

July 2011/\$5

Journal of the Air Force Association

AIR FORCE

MAGAZINE

Space Dominance

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About the cover: A Delta IV rocket launch at Vandenberg AFB, Calif. See "Five Roads to Space Dominance," p. 24. NRO photo.



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To educate the public about the critical role of aerospace power in the defense of our nation.

To advocate aerospace power and a strong national defense.

To support the United States Air Force and the Air Force family and aerospace education.

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Lies, Damn Lies, and the Trillion-Dollar F-35

THE F-35 Joint Strike Fighter's development program may have reached its darkest hour. We hope that is the case, because even the program's staunchest Pentagon advocates are now calling F-35 costs unacceptable and unaffordable.

Unfortunately, the Defense Department has painted itself into a corner with this program. The F-35 will soon be the only US stealth fighter in production, and DOD is counting on it to replace thousands of A-10s, AV-8s, F-16s, and F-18s for the Air Force, Navy, and Marine Corps. Despite its problems, there is no reasonable substitute to the F-35, and killing it to save money is only an option if national security is also optional.

According to Christine H. Fox, the Pentagon's top cost estimator, even in its current state, the F-35 is projected to cost less to operate than the F-22 or the F-15. Compared to the F-16 and F-18, JSF costs are about 22 percent higher, but those legacy aircraft do not have the stealth, advanced avionics, or other fifth generation features of the F-35.

The F-35 is, in a word, better, so "it is not unreasonable that JSF costs more to operate and sustain than some legacy aircraft," Fox noted.

But years of cost growth, development problems, and schedule delays came to a head at a Senate Armed Services Committee hearing in late May. "We cannot support programs that do not perform," said top DOD weapons buyer Ashton B. Carter. "The per-aircraft cost of the 2,443 aircraft we want has doubled in real terms. ... It is unaffordable at that rate."

The take-away from this hearing was not how the F-35 got to this point, nor what the Pentagon intends to do about it. Instead, people wanted to talk about the cost to operate and maintain the strike fighter. On top of \$385 billion to design and build the airplane, the F-35 boasts a round-number operating cost with tremendous shock value: one trillion dollars.

The F-35 certainly deserves much of the wire-brush treatment it has been receiving, but this trillion-dollar figure is misleading and deceptive. Since it is DOD's own number, critics and the press immediately seized upon it.

The headlines were predictable: "F-35 Strikes Trillion-Dollar Mark for Maintenance Bills," wrote *Flight International*. "The \$1 Trillion Fighter-Jet Fleet," said the *Wall Street Journal*. And in the damning with faint praise category, Bloomberg reported: "Lockheed Sees F-35 Lifetime Operating Cost Below \$1 Trillion."

Take a deep breath, everybody. The trillion-dollar operation and maintenance cost everyone is hyperventilating about is hardly worth the paper it

Decades of compound inflation do amazing things.

is printed on. It counts every possible cost to operate and modernize the F-35 during a 25-year production run, followed by a 30-year operational life. It represents a half-century's worth of fuel, parts, upgrades, and even related construction costs.

This time horizon extends until 2065. What makes the estimate particularly worthless is that it is computed in "then-year" dollars—an estimate that measures cost not by 2011 standards, but by what they will cost in the year they are spent. This includes 55 years of inflation at the tail end of the computation, an enormous multiplier that is especially damaging because all of these costs are still, psychologically, perceived as 2011 dollars.

All one has to do is think about the references to what a gallon of gas or a loaf of bread cost in some long-past year to appreciate the effect of decades' worth of inflation. Just as 2065 is 54 years in the future, 1957 is 54 years in the past. The iconic 1957 Chevrolet cost roughly \$2,500 at the time, while the average paid for a new car today is more than \$28,000. Decades of compound inflation do amazing things, and anyone who claims to know what inflation rates or fuel prices will be 25 and 50 years hence is a fool.

The Pentagon's most recent selected acquisition report for the fighter pegs its O&M cost at 1.005 trillion then-year dollars. A comparison using 2011 dollars was not available, but the same O&M cost in 2002 dollars (the baseline year used for constant comparisons) was

\$420 billion. This is far from cheap, but less than half the \$1 trillion estimate.

Historically, Carter said, roughly 30 percent of a weapon's cost derived from buying it, while 70 percent comes from owning it. "You should not believe them," said Carter of the Pentagon's own O&M numbers, because "we have not really begun to manage them yet. ... Nobody is going to pay that bill."

In fact, he added, "If you thought that was really going to be the bill for sustaining the airplane, we might as well all get up and ... leave now."

The expense is not in a vacuum: If the F-35 program were canceled and replaced by new F-16s and F-18s, to cite one common suggestion, those aircraft would also accrue massive expenses over more than half a century of use. Critics of defense spending, however, will naturally gravitate to the largest possible number in attempts to discredit weapons programs and brand them as wasteful and unaffordable.

The trillion-dollar number is undeniably a useful stick with which to flog the F-35 and defense spending in general. For example, longtime critic of defense spending Winslow T. Wheeler has already estimated the F-35 will cost \$250 million to \$300 million per aircraft.

The number will also be frequently misconstrued. In a graphic, the *Wall Street Journal* explicitly listed the F-35's total life-cycle cost as \$1.385 trillion in 2011 dollars.

Flight International's Stephen Trimble said F-35 O&M cost estimates represent just 62 percent of life-cycle costs. "To correspond with Carter's [70 percent] rule of thumb for weapons systems, the operations and support bill for the F-35 would have to rise to nearly \$1.3 trillion," Trimble helpfully adds.

None of this is to excuse the poor cost and schedule performance of the F-35's development program to date. As Carter said, DOD's objective now is to get the program back on track, partly by determining what the aircraft *should* cost. "Our objective is to make sure that those estimates do not come true, and that we have an affordable program," Carter said.

DOD and the Air Force can't afford otherwise, because the F-35 is too important not to get right. ■

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Qaddafi: Con, Neutral, and Pro

Adam J. Hebert's editorial in the May issue was well-done and extremely salient [*"Why Qaddafi Must Go," p. 4*]. I would like to amend the time line presented in the editorial that begins on June 1970 with the dustup at Wheelus Air Base. In late 1969 upon returning to my home station with the Vermont Air National Guard from basic training at Lackland Air Force Base, my operations officer (then Maj. David L. Ladd) was attending the in-residence course of Air Command and Staff College at Maxwell Air Force Base. In his class were several foreign exchange students, including Muammar Qaddafi. As the story goes, Qaddafi skipped town before graduation to return to Libya to oust the ruling family.

I would be interested in knowing if there are others from that ACSC class that remember this now infamous student. Also, it would be nice to look through the archives to see if this dictator penned any significant papers while in the course at Maxwell. I tend to think not.

Col. Dick Strifert,
USAF (Ret.)
North Danville, Vt.

Qaddafi is one of a long line of African leaders with the complicity of the West, who has taken advantage of the regional, language, and tribal divisions in Africa. The events of Africa have been long in coming and yet to be settled. Out of the events in North Africa, there will be internal unrest and civil war in Central and Southern Africa. The West must be in a position to prepare for this and to help new emerging governments and to prevent the exploitation of Africa by China. To replace Qaddafi with a new leader and to deny the people what they seek is a recipe for failure.

The United States must find the will to help direct the coming changes in Africa and somehow find the economic and military will to do so. NATO is not up to the task. ... It is in the best interest of the United States to take the lead and use bilateral, multinational, and institutional means to help to create a more stable and democratic Africa. The Europeans and Russia must see that it is in their best interest to see strong nation-states

in Africa and not a return to a divided Africa with the West and East dividing the spoils.

Joe F. Robinson
Glendale, Ariz.

The rationale presented in the editorial is, in my opinion, deeply flawed. While all of the historical points made in the article highlighting his terrorist credentials are true, the other side of the coin was omitted. For example, after President Reagan ordered Qaddafi's residence bombed, killing his son, he ceased supporting terrorism abroad, stopped working toward developing nuclear weapons, and by providing compensation to the families of the Lockerbie incident, took responsibility and settled that matter.

The Libyan rebels whom you would provide additional military support to, bear a long-standing tribal grudge against Qaddafi. They chose armed rebellion over peaceful protest and started a fight they could not win. It is by now apparent that Qaddafi enjoys the support of his military and the majority of Libyans. Both of the latter groups have remained steadfast in their support in the face of determined, and expanded, US and NATO air attacks. Videos have shown Qaddafi standing in an open automobile driving through the streets of Tripoli with adoring crowds shouting their support. He doesn't feel the need to hunker down in a bulletproof limousine.

To justify further expanded military action against Qaddafi on the basis that he promised to "ruthlessly murder his opposition" while we, along with NATO, ruthlessly murdered Qaddafi's son and three grandchildren in the dark of night, represents the height of cynicism. Continued killing by NATO and attempts to murder others of Qaddafi's family is unconscionable.

It is time for a diplomatic solution and the swallowing of our misplaced pride.

Col. Jay W. Spechler,
USAF (Ret.)
Boca Raton, Fla.

Airpower Classics

"Airpower Classics" in the Almanac issue stated 7,168 F-84s were built [p.

144]. That number got me to thinking about the numbers of aircraft currently in the Air Force inventory listed earlier in the issue. By AFA numbers, there are just over 5,000 total aircraft currently in use by the Air Force. This is about 30 percent less than the number of F-84s produced—talk about a shrinking Air Force!!

Lt. Col. Dan Phillips,
USAF (Ret.)
Rapid River, Mich.

Almanac

On p. 75 of the May 2011 *Air Force Magazine*, the phone number for the Des Moines Airport is listed incorrectly [*"Guide to Air Force Installations Worldwide"*]. The correct phone number is 515-261-8210.

CMSgt. Lowell E. Schellhase Jr.,
ANG
Des Moines, Iowa

For almost 30 years I have had a copy of the USAF Almanac in my attache case. I keep it there as a reference guide. You know what section I used the most over the years? "Guide to Air Force Installations Worldwide." This valuable reference source would tell me if a base has a BX and a commissary, the availability of lodging on base: VAQ, VOQ, TLQ, TFQ, and how many rooms or type of quarters are available. I was also interested in whether or not the base had a clinic or a hospital. I have even used the Almanac to tell me how many people were assigned to the base in order to give me a better idea of the possible facilities I could expect to find, such

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as a service station, a base library, a base gym, a dining facility, an NCO club, etc. None of this information is available in the latest Almanac. As a result, the 2011 USAF Almanac will probably be of little use to me.

I will continue to travel with the 2010 edition and hope you, the editors of the 2011 USAF Almanac, once again include the valuable information I mentioned above in the 2012 USAF Almanac.

CMSgt. William M. Brienza,
USAF (Ret.)
Calais, Maine

I spent far too many hot summer and cold winter days on the Cannon AFB flightline for me to let you get away with omitting tail marking "CC" and the 27th wing.

Capt. Samuel Maurice Porter,
USAF (Ret.)
Antioch, Calif.

■ *The CC fin flash went out of service when Cannon became a special operations base.*—THE EDITORS

Great new format, content, etc.!! Suggested for future issues:

1. Move the dot on the p. 72 map of Europe to show the actual location of Incirlik Air Base. The place shown is about 50 kilometers too far east.

2. P. 73 should state the nearest city to Offutt Air Force Base to be Bellevue, which has a population of over 50,000 and essentially surrounds Offutt. Omaha is about 10 miles from Offutt.

John Carstensen
Bellevue, Neb.

I saw your usual superb Almanac issue but found some matters that should be addressed.

The magazine continues, wrongly, to include Billy Mitchell as a recipient of the Medal of Honor. I am a strong supporter of Billy Mitchell and am appalled at the treatment he received, especially from the Navy, when he advocated the supremacy of airpower. His medal, however, is not the classic Medal of Honor for combat bravery and is not a Congressional Gold Medal.

In 1946, Congress approved a request asking that the President present "a gold medal" (the language found in the statute) to Mitchell's son. The reason for the medal was "outstanding pioneering service and foresight in the field of American military aviation."

The front of the medal bears his likeness, showing him with leather helmet, goggles, and a scarf.

Col. Charles A. Jones,
USMCR (Ret.)
Norfolk, Va.

As always, I enjoyed this year's Almanac issue. However, this aging, former desk jockey did ponder apparently conflicting statistics the issue gave readers about the MQ-1 Predator. Let's play a little numbers game.

The "Last Predator" brief on p. 19 reports USAF accepted 268 MQ-1s [*"Air Force World,"*]. The "Aircraft Age" chart on p. 52 shows a total of 138. OK; that could be because 130 of the 268 no longer operate or exist. But then, the "Gallery of USAF Weapons" entry for the MQ-1 on p. 85 states 186 air vehicles were produced—an 82-airframe difference from 268—and the inventory is 174, not the 138 from the age chart.

If we go with the 186 production number and 174 inventory, only 12 MQ-1s no longer operate or exist. Hmmm! Or have 94 of the 268 production number "disappeared," leaving the inventory at 174? Or is the inventory difference (174-138) because there were 36 MQ-1s built so stealthy no one can count them? Obviously, for me, trying to make sense of the numbers was futile and put me in an almost uncontrollable mental spin.

Lt. Col. John Walmsley,
USAF (Ret.)
Egg Harbor Township, N.J.

■ *The Almanac figures are accurate as of Sept. 30, 2010, as provided by USAF. All numbers will be updated for the 2012 Almanac.*—THE EDITORS

Thank you so much for the photograph of Col. Vermont Garrison on p. 125 [*"Air Force Aces"*]. Obviously an outstanding pilot, but I knew him at the 4780th Air Defense Wing at Perrin AFB, Tex., as one of four clearly outstanding wing commanders with whom I served in 28 years in the Air Force.

He held that a commander should spend a very high percentage of his time with the people who were supporting the unit and a very small amount on those who weren't—just enough to throw them out. I would see this written in almost the same words some three to four years later by Lt. Gen. [Alvan C.] Gillem (then AU/CC). Colonel Garrison also believed in and held in the same stature and to the same standards the significance of the contributions to the success of the unit by those who were not in the cockpit.

Lt. Col. Oliver P. Doe Jr.,
USAF (Ret.)
York, Maine

The Almanac has not been "streamlined." It has been gutted.

To be fair, you have made a few improvements. You combine active, Guard, and Reserve aircraft inventory

(TAI) into one table on p. 48, broken down by model for the first time. You track the age of the entire aircraft fleet on p. 52 (not broken down by model), and you've added a variant heading to the aircraft descriptions in the "Gallery." Apart from these improvements, this is the worst Almanac in the 21 years I've been an AFA member.

You reduced the 2010 Almanac's 23 pages of detailed information on the commands to six pages. The two Air Guard pages are cut to one page that lists units and aircraft, but not where they are based. The two Air Force Reserve pages are shrunk to half a page that does not list units, aircraft, or bases.

Details such as area, runways, personnel, and aircraft have been removed from the base profiles on p. 66-77. Civilian force data, inflation rates, educational levels, and military and civilian pay tables are among the other deletions.

In order to make amends for the sad state of the 2011 Almanac, I suggest that you include a gallery of Navy, Marine Corps, and Army aircraft in one of this year's editions, something you have not done since 1990, and make that an annual feature as well.

Maj. James McLoughlin,
USAR
Boston

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Navy reveals big shopping list; Goodbye to aircraft carriers?; Adapting to new warfare realities

WHO GETS AIRCRAFT PRIORITY?

The Navy, and not the Air Force, is in line to get the most new fixed-wing aircraft types purchased by the Defense Department over the next 30 years, according to a paper released to support the 2012 Pentagon budget.

The "Aircraft Procurement Plan, Fiscal Years 2012-2041," mandated by Congress to inform the annual defense budget—but only released in late spring—shows that the Navy will have a new patrol aircraft, a new carrier-based stealth drone, F/A-18E/F and F-35C manned carrier strike fighters, new EA-18G electronic warfare aircraft, and a new-start fighter called the FA-XX. There will also be F-35B short takeoff and vertical landing fighters and a new stealth drone for the Marine Corps.

Meanwhile, the Air Force's shopping list is considerably more modest. While USAF will buy the lion's share of Joint Strike Fighters—1,763 F-35As through 2034—it only has two other significant new programs planned: purchase of the KC-46A aerial tanker and the eventual purchase of a new long-range strike aircraft.

The Navy will get "bridge" buys of F/A-18E/Fs to keep the sea service's air arm in business while it waits for F-35s, which have been delayed. The Air Force will have to make do being some 200 aircraft short of its national strategy-dictated level of fighters, and will, according to the report, "mitigate its shortfall until the 2020s via investments in the F-16 force." Those investments refer to an as-yet-undefined series of capability and structural upgrades to extend the F-16's service life, likely to include some new spars and stiffeners, electronic warfare enhancements, and new radar.

Moreover, it seems the F-16s are going to have to last longer in any case. The plan refers to the Air Force retaining at least some F-16s through the end of the 2030s, whereas it previously said it would extend the fleet into the mid-2020s, or at the latest, to 2030.

The 2011 version of the plan posited real growth (above inflation) of three percent a year in aviation accounts throughout the scope of the plan, but the 2012 version anticipates zero real growth in aviation after 2017. This reflects the Obama Administration's plan to reduce defense spending by \$400 billion over that period.

The plan calls for the Air Force to buy 603 F-35s between Fiscal 2012 and Fiscal 2021. As recently as last year, the Air Force was hoping to get its F-35 buy up to 110 aircraft a year—which would reduce the need to extend the service lives of F-15s and F-16s—but Air Force officials say privately they no longer see their peak buy exceeding 80 a year.

The plan noted that the F-22 program is nearly complete, and that the Pentagon will maintain the Raptor as "the premier air-to-air fighter by spending \$4.5 billion on modernization" over the next 10 years. However, in previous years, the Pentagon said it would spend \$7 billion on F-22 modernization.

Once C-17 production comes to a halt, there will be at least a 10-year drought in buying strategic cargo aircraft, according to the plan.



USN photo by Mass Comm. Spec. 3rd Class Travis K. Mendoza

Navy gets bridge F/A-18s; USAF forced to make do.

"Although the department is spending considerable sums on modernizing legacy strategic lift and long-range strike platforms, there will be no new procurement of aircraft in these categories during FY 2012-2021," it reads.

The strategic cargo fleet is going to level off at about 300 airframes, comprising C-5s which have received an omnibus upgrade and re-engining package, and C-17s, many still considered "new" by Air Force standards, even though the oldest of the types are now about 20 years old. The Pentagon anticipates that the C-17 fleet, having seen heavy usage in Iraq and Afghanistan, will undergo a major service life extension and upgrade program to keep it operable for another 30 years.

The Air Force's family of bombers—B-1s, B-2s, and B-52s—will likewise be upgraded with new defensive systems and weapons to keep the US in the long-range strike business until the new bomber begins entering the inventory in the 2020s. The Air Force plans to buy about 100 new bombers at a forecast unit cost of \$550 million a copy, but the system's requirements are still in flux and no formal program yet exists to develop and build it.

In testimony before the House Armed Services Committee's oversight panel, Vice Adm. P. Stephen Stanley, principal deputy director of the Pentagon's cost assessment and program evaluation office, said the 30-year annual plan is not an effective way to plot or assess the Pentagon's aircraft acquisition strategy.

Stanley said the plan would work better if it was demanded less frequently—say, every four years—so it could be tied to the Quadrennial Defense Review, and that it should only have to look 20 years into the future, rather than 30.

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While a 20-year look is manageable, Stanley said, 30 years requires difficult and speculative predictions about economies, strategies, budgets, and technologies.

However, Congress ordered the plan because it was concerned about the aging of America's military air fleets, dwindling numbers of military aircraft in Pentagon procurement plans, and concerns about the long-term health of the defense industrial base. Without work to look forward to on a predictable basis, Congress was concerned that the industry would close down certain critical design and production capabilities.

HASC oversight panel chairman Robert Wittman (R-Va.) said at the hearing that "decisions to cut or efforts to kill a number of programs, including the F-22 fifth generation fighter, the C-17 cargo aircraft, and the Air Force's combat search and rescue helicopter ... arguably place American air supremacy at risk, or at least at question."

Other witnesses at the hearing—including representatives of think tanks and government watchdog agencies—suggested that while the Pentagon probably already had 30-year investment plans that they were maintaining for planning purposes, the plan as now required gives Congress visibility into defense thinking that it otherwise wouldn't have.

A NEW REVOLUTION IN MILITARY AFFAIRS

The US will soon likely witness another Revolution in Military Affairs, like the one during the 1990s in which stealth, precision attack, and networked systems vastly multiplied the capabilities of US military forces and changed the calculus of warfare.

Now that those same capabilities are bubbling up in nations and nonstate actors of all sizes, it may be time for the US to rethink how it will fight in the future—a future that may see an end to the utility of aircraft carriers, an inability to deploy large ground forces overseas, and possibly the end of the era where "stealth" as we now know it is an effective military tool.

Such were the conclusions advanced by Barry D. Watts, writing in a paper for the Center for Strategic and Budgetary Assessments, "The Maturing Revolution in Military Affairs."

The demonstrated effectiveness of missiles such as China's D-21 ballistic missile—which can be retargeted inflight—and broadly, other anti-aircraft and area-denial means "have the potential to bring the era of the aircraft carrier to an end," Watts wrote. They could "obviate the ability of short-range, tactical US airpower to operate from forward bases, and substantially raise the difficulties and costs of moving heavy ground forces into overseas theaters, much less sustaining them once there."

Moreover, since these factors will push forces farther away from their targets, "if the technologies and capabilities for precision strike at intercontinental distances emerge and proliferate widely, so will the temptation in time of war to attack the adversary's homeland directly."

Watts wasn't sure how that would play out, given the "continued existence" of nuclear arsenals, and said it's hard to guess what the future of stealth will be. On the one hand, the proliferation of active electronically scanned array radars—AE-SAs—and long-wavelength search radars may finally defeat stealth. With enough processing power, and assuming Moore's Law holds and computers double in power at the same cost every 18 months or so, information warfare will, some argue, inevitably "overwhelm the capacity of aerospace engineers to reduce platform signatures."

On the other hand, he noted, the US is increasing its numbers of stealth platforms, and they will be able to operate in groups. The F-35's AESA "can be used for electronic attack of

enemy air defenses as well as digital radio frequency memory (DRFM) capabilities," which will allow the F-35 to duplicate incoming radar signals, alter them, and send them back to the receiