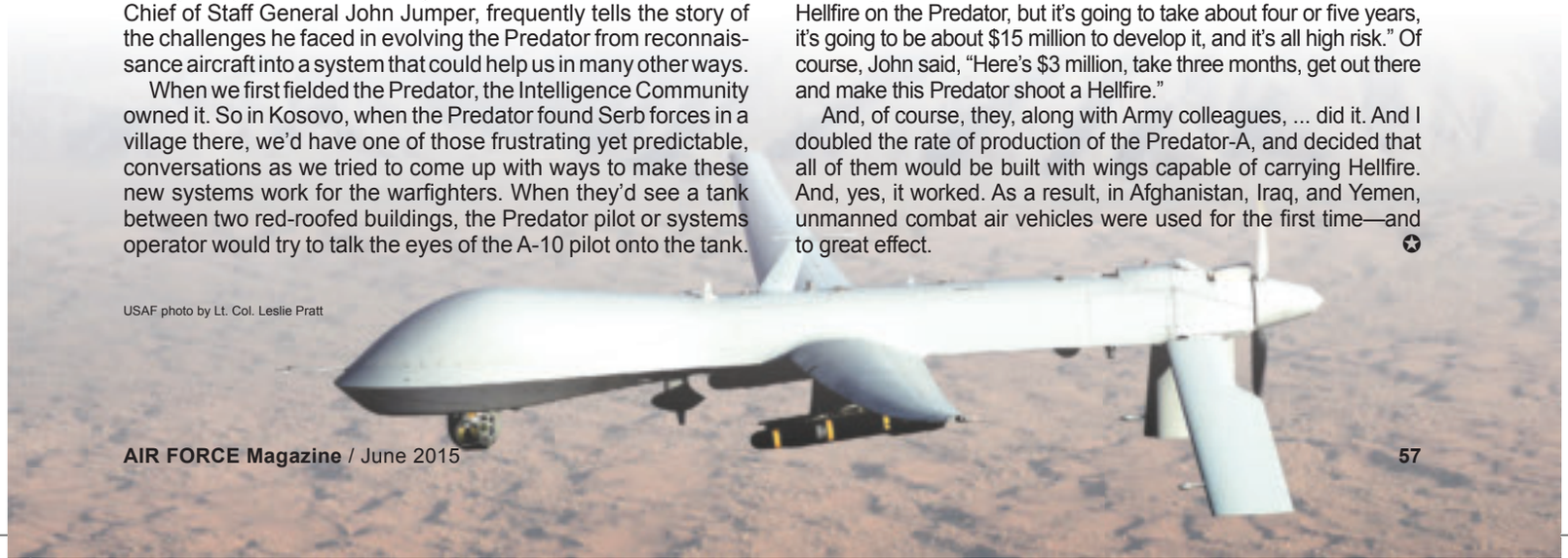
When we first fielded the Predator, the Intelligence Community owned it. So in Kosovo, when the Predator found Serb forces in a village there, we'd have one of those frustrating yet predictable, conversations as we tried to come up with ways to make these new systems work for the warfighters. When they'd see a tank between two red-roofed buildings, the Predator pilot or systems operator would try to talk the eyes of the A-10 pilot onto the tank. But the people flying the Predator were not people who were schooled in close air support or the tactics of forward air control. ...

You'd have this "dialogue of the deaf" between the Predator crew and the A-10 crew: "Sir, it's the tank between the two red roofed buildings." Of course, the A-10 sees 40 [buildings], all with red roofs. The operator of the Predator is looking through a soda straw at 10-power magnification. He says, "Well, if you look over to the left there's a road right beside the two houses. A tree line is right next to that. A river is running nearby." Forty-five minutes later, the A-10 might be in the same ZIP code, but certainly hasn't gotten his or her eyes on the target.

After too many of these exasperating exchanges, John said, "Let's put a laser designator on the Predator." The rapid-reaction part of the acquisition community came in and did just that. It took them just two weeks to put a laser designation device on the Predator. Then we quickly learned how to do target designation and talk others onto a target. As you might expect, however, when the conflict was over, the tyranny of our acquisition process engaged again, and that laser designator came off the aircraft because it wasn't "in the program." Thanks to John's determination, he had it put back on, but not without difficulty.

Then he said, "If this thing can find the targets and can laser designate the targets, why can't it shoot at the targets? Let's put a Hellfire missile on it." Again the acquisition system rattled around, not because the system is full of bad people, but because the system isn't designed to be adaptive, innovative, nor is it designed to be fast. ... You can predict what happened next: The team came back and said, "We can put a Hellfire on the Predator, but it's going to take about four or five years, it's going to be about $15 million to develop it, and it's all high risk." Of course, John said, "Here's $3 million, take three months, get out there and make this Predator shoot a Hellfire."

And, of course, they, along with Army colleagues, ... did it. And I doubled the rate of production of the Predator-A, and decided that all of them would be built with wings capable of carrying Hellfire. And, yes, it worked. As a result, in Afghanistan, Iraq, and Yemen, unmanned combat air vehicles were used for the first time—and to great effect. ✪



USAF photo by Lt. Col. Leslie Pratt

Chronicling

Americans could appear brash and maybe occasionally juvenile to the Allies during World War II. Yet the vigor with which the US prosecuted that war to victory, punctuated by two atom bomb drops that astonished even Americans who had closely followed the war, produced a postwar atmosphere that was at once heady and sobering.

It would be decades before pundits began calling the 20th century the American Century. Nonetheless, in 1946 the United States was the world's sole nuclear power, and unlike most combatants it had emerged from the war with its industry and infrastructure largely intact.

The fact that the Soviet Union had at least nominally been a US ally during the war could not deflect a growing postwar concern that the Soviets wanted expansion of their sphere of influence and would use military means to achieve this. It has been suggested the two atomic attacks on Japan in August 1945 had a pointed secondary goal of impressing the Soviets, who declared war on Japan only in the closing spasms of the Japanese empire.

When Japan surrendered unconditionally at the end of World War II, only three atomic bombs had exploded. The original test device near Alamogordo, N.M., followed by two combat drops over Hiroshima and Nagasaki.

Atom bomb No. 4, nicknamed Gilda, would alter the seascape of Bikini Atoll in a peacetime 1946 test that promised closer scientific scrutiny than had been possible with the previous missions. Gilda also offered the opportunity for sufficient media coverage to ensure that the world understood the portent of the weapon only the United States had—at the time.

Gilda would plunge toward Bikini Atoll's lagoon on Able Day, as part of Operation Crossroads. The United States put great thought and planning into the photographic coverage of Operation Crossroads and recruited cinematographers and still photographers with impressive and colorful résumés. Crossroads proved to be

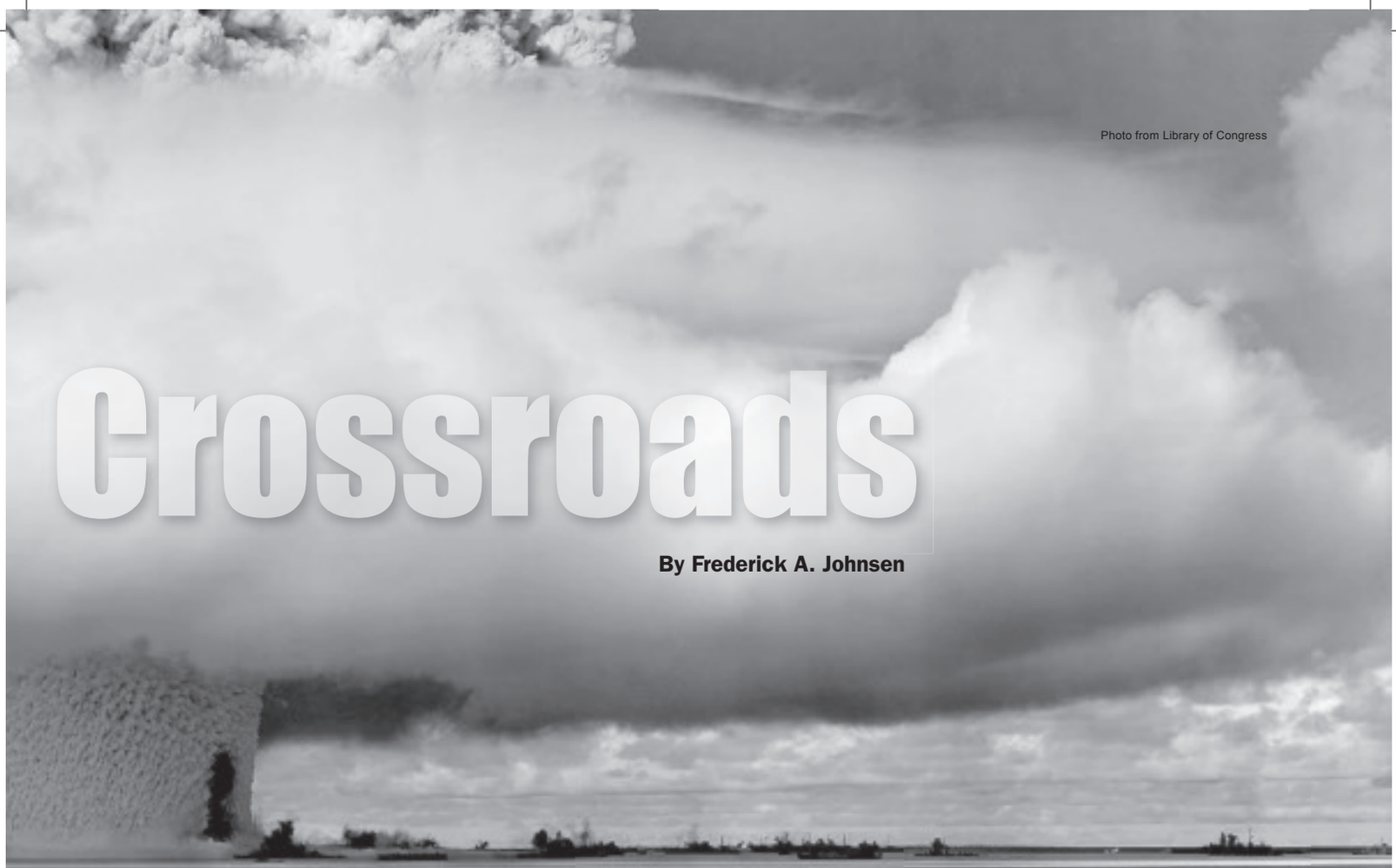


Photo from Library of Congress

Crossroads

By Frederick A. Johnsen

Photo and film adventurers of the day recorded the Bikini Atoll atomic tests.

The Baker explosion, shown here, was the first underwater nuclear detonation. The bomb was placed deep beneath the surface of the Bikini Atoll lagoon, suspended from a mechanized landing craft.

the next great adventure for many whose lives had slipped back into a peacetime routine less demanding than the recently concluded world war.

TIME-HONORED TRADITION

Operation Crossroads was a joint Navy-Army effort; the Army Air Forces was still part of the Army in 1946. While other aspects of the military were winding down in the postwar months, by February 1946, the trains steaming into Roswell, N.M., were filled with men recruited for a secret mission. Roswell was home to the 509th Composite Group, the same nuclear-equipped B-29 outfit that had delivered the two A-bombs over Japan. At Roswell, the organization that would document Operation Crossroads coalesced as Air Photo Unit 1.52 (Provisional).

In 1946, people could not pull a smartphone from a cargo pants pocket and show hundreds of images of the shared event, even if they had been allowed to photograph the scene—which most were not. A tradition, an expectation, grew. That expectation was the creation of a yearbook-style leatherette hardbound volume with many photos, to commemorate a shared event among the participants.

Air Force bomb groups, fighter groups, training schools, and all manner of organizations produced these, typically by subscription since they were not to use official funds. The books enjoyed greater or lesser degrees of official sanction.

The volumes answered a basic human desire for photos to say, "I was there." The photo operations officer for Crossroads' air photo unit was Lt. Col. Richard J. Cunningham, whose brief biography in the Army Air Forces Operation Crossroads book says tersely: "Film editor in movie industry before war."

By May 1, 1946, no personal cameras were allowed on Kwajalein or Eniwetok, the islands hosting Operation Crossroads. The book would have to be the memory-keeper for everyone.

For books like Operation Crossroads, the official photographers and their files

were indispensable, after they ran the gauntlet of security reviews and censors. It is said more than 300 official cameras were trained on the Able Day bomb drop of July 1, 1946.

"The purpose of these tests was to determine the effect of atomic bombs against naval vessels," the book explained, "to gain true appraisals of the strategic implications of the atomic bomb."

The AAF Crossroads book had official blessing. In addition to a morale memento for participants, it may have been viewed as a positive unclassified document of the scope and magnitude of the Army Air Forces' efforts to support the operation.

Maj. James L. Gaylord led a team of 13 officers, enlisted members, and civilians in compiling and publishing what they called the "Crossroads Yearbook."

The book used abridged accounts and cleared photos to tell the stories of the two atomic blasts of Operation Crossroads.

The men chronicling Operation Crossroads today appear almost as time capsules of 1940s flamboyance and of Hollywood's golden age—individuals who were looking for their next great adventure and who found it with atomic bomb tests at a remote Pacific atoll. The adventure wasn't limited to recording atomic bomb blasts. As the book notes, the chroniclers were also "battling rain, flooded streets, decayed and coral-filled buildings."

Maj. James Gaylord
Executive Officer

Maj. John Craig
Deputy Movie Director

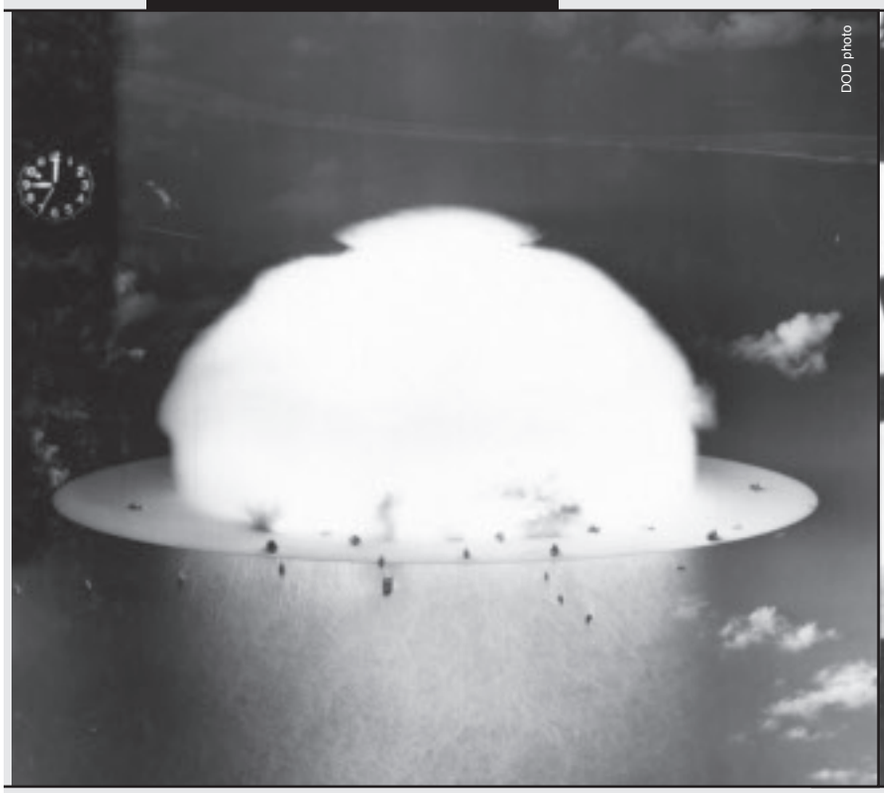
A COLORFUL CAST

The outfit's deputy movie director, Maj. John D. Craig, was described in swashbuckling terms that put 21st century descriptions to shame: "Former adventurer, deep sea diver, and author. Veteran of 36 combat missions in Europe." Who wouldn't want to list "adventurer" as one's occupation? It conjures lost images of globe-trotting travel before the Internet and the airlines diminished the luster and panache of such endeavors.

One of the grand old men of the operation was aerial movie photographer Louis Hagemeyer, a civilian whose bragging rights included "aerial photographer since World War I." Hagemeyer "photographed General 'Billy' Mitchell's bombs vs. ships experiments in 1921 and 1923," the Crossroads book noted. How could he possibly stay back in Dayton, Ohio, when the most titanic airplane-vs.-ships test of all time demanded documentation?

For Able Day, "at 0430, exactly on schedule, the command plane, with Generals LeMay and Power aboard … rolled

Below: An iconic mushroom cloud begins to form after a nuclear explosion at Bikini Atoll in 1946. Of the ships surrounding the atoll, many were sunk, and those that remained afloat were twisted and torn and contaminated by radiation. Below right: Hundreds of officially sancttioned cameras were trained on the action in the Pacific, including movie cameras such as these two mounted in a modified C-54.



DOD photo

Photo from the Gene Furnish collection

Lt. Col. Richard Cunningham
Photo Operations Officer

Maj. Daniel Forbes Jr.
Deputy Operations Officer

Capt. Norman Dick
Reports Officer

down the field and took off into the dawn, followed, one by one, by the eight F-13 photoplanes (modified B-29s), responsible for recording on film the appalling effects of the atom bomb when dropped on the target fleet," the book noted with characteristic flair. At 5:54 a.m., the B-29 *Dave's Dream* "took off on its awesome mission into the morning sun, with 'Gilda,' its frightening cargo, secured in its bomb bay."

The book described the events as vividly as words ever could:

"A blinding flash which virtually blotted out the morning sun marked the detonation of the world's fourth atomic bomb. ... A brilliant fireball emerged, supported by a flaming stem which reached down into the water. As the flaming fireball subsided, the mushroom cloud development began, ... completely dwarfing the entire lagoon and target fleet. ... Clearly seen was the smoke issuing forth from every ship in the array. Drones, guided by their mother planes, flew directly into the center of the radioactive cloud which, after 10 minutes, had risen to a height of over 12 miles. ... Cameramen, cameras grinding, photographed the towering cloud and array from all angles."

Movie film and color film were flown back for processing. Thousands of black-and-white still images were developed and catalogued in a special photo lab created on Kwajalein in the face of harsh temperatures and little fresh water. Crossroads had all the trappings of a huge bonding buddy flick as these men of action united. Their temporary service must have thinned Tinseltown.

Maj. Gilbert Warrenton left Hollywood to join Crossroads. His bio reads: "Formerly a cameraman for Paramount-Universal in Hollywood. Recalled to Active Duty to serve with Crossroads."

Dapper Capt. Rene Dussaq's dossier included prewar time as a Hollywood motion picture technical advisor. Liaison officer Maj. Henry G. Ross of Santa Monica, Calif., worked for MGM in a former life.

Capt. H. Clark Ramsey's rakishly trimmed mustache belongs on a man who "entered the Army July 1942, right out of the motion picture industry." Ramsey's biography in the Crossroads book says he "makes his home in Hollywood and plans a return to motion pictures."

The even-toothed smile of 1st Lt. Edward J. Guill, the group's assistant lab commander, captures all the hope and pride of postwar Americans. His bio tells us: "Prior to entering the Army, he was employed by Technicolor in Hollywood and plans to return."

Not everyone was a confessed Hollywood insider or an adventurer, but the ranks were filled with manly men of the day. Capt. Norman W. Dick's photo countenance gazes calmly into the distance above the notation: "Plans to open hunting and fishing lodge after discharge."

The Crossroads book is part Bing Crosby's "White Christmas" movie, part "South Pacific" musical camaraderie, and thoroughly reassuring about the grit of those who came before.

ABLE, BAKER, SORRY CHARLIE

The first underwater nuclear detonation took place July 25, designated Baker Day. "Several fathoms below the surface of the lagoon, suspended from an LCM [mechanized landing craft] anchored in the midst of the Guinea Pig Fleet, the atomic bomb awaited radio-controlled detonation. At 0835 a.m., the vast area of Bikini Lagoon arose with terrific speed and boiling violence. The first sign of detonation to aerial observers was the emergence of a fireball from the surface of the water," the AAF book recounted.

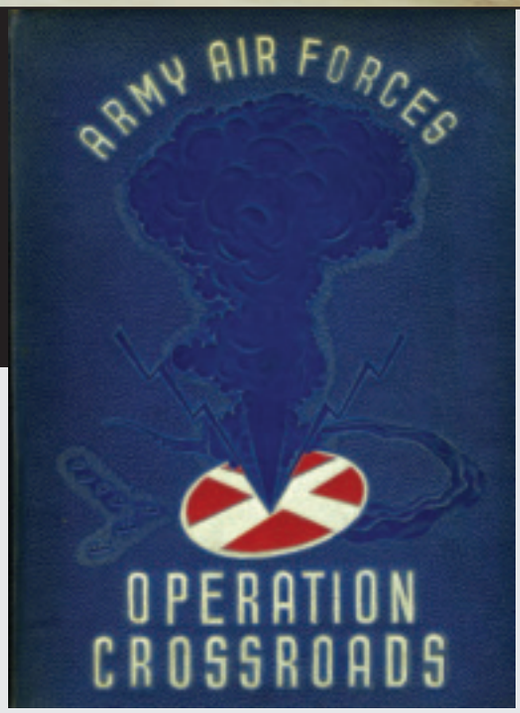
The fireball "was almost immediately hidden by the spherical dome of the water column as it opened up, forming a crown.

Official Crossroads photographers horsing around on the island.

Photo from the Gene Furnish collection

Photo from the Gene Furnish collection

Above left: An unidentified public information officer strikes a classic skyward-looking pose in front of a B-17 used in Operation Crossroads. Note the airplane's emblem. Above: B-17s, drones, and mother ships at Eniwetok, one of two islands that hosted Crossroads operations. Right: The cover of the operation's book. It would serve as a souvenir for those who worked on the classified mission since personal cameras were forbidden.



Dwarfed by the towering pillar of water, which reached a mile into the air ... were the target ships, standing out in bold relief against the eerie background of the turbulent waters. The LCM disappeared immediately." Of the Baker Day ships that managed to remain afloat, "many had been twisted and torn by the devastating force unleashed by the bomb."

The anticipated third test, Charlie Day, was then scrubbed, but the hefty yearbook preserved the memories and gave the deployed AAF air photo unit at Crossroads an opportunity to tout its accomplishments.

The volume's dark blue embossed cover shows a hypothetical white crossroads intersection on the water's surface, with a mushroom cloud rising from it.

In what might be either wry humor or merely idiosyncratic coincidence, the mushroom cloud does not rise from the exact intersection of the crossroads. It is visibly off center. The Able Day airburst was more than 2,000 feet laterally from its intended detonation point.

The panache of this yearbook echoes the confidence of those who had just survived and won a world war and who now stood on the brink of a world that would antiquate that war rapidly. The photo organization's deputy operations officer was a smiling young flier from the Midwest, Maj. Daniel H. Forbes Jr. He could not have foreseen at that time that his life would end two years later in the wreckage of the experimental YB-49 Flying Wing, strewn across the Mojave Desert in California.

Unique among the photographed men of Crossroads, sound technician 2nd Lt. Walter L. McDougal Jr. is framed by the Bakelite headset he wears. "As a civilian, he was a cameraman for Universal Picture Corp. of Los Angeles," the book tells us. There's another of those dapper '40s mustaches on Navy liaison officer Lt. Fred Terzo, who told the book's publishers he was a former cameraman for Warner Brothers studio, where he intended to return after Crossroads.

The grinning mug of civilian movie cameraman Albert Alwood basks beneath the upturned brim of a GI cap marked "Mickey." Before the war, he logged 14 years with Paramount in Hollywood. Robert Bartlett, looking almost Gregory Peck-like in his photo, lists his Crossroads occupation as "movie writer," although he evidently had a day job in real estate back home. A resident of the Southern California mountain resort playground of Big Bear Lake, Bartlett is said to have opined that after Crossroads, "I'll never leave California again."

If you called Central Casting for a studious camera repairman, you'd want to get someone like civilian Ove S. Bryhn from Beverly Hills, whose intense visage supports wire-rimmed glasses. "Before joining Crossroads, he was camera repairman for 20th Century Fox in Hollywood and previous to that had worked for Paramount 13 years. Will return to studios."

Photo from the Gene Furnish collection

A BYGONE ERA

Carl Burmahln was another civilian Ohio transplant whose credits included "13 years in special effects department of Warner Bros. studios in Hollywood." For Operation Crossroads, Burmahln was a movie cameraman aboard an orbiting C-54.

Adrian Geoffroy left Los Angeles for the rigors of Kwajalein as an air and ground photographer. The brief write-up for Geoffroy says: "On 'loan' to Crossroads from Paramount, Hollywood, where he is sound engineer."

Civilian Alpha Hart was photographed wearing a necktie and sporting a trimmed goatee not long enough to be a Vandyke. A civilian Army Air Forces script writer, Hart is characterized as a "fiction writer, photographer, poet, and former newsman" in an era when apparently versatility may have been more appreciated than it would later be in the compartmentalized warrens of some government agencies.

Hart's contemplative gaze contrasts with another writer's mug shot, the openly grinning Don Christiansen, director of documentary stills, from a suburb of Salt Lake City. Christiansen was a veteran combat photographer in the Mediterranean who, according to the epic photo book about Crossroads, came to this task "as 'vacation' from job as storyteller, confidence man, and newsman in Salt Lake City."

Another print-media recruit was Charles E. Nerpel from Los Angeles. For Crossroads, he was a director cameraman primarily assigned to the B-17 drone operation on Eniwetok. Almost as an aside, his book bio mentions: "He formerly was chief photographer for Scripps Howard newspapers."

The world was a larger place when movie camera maintenance man I. Robert Holland brought his pencil-thin mustache to Crossroads. His credits included "several years in Africa as a cameraman and sound technician shooting native and animal life."

Stanley E. Johnson slipped away from his Hollywood home and Paramount Studios to be a Crossroads film editor.

The grand old man of Crossroads motion picture work had to be civilian Reginald E. Lyons, employed by the Army Air Forces at Wright Field in Ohio. If Crossroads seems only a faint and distant glimmer on a Pacific wave to readers today, imagine that in 1946, Lyons' résumé stretched back to 1908 when he worked for pioneer motion picture company Vitagraph in Brooklyn, moving west to Hollywood in 1916 to work for Keystone, Christia, MGM, Fox, and Warner Brothers. By the way, he became the officer in charge of the camera crew for a squadron in World War I. Photographed against a backdrop of some of the few palm fronds still waving on Kwajalein in the immediate postwar era, Lyons' visage shows the experience gained in 38 years of film work. He looks like the person others would turn to when things went sideways.

Harry F. Perry brought aerial movie photographer skills to Operation Crossroads. A cinematographer in Hollywood going back to 1918, his credits included "The Virginian," "Wings," "Hell's Angels," and European pieces including "Rebecca," "Bluebeard's Eighth Wife," and "Dodsworth." For the three years running up to Crossroads, Perry worked in the camera department at Paramount.

Fellow Crossroads aerial movie cameraman Paul P. Perry directed photography on about 40 movies filmed on the Paramount lot. From 1931 to 1943, Perry "made a series of world travel pictures released under the title of Perry Color Pictures." His ringside seat for Crossroads was operating a movie camera aboard an F-13 on Able Day.

Ground movie photographer Earl Rossman listed his address as the Beckel Hotel in Dayton, Ohio, in an era when that was not uncommon for entrepreneurial professionals. The bio on Rossman backs him up: "Writer and world adventurer, who has taken his camera to the Arctic with the Wilkins expedition, to the ocean bottom off Nassau, into the jungles of South America and Africa, and was first to fly over Mt. McKinley. Author of *Black Sunlight.* Cameraman at Wright Field, Ohio, last four years. Married."

Thomas W. Scott of Los Angeles, a civilian movie cameraman at Crossroads, was a Paramount film editor. Vladimir Svancara brought 20 years' experience as a "sound man on radio and motion pictures." He was working at Wright Field when picked for Crossroads duty.

Film editor John R. Truppe had worked for Warner Brothers in Brooklyn, declining to follow the studio to Hollywood.

Thomas E. Tutweiler was first cameraman for Warner Brothers in Hollywood when he agreed to be part of Crossroads.

Before his Army service, Elmer L. Whiles of Hollywood was a writer for Warner-First National, where he planned to return after Crossroads duty.

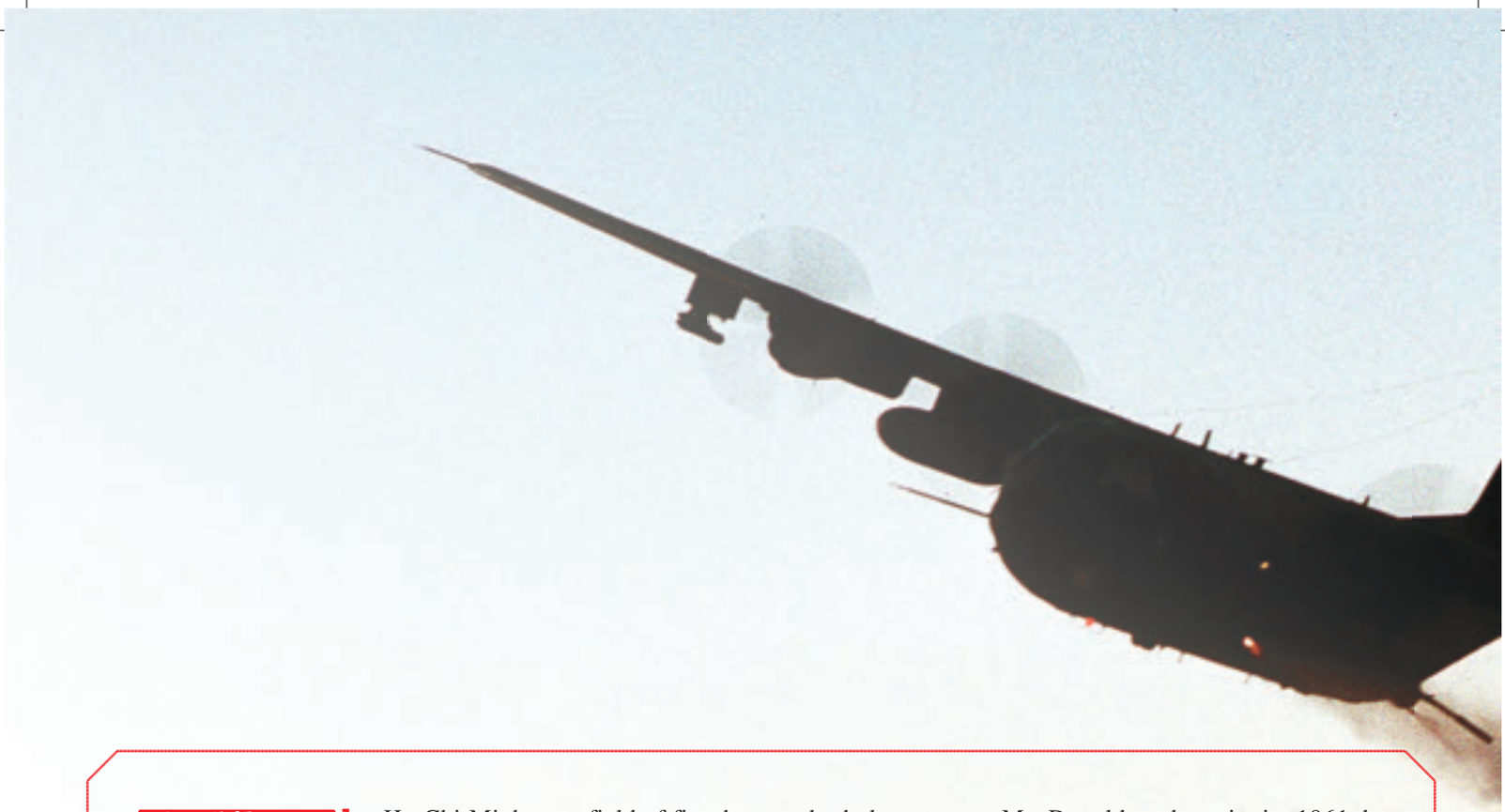
Some of the men traveled to Crossroads in Navy ships. Others flew there in "Green Hornet" C-54 transports.

Gene Furnish was one of the photographers who answered the call. Turned down for wartime military service due to a prior respiratory condition, Furnish was hired on at Wright Field as a civilian photographer. Never shy of adventure and risk, Furnish made parachute jumps as a photographer to test German ribbon chute technology before he made the journey to the Pacific.

Fortunately, photographers are notorious pack rats and Furnish kept images from throughout his career, offering a brilliant window into Operation Crossroads through news-like black-and-whites and the occasional gorgeously rich Kodachrome color transparency. Crossroads was the Big Show. Furnish's candid images serve as a posthumous nod to his skill, enthusiasm, and engagement with life.

The old Crossroads book published for the participants occasionally surfaces in the collections of the men or their descendants, and it compels viewing. Seasoned veterans and happy-go-lucky kids look back from its pages, frozen in time in images from 1946, truly a bygone era. ✪

Frederick A. Johnsen is a frequent contributor to Air Force Magazine. *His most recent article was "Ice Boxes" in the December 2014 issue.*



The Ho Chi Minh Trail ran southward for 500 miles from the mountain passes of North Vietnam through the Laotian panhandle into Cambodia. All along the way, exit routes led across the border into South Vietnam.

Laos was supposedly neutral, but from 1959 on, Hanoi used the panhandle as an infiltration lifeline to sustain and support its war against South Vietnam. The US Air Force first attacked targets on the Ho Chi Minh Trail in December 1964 and a few months later expanded the effort into a continuing operation named Steel Tiger.

The Air Force tried all kinds of airplanes to interdict the trail, from World War II-vintage A-1s and A-26s to F-4 jet fighters and B-52 heavy bombers. Of all of them, the most effective were gunships, a category of weapon systems that had not even existed when the war began.

Gunships were aircraft—such as old Douglas C-47 transports—originally built for other purposes and retrofitted with heavy armament for a new mission of attack. Gunships, however, were not simply airplanes with guns. Their defining characteristic was a trademark tactic, the pylon turn, in which the aircraft flew a counterclockwise orbit around a point on the ground.

The guns were mounted on the left side of the airplane, which laid down a field of fire that was both devastating and precise as it circled the target. The crews called it "flying geometry."

The gunship program consisted of a series of modifications to aircraft that could be wheedled out of the system. Advocates had to fight, almost airframe by airframe, for the conversions. Critics did not believe that gunships would work or that they could survive in a combat environment.

The first Air Force gunships in Vietnam were AC-47s, followed by AC-119s and AC-130s. There were never more than a few dozen gunships at a time operating on the Ho Chi Minh Trail, but they were so successful the presence of a single gunship could make a difference. Intelligence agencies and doubters in Washington refused to believe the results.

Fortunately, the gunship overcame the resistance well enough to keep going, and 50 years later, the gunship is still an important part of the Air Force's combat inventory.

A BUCKET AND A ROPE

The pylon turn maneuver, in which an airplane flies in a perfect circle while keeping the target in the exact center, had been discovered and rediscovered several times. In 1926, Lt. Fred Nelson, at Brooks Field in San Antonio, demonstrated the accuracy of a .30 cal. machine gun fired from a DH-4 biplane in a pylon turn.

The concept was next proposed in 1942 by 1st Lt. Gilmour Craig MacDonald and again in 1961 by MacDonald, who by then was a lieutenant colonel.

Lt. Gen. Gabriel P. Disosway of Tactical Air Command called it "the silliest idea I've ever heard."

Bell Aerosystems engineer Ralph Flexman picked up the gunship notion from MacDonald in 1963 and pursued it. Flexman had heard about Nate Saint, an American pilot and missionary to Ecuador who used the pylon turn to deliver mail and supplies to remote villages. Saint would lower a long piece of rope with a weighted pouch—or a covered leather bucket as some tell it—from his airplane. When the pouch was about where he wanted it, he would orbit and fly a pylon turn around it. The pouch stayed in place long enough for the villagers to take out their supplies and mail.

Flexman and Capt. John C. Simons persuaded the the Aerospace Medical Research Laboratory to conduct limited tests but that effort, Project Tailchaser, soon stalled out as well.

Momentum was restored in 1964 when Capt. Ronald W. Terry of the Cargo Test branch at the Aeronautical Systems Division at Wright-Patterson AFB, Ohio, found the Tailchaser files.

Terry, a former fighter pilot disinclined to take no for an answer, is recognized by the Air Commando Association as "the undisputed father of the gunship."

Terry somehow managed to borrow a C-131 aircraft and a 7.62 mm

USAF photo by TSgt. Lee Schading

Spectre and Stinger flew rings around the enemy on infiltration routes in Southeast Asia.

Gunships on the Trail

By John T. Correll

The gunship, banked in a pylon turn, concentrates enormous firepower on a target in the center of the circle.

Gatling gun and organize, under ASD auspices, a live-firing test at the Eglin AFB, Fla., range, which demonstrated the validity of the concept. Tests with a C-47 repeated the success.

"Captain Terry felt the aircraft could be effective flying above the range of small-arms fire expected in South Vietnam," said gunship historian Jack S. Ballard. "Certainly it would be less vulnerable than the helicopters already being used extensively as gunships." The gunship's destiny on the Ho Chi Minh Trail was not yet imagined.

It is not completely clear how Terry talked his way into the Pentagon office of Gen. Curtis E. LeMay, the Air Force Chief of Staff, but LeMay authorized Terry to take his team and equipment to Vietnam, modify three aircraft there, and test them in combat. Tactical Air Command attempted to block Terry's expedition to Vietnam until the TAC commander got a pointed message from LeMay.

SPOOKY

In Vietnam, Terry and his team modified three C-47s as gunships and trained crews to operate them. When the fighter community took exception to designation of the aircraft as FC-47s (for "Fighter Cargo"), they were renamed AC-47s (for "Attack Cargo").

The AC-47 had three 7.62 mm Gatling miniguns, two of them mounted in window ports and one in the open cargo door. In later AC-47s, all three miniguns fired from window ports. They were called "miniguns" because other guns with similar mechanisms used larger ammunition.

Firing together, the miniguns could spit out 18,000 rounds per minute, enough that a three-second burst could theoretically place a round in every square foot in an area the size of a football field.

The gunsight was to the left of the pilot, who fired the guns. The responsibility of the gunners, on the AC-47 and other gunships, was to keep the weapons loaded and operating.

The gunships began combat operations in the Mekong Delta in December 1964, attacking the Viet Cong where they found them, supporting ground troops, defending villages and outposts, and blowing the enemy away in spectacular fashion.

The results were stunning and made instant believers. Without waiting for completion of the combat evaluation, Air Force leaders in Vietnam asked for a squadron of gunships as soon as possible. In the summer of 1965, the Air Force took 20 C-47s out of storage, modified them, and sent them to Vietnam to form the 4th Air Commando Squadron.

Their initial call sign was Puff (after a then-popular song, "Puff, the Magic Dragon") but was soon changed to Spooky, suggested by the signature night operations. That also became the nickname by which the AC-47s were known.

Spooky's domain was mainly South Vietnam, but in early 1966, four AC-47s moved to eastern Thailand where they averaged two interdiction sorties a night on the Ho Chi Minh Trail.

They had some success against enemy trucks but encountered several problems. The miniguns were too small for the job and their range was too short. The low wing of the aircraft prevented full view of the target. The top speed was 200 knots, which left them vulnerable to ground fire.

"For the AC-47s to be effective, they had to fire at the trucks from about 1,500 feet," Terry said. "Mainly the pilot was shooting with his eyes. He had nothing to go on in the AC-47 other than what he saw on the ground. You're not going to see things at night much higher than that, even dropping flares."

The greater difficulty was the steadily improving antiaircraft defenses on the trail. In August 1966, the Spooky squadron withdrew to South Vietnam,


Magazine of RDT&E photo

Pictured here in 1969, then-Maj. Ronald Terry, the recognized "father of the gunship," got the program started in 1964 and remained in charge until 1973.

The AC-47 Spooky was highly effective in supporting ground forces and defending villages and outposts in South Vietnam, but it did not have the weapons or the defenses to operate on the Ho Chi Minh Trail. Note the 7.62 mm Gatling miniguns.

as the Ho Chi Minh Trail called for new and better gunships. Terry, continuing as chief of gunship programs at Wright-Patterson, was on the job—but so were others.

BOTH FORKS OF THE ROAD

To provide for heavier and more accurate firepower, a larger aircraft was required. A high wing was also needed to allow an unobstructed field of fire. By 1967, it had come down to a decision between the aging twin-engine C-119 and the newer four-engine C-130 turboprop. Faced with two options, USAF took both of them.

Commanders up and down the line thought the C-130 was the best choice. In January 1967, the Air Staff directed Systems Command to configure a C-130 for testing as "Gunship II." This configuration added four 20 mm Vulcan Gatling guns—which qualified as cannons—and a fourth minigun to the ordnance.

Gunship II had barely begun when Secretary of the Air Force Harold Brown threw a wrench into the works. He was persuaded by advice from an Air Staff board that C-130s could not be spared from airlift duty and convinced that an older airplane would do. C-119s were readily available for transfer from Air Force Reserve units.

Brown overrode the opinions of his generals and in June 1967 picked the C-119G to replace the AC-47.

That went against the advice of Brown's own board, which regarded the C-119G's two piston engines as marginal and had recommended instead the C-119K, which had auxiliary jet engines under the wings.

Gen. William W. Momyer at 7th Air Force in Vietnam complained that he did not want "another obsolete weapon system." Pacific Air Forces, Tactical Air Command, and Air Force Chief of Staff Gen. John P. McConnell also endorsed the AC-130 option, but Brown held his ground.

Meanwhile, Gunship II proceeded. A modified C-130A went to Vietnam for combat testing in September 1967. It proved to be three times better than the AC-47 at destroying trucks. Brown backtracked somewhat in April 1968, announcing that he had approved a gunship mix to include 26 AC-119Gs, 26 AC-119Ks, and 18 AC-130s. The first G models began their combat evaluation in Vietnam in January 1969, followed by the first Ks in November.

In official parlance, the AC-47 was Gunship I, the AC-130 was Gunship II, and the AC-119 was Gunship III—even though it was less advanced than the AC-130, which became the definitive gunship. Taking their names from their call signs. The AC-119G was Shadow, the K was Stinger, and the AC-130 was Spectre.

Gunship II was developed by Air Force Systems Command with Terry in charge of the project, whereas Gunship III was handled by Air Force Logistics Command at the Warner Robins Air Materiel Area in Georgia.

The gunship was never a standard acquisition program. As Momyer pointed out, it was "a series of ad hoc actions." The conversions were made in small increments with considerable differences among them.

SHADOW, STINGER, SPECTRE

The airframe for Shadow and Stinger was the ubiquitous C-119 Flying Boxcar, which had shoulder-mounted wings and a low-slung fuselage, situated well forward between the twin tail booms.

The G-model Shadow was a modest improvement over the AC-47. It had four miniguns instead of three, carried more ammunition, and had computerized fire control and a night observation device. It was used mostly along with the AC-47 Spooky within South Vietnam, where it was especially valuable in defense of isolated outposts.

The K-model Stinger had two 20 mm cannons in addition to the miniguns and sensors for night attack. The J85 jet engines under its wings added almost 6,000 pounds of thrust. The AC-119K Stinger worked effectively on the Ho Chi Minh Trail, although it did not have the same firepower or capabilities as the AC-130 Spectre. The auxiliary jet engines raised Stinger's operating ceiling to 5,500 feet.

Spectre, with four engines and bigger guns, operated from higher altitudes and greater range.

The AC-130A in 1967 was the first of four Spectre variants, leading up to Vietnam's ultimate AC-130E model, which was armed with two 20 mm Gatling guns, one 40 mm Bofors cannon, and a huge 105 mm howitzer. The 40 mm was the standard anti-truck

USAF photos

weapon. The howitzer, which chambered a 42-pound shell, was reserved for the most formidable targets.

Spectre had forward-looking infrared and low-light-level television sensors, plus the mysterious "Black Crow," which could detect spark plug impulses in truck engines 10 miles away. The gunships also made use information from the acoustic and seismic sensors strewn along the trail by Project Igloo White.

The gunships could attack trucks singly or in convoys, moving or stopped, at road cuts or in truck parks, or when forced to halt by the gunship itself. "The sensor operators got very good at judging the speed of a truck," said Terry, who returned to Vietnam in 1967 for testing of the AC-130. "You could pick out a point in front and then down from the gunship. The infrared sensor needed no visible light source.

The roster of gunships sometimes includes the experimental "Black Spot" aircraft, designated as AC-123Ks. Two Black Spot prototypes operated for 14 months in Southeast Asia. They had no guns, instead dispensing cluster bombs from canisters in the fuselage through openings in the cargo floor. They often damaged trucks and sometimes killed the drivers but seldom completely destroyed a truck or its cargo.

12,000 MILES OF ROAD

When the Rolling Thunder campaign in North Vietnam ended in November 1968, the Air Force was able to apply more of its effort to the Ho Chi Minh Trail, which had become a labyrinth with 12,000 miles of road, including five main roads, 29 branch roads, and various cutoffs and bypasses.

The trucks sometimes moved south in convoys of 50 or more. There was no real chance of shutting down the trail altogether, but seven air interdiction campaigns over the next four years—designated Commando Hunt I through VII to correspond with the monsoon seasons—reduced the infiltration considerably.

Everything the Air Force had, including B-52s, took part in Commando Hunt, but the gunships had special advantages in their ability to operate at night and persist with a precision attack.

There were never many of them. At the peak of their involvement, 53 gunships were deployed to Southeast Asia and only about half of those—the AC-119Ks and the AC-130s—worked the Ho Chi Minh Trail. Their effectiveness, however, exceeded their numbers.

In Commando Hunt VII, for example, the AC-130s destroyed or damaged an average of 5.37 trucks per sortie. The AC-119s were next best with 2.14. That compared with 0.29 trucks per sortie for the F-4, the best of the Air Force fighter-bombers. AC-130s alone accounted for almost 70 percent of the trucks.

"At first, I was skeptical about the advertised capability of the aircraft to kill trucks," said Momyer. "Not long after these aircraft were in combat, however, the results more than confirmed the advertised potential." Momyer, whose enthusiasm for gunships was limited, acknowledged, "The AC-130

Photo by Michael Drzyzga

The AC-119 represented a mid-level of capability between the AC-47 and the AC-130. Both the Shadow and Stinger variants were strong performers. Here, a Shadow saturates a target with shells during a pylon turn west of Phan Rang AB, South Vietnam. Every fifth bullet was a red tracer.

the truck would run into [the fire] when he gets there. We'd hit the truck on the move sometimes. Sometimes the driver would stop and get out and run. We never shot at the driver [when he ran]. We wanted the truck to stop. It was much easier to hit."

When Spectre entered its pylon turn to attack, the copilot flew the altitude and airspeed while the pilot flew the ailerons—controlling bank angle—and kept his eyes on the ground. On moonless nights, illumination for the TV sensor was provided by a laser light not visible to the naked eye, beamed

became the best truck-killing weapon of the war."

The gunships were so good that the North Vietnamese could no longer count, as they had previously, on darkness as a sanctuary. They rescheduled their heaviest traffic for dawn and dusk, when the silhouette of the gunships against the sky was easy for the gunners to see and when the infrared and low-light-level TV sensors worked poorly.

By 1972, the North Vietnamese had hundreds of AAA guns and surface-to-air missiles protecting the trail and the gunships could no longer survive there, even with fighter escort. Commando Hunts VIII and IX were canceled, but the emphasis on interdicting the trail was about over anyway.

North Vietnam's Easter invasion in March 1972 drew most of the available airpower, including the gunships, back to defend South Vietnam and the invasion led to a resumption of the bombing of North Vietnam in Operation Linebacker I.

USAF photo

An AC-130A at Ubon RTAB, Thailand, in 1969. The AC-130 Spectre was the ultimate gunship in Southeast Asia, better than any other weapon system at destroying trucks.

COUNTERS AND DOUBTERS

The Air Force estimated more than 35,000 trucks destroyed or damaged on the trail by gunships and other aircraft. Analysts at the Central Intelligence Agency and Defense Intelligence Agency back in Washington refused to believe the numbers and arbitrarily discounted 75 percent of the Air Force claims. Congressional staffers, even further from the action, quipped in a report for a Senate Foreign Relations subcommittee in 1971 that "the total figure for the last year exceeds the number of trucks believed by the embassy to be in all of North Vietnam."

If the Air Force claims could be cast in doubt, so could the criticism. Then as now, the bomb damage assessment process was flawed on both ends. Operations tended to claim too much; Intelligence tended to credit too little. Political axe-grinding was most likely an element in the smart remarks by the congressional staffers, who may not have known that North Vietnam was importing almost 10,000 trucks a year to stay abreast of the losses.

"The interdiction campaign was able to limit the number of forces the North Vietnamese could support in the south," Momyer said. "Not until the interdiction campaign ended with the termination of US involvement could the North Vietnamese logistically support and deploy their full strength of 18 to 20 divisions. Before the 1975 offensive, they never deployed more than 11 or 12 divisions, apparently for fear of the destruction they would suffer by exposure to our airpower."

In all, 135 aircraft were converted into gunships during the Vietnam era. Of these, 53 were AC-47 Spookys, 30 were AC-130 Spectres, 26 were AC-119G Shadows, and 26 were AC-119 Stingers.

The leading gunship hero of the war was A1C John L. Levitow, loadmaster on an AC-47 that was suppressing an enemy mortar attack on the Long Binh Army post near Saigon during the Tet Offensive of 1969.

When a live flare fell inside the aircraft, Levitow threw himself on it, crawled to the cargo door, and threw it out, saving the entire crew. He was severely wounded, but lived to be awarded the Medal of Honor.

The US Air Force flew its last mission with the AC-47 in December 1969, but it remained in service in Southeast Asia with the Vietnamese, Laotian, and Cambodian air forces. The AC-119 was out of the USAF inventory by 1973, with both the G and K models passed on to the Vietnamese air force.

Ronald Terry continued as chief of the gunship program at the Aeronautical Systems Division until 1973. He returned to Southeast Asia several times during testing of the gunships and training of crews, accumulating 56 combat missions in the AC-47 and 140 in the AC-130. He retired in 1983 as a colonel.

The gunship had proved its point well enough that in 1971 USAF was ready to promote it from an on-again, off-again modification project to official status as a formal Air Force Systems Command acquisition program. The experimental approach had put gunships in the field in record time, but the formal acquisition program would require two years to produce the next airplane. After that, the program went back to informal status and gunships were rolling off the line in six months.

The AC-130 gunship is still going strong. It has been a valuable asset in every US military action for the past 50 years, including Iraq and Afghanistan.

The fourth generation gunship, the AC-130J Ghostrider, entered developmental test and evaluation in 2014. USAF plans to acquire 32 of them to replace older gunship models. ✪

John T. Correll was editor in chief of Air Force Magazine *for 18 years and is now a contributor. His most recent article, "George Kenney's Fighting Spirit," appeared in the April issue.*

AFA National Report

natrep@afa.org

By Frances McKenney, Assistant Managing Editor

Emerging Leaders

The Air Force Association's Emerging Leaders Program began in 2013 as a way to prepare volunteers for future AFA leadership roles. Emerging Leaders serve for a year. They participate on a national-level council, attend national leader orientations, and serve as National Convention delegates.

Emerging Leaders for 2015 are: Emilie S. Boschert, Shannon M. Farrell, Deborah A. Landry, Michael J. Liquori, Emily C. Shay, Christopher M. Talbot, James A. Thurber, Jeremy Trotter, and Daniel Whalen.

Here's the eighth profile in AFA's second group of Emerging Leaders.

Jeremy C. Trotter
Home State: Georgia.
Chapter: Carl Vinson Memorial (Ga).
AFA Offices: State treasurer; former Community Partner.
Occupation: Senior engineer, Alion Science and Technology.
Education: B.S. and M.S., Mercer University in Macon, Ga.

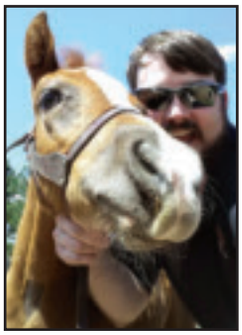
Photo by Capt. Becky Grotewiel

Q&A

How did you hear about AFA? Both of my parents [Mike Trotter and Jacqueline Trotter] are retired Air Force and are actively involved, and I had an opportunity at my previous company to be the company's representative to AFA.

In AFA Membership Committee meetings, the best idea I've heard is ... trying to push to reach out to a younger group of officers, specifically through the Company Grade Officers Council. We're actually looking at getting a CGOC representative on the Membership Committee so we have a voice for younger officers; they aren't targeted for [AFA] membership as much as they used to be.

What new suggestions do you have for AFA? I personally was pricing out eLife Memberships and graduated Life Memberships. I think basically we priced it out, and it didn't really appear that it was going to be effective, but we certainly were given an opportunity to defend it and give it a shot.



"Best selfie I've ever taken," Trotter calls this photo. He took it last year at Strike Eagle Farms, near Macon, posing with a new foal. Trotter teaches horseback riding to youngsters, including those with physical or mental difficulties.

Photo by Amy Gold

Runners in the Eglin Chapter and Eglin Top 3 Association's fifth annual 5K raised $2,600 this March, benefiting Fisher House of the Emerald Coast in Florida. Fisher House Foundation provides temporary lodging for military families whose loved one is hospitalized.

Photo via Bob Schure

The Spirit of St. Louis Chapter in Missouri held its awards banquet in March for airmen in the Scott AFB, Ill., area. L-r are award winners and ceremony participants: Col. Clarence Atterbury, SrA. Hillary McCaherty, Col. Jack Van Ryn, MSgt. Patricia Rodriquez, TSgt. Kim Miller, MSgt. Peter Hensel, TSgt. Brandon Archer, and Lt. Col. Thomas Koory.

Photo by Mayer Karissa

Josh Cockey of the Sarasota School of Arts and Sciences and Grace Callahan from Epiphany Cathedral School hold awards from the Sarasota-Manatee Chapter, presented by President Michael Richardson (center). The Florida chapter rewarded the students' entries in a regional science fair.

Colorado's Air Force Ball Spotlights Space

At the invitation of the **Lance P. Sijan Chapter** and Air Force Space Command, nearly 700 guests filled the Broadmoor resort in Colorado Springs, Colo., in March for an Air Force Ball. They celebrated achievements by airmen in the space arena.

The highlight of the black-tie gala was presentation of the Gen. Jerome F. O'Malley Distinguished Space Leadership Award to Brig. Gen. Nina M. Armagno. As commander of the 45th Space Wing at Patrick AFB, Fla., Armagno oversees the launch of government and commercial satellites from Cape Canaveral Air Force Station. She previously commanded the 30th Space Wing at Vandenberg AFB, Calif. A 45th Space Wing news release stated that this gives Armagno the distinction of being the only USAF officer to command both the Eastern and Western US rocket and missile ranges.

Retired Maj. Gen. Roger W. Burg, former commander of Air Force Global Strike Command's 20th Air Force, presented the O'Malley award on behalf of his wife, Sharon O'Malley-Burg. The award honors her father, who was head of Tactical Air Command when he and his wife died in a 1985 crash of a military T-39 at the airport in Scranton, Pa.

At the Colorado Air Force Ball, special guests included 2014 Outstanding Airmen of the Year SMSgt. Boston A. Alexander from Peterson AFB, Colo., and TSgt. Ryan E. Gangadeen from Schriever AFB, Colo.

Chapter VP Linda S. Aldrich said proceeds from this annual event go toward such projects as scholarships and unit awards.

Air Force Academy Superintendent Lt. Gen. Michelle Johnson, an Air Force Ball guest speaker, presents a challenge coin as a thank-you to Mitchell High School AFJROTC cadets from Colorado Springs. They were the evening's color guard.

Photos by Allison Earnest

At the Air Force Ball in Colorado, Brig. Gen. Nina Armagno gestures toward Roger Burg, who presented her with the O'Malley leadership award. On the right: Sijan Chapter President Don Kidd and AFA Board Chairman Scott Van Cleef.

As He Sees It

In North Carolina, the **Blue Ridge Chapter's** meeting in March featured State President Lawrence L. Wells.

Having retired as a major general and commander of 9th Air Force at Shaw AFB, S.C., in 2013, Wells spoke with an insider's knowledge about Air Force readiness and the impact of sequestration. He also talked about his personal experiences with aircraft ranging from the F-16, KC-10, and U-2 to the remotely piloted RQ-4.

Wells presented a 2014 AFA Exceptional Service Award to past Chapter President Alicia L. Hughes and an AFA Aerospace Education Achievement Award to Chapter VP for Aerospace Education Nancy B. Duncan.

Chapter President William D. Duncan Jr. said they had won the Aerospace Achievement Award for three reasons: support of the Visions of Exploration AFA-*USA Today* newspaper program that encourages students to study science, technology, engineering, and mathematics topics; its involvement with the Western North Carolina Regional Science Fair; and its Teacher of the Year programs. ✪

Photo via Joseph Hardy

In Maryland, Thomas W. Anthony Chapter President John Huggins (l) and Central Maryland Chapter's Frank Coorsen flank Andy Nguyen (l) and Henry Danchi. The cadets earned the chapter's Hap Arnold-Chuck Suraci Award and the Frank Coorsen Award, respectively.

Photo via Howard Leach

Shooting Star Chapter members Arthur Snyder (left) and Bob Vaucher pose for a photo at a March meeting in New Jersey. Guest speaker Snyder gave a presentation on his Korean War B-29 missions. Vaucher flew the B-29, too—in World War II.

Photo via John Schmidt

Col. H. M. "Bud" West Chapter member John Schmidt (l) presented Florida State University AFROTC cadets with AFA and chapter awards in April. L-r are Anita Naylor, Steven Reyes, and Rollin Read. Col. Gregory Reese (r) accepted the chapter's CMSgt. John Schmidt Award on behalf of cadet Jordan Muntain.

Photo via Bruce VanSkiver

At April's AFA Breakfast Series session, guest speaker USAF Chief of Staff Gen. Mark Welsh (fifth from left) poses with AFROTC Det. 130 cadets, based at Howard University in Washington, D.C. Their commander, Nation's Capital Chapter's Aerospace Education VP Lt. Col. Darryl Terrell, is at far right. The chapter told Welsh's office the students would be there, so he acknowledged them among the crowd of 160 guests. Front row, left to right are: Samantha Smithson, Walter Saunders, Samantha Dewar, and Tiana Lockhart. Back row (l-r): Timothy Hill, Evan Melick, Welsh, Kristoffer Rhodes, Ellen Petersen, Austin Bryan, and Terrell. Except for Bryan, who will be a senior this fall, the cadets were commissioned in May.

reunions@afa.org

Reunions

1st Fighter Assn. Sept. 17-20, Colonial Williamsburg Woodlands Hotel, Williamsburg, VA. **Contact:** Bill Goodrich, 253 Pescado Drive, St. Augustine, FL 32095 (352-212-9694) (lbgoodrich@comcast.net).

13th Tactical Fighter Sq, Misawa AB, Japan (1984-88). Nov. 12-14, Tucson, AZ. **Contact:** Becky Coubrough (misawa13tfspantherreunion@gmail.com).

18th Fighter-Interceptor Sq. Oct. 12-16, Tucson, AZ. **Contact:** Lou Klar, 5408 N. Central Ave., Tampa, FL 33604 (813-237-4454) (bluefox18thfis@verizon.net).

20th Fighter Wg Assn. Oct. 14-18, Hilton New Orleans Riverside in New Orleans. **Contact:** Keith Greene (850-651-4158) (godthing2@cox.net).

71st SOS, 305th RQS, 943rd RQG, all members (1987-2015). Sept. 11-12, Starr Pass Resort and Davis-Monthan AFB, AZ. **Contact:** Pete McNall (520-820-1024) (petemcnall@gmail.com).

100th Bomb Gp Foundation, Thorpe Abbotts, UK (1942-45). Sept. 24-27, Hilton New Orleans Hotel and Nat'l WWII Museum in New Orleans. **Contact:** (100thbg.com).

325th Fighter Gp. Sept. 24-27, Tyndall AFB, FL. **Contact:** Patrice Manget (406-253-2471) (pmanget@centurytel.net).

764th Aircraft Control & Warning/ Radar Sq. Aug. 14-16, St. Albans, VT. **Contact:** John Hauck, 42 N. Shore Rd, St. Albans, VT 05478 (802-309-9988) (hauck@comcast.net).

815th Troop Carrier Sq, Ashiya, Japan (1952-60). Sept. 10-14, Holiday Inn Dayton/Fairborn in Fairborn, OH. **Contact:** Amy Richards (765-964-7242) (amy.richards28@gmail.com).

5021st Tactical Ops Sq, Elmendorf AFB, AK (1981-88). Sept. 4-6, Anchorage, AK. **Contact:** Marc Feigenblatt (513-753-6136) (mfeigenblatt@me.com).

AF Postal & Courier Assn. Sept. 18-20, DoubleTree by Hilton Savannah Airport, Savannah, GA. **Contact:** Ernie Smith (904-824-6097) (esmith-6@comcast.net).

Air Rescue Assn. Oct. 18-20, San Diego. **Contact:** Al Gailey, 1591 Pine Lakes Ranch Dr., Cascade, ID 83611 (208-382-6395) (cagailey@yahoo.com).

Berlin Airlift Vets Assn. Sept. 30-Oct. 3, Oklahoma City. **Contact:** J. W. Studak (512-452-0903).

Phan Rang AB/Happy Valley, all welcome. Oct. 8-11, Crowne Plaza Charleston Hotel in Charleston, SC. **Contact:** Lou Ruggiero (laruggs@comcast.net).

Thailand Laos Cambodia Brotherhood. Sept. 10-13, Crowne Plaza Hotel Boston-Woburn in Boston. **Contact:** John Sweet (aircommando@comcast.net).

Undergraduate Pilot Tng Class 56-S. Sept. 28-30, Branson, MO. **Contact:** Barry Brannan (775-721-3236) (barryb1935@gmail.com).

UPT Class 62-A. Sept. 30-Oct. 2, Wright-Patterson, OH. **Contact:** Dave Tippett, 227 Forest Creek Dr., Bozeman, MT 59718 (406-570-8290).

UPT 70-06, Craig AFB, AL. Oct. 1-4, Antlers Hilton Hotel, Colorado Springs, CO. **Contact:** Bob Denny (719-488-8328) (jrdcjd@aol com).

UPT 76-04, Moody AFB, GA, including IPs. Nov. 6-8, Valdosta, GA. **Contact:** Jim Chafin (jchafin@co.henry.ga.us). ■

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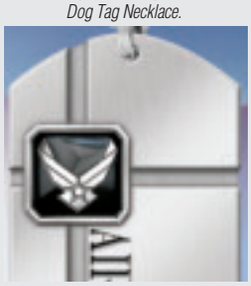

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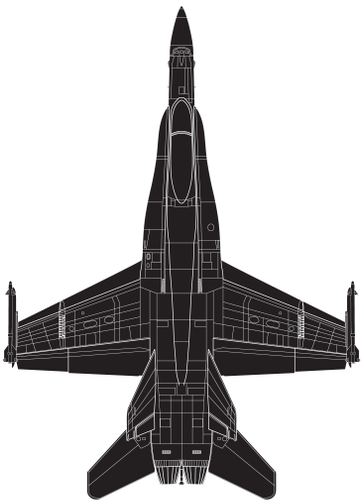
F/A-18 Hornet



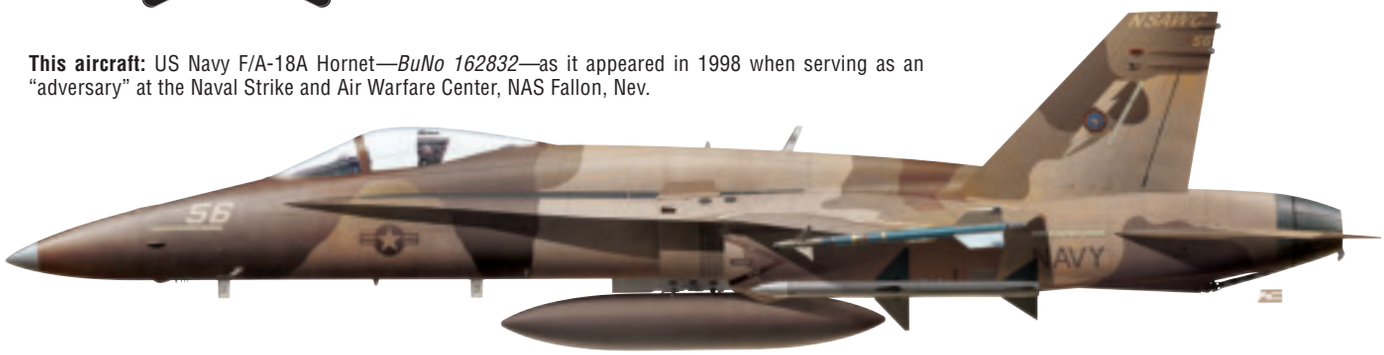
The F/A-18 fighter/attack aircraft is the dominant tactical system of the sea services. The term "F/A-18" actually applies to two different aircraft—the original Hornet (A/B/C/D models) and a far larger and more-capable derivative, Super Hornet (E/Fs). Both Boeing fighters are in service in the Navy and Marine Corps, on carriers and ashore.

The original twin-engine, supersonic, multirole Hornet is a redesign of the lightweight Northrop YF-17 of the 1970s, intended for both air combat and attack. It is maneuverable and versatile, capable of carrying a wide array of ordnance, though limited in range. It is easy to maintain. Hornet replaced A-4s, A-6s, and A-7s and first saw combat in 1986 in Libya. It has taken part in virtually all US operations since then.

The Hornet was the baseline for the F/A-18E/F Super Hornet, unveiled in the 1990s. Super Hornet is 25 percent larger, carries more fuel and weapons, has more powerful GE engines, and sports upgraded avionics—essentially, a different airplane. Naval aviators informally call it "Rhino" to differentiate it from legacy Hornets and avoid call-sign confusion. It supplanted the F-14, A-6, S-3, and KA-6D aircraft types. (An F/A-18G variant will replace the EA-6B.) Its first combat occurred in 2002 over Iraq.

—Robert S. Dudney with Walter J. Boyne

This aircraft: US Navy F/A-18A Hornet—*BuNo 162832*—as it appeared in 1998 when serving as an "adversary" at the Naval Strike and Air Warfare Center, NAS Fallon, Nev.



DOD photo

Blue Angel Hornets fly in formation at an air show in 2014.

In Brief

Built by McDonnell Douglas, Boeing, Northrop ★ first flight Nov. 18, 1978 (Hornet) and Nov. 29, 1995 (Super Hornet) ★ number built 1,980 (1,480 Hornet, plus 500 Super Hornet) ★ crew of one or two ★ defensive armament (typical) one 20 mm cannon and four AIM-9, plus two AIM-120 air-to-air missiles ★ max speed 1,190 mph ★ cruise speed 777 mph ★ combat radius ~460 mi ★ ceiling 50,000 ft. **Specific to Hornet:** two F404-GE-402 turbofans ★ load 13,700 lb. of bombs, missiles, rockets ★ weight (loaded) 51,900 lb ★ span 40 ft 5 in ★length 56 ft ★ height 15 ft 4 in. **Specific to Super Hornet:** two F414-GE-400 turbofans ★ load up to 17,750 lb of bombs, rockets, missiles ★ weight (loaded) 66,000 lb ★ span 44 ft 8 in ★ length 60 ft 1 in ★ height 16 ft.

Famous Fliers

US Navy Notables: Mark Fox and Nick Mongilio (first Hornet victories, Gulf War), Scott Speicher, Robert Dwyer (KIA in Gulf War), John Turner (first Super Hornet combat, 2002). **Test pilots:** John Padgett (first Navy pilot to fly Hornet).

Interesting Facts

Started out with two designations: the F-18 and A-18 ★ can drop B61 nuclear bomb ★ flown by Blue Angels since 1986 ★ initially opposed by Vice Adm. William Houser, Navy's highest ranking aviator ★ has engines that can be removed in 20 minutes ★ flown by Navy test pilots instead of civilians in early development ★ featured in Hollywood films "A Few Good Men" (1992), "Under Siege" (1992), "Clear and Present Danger" (1994), "Independence Day" (1996), "Behind Enemy Lines" (2001), "The Sum of All Fears" (2002), "Tears of the Sun" (2003), "The Dark Knight Rises" (2012) ★ operated by Australia, Canada, Finland, Kuwait, Malaysia, Spain, and Switzerland.

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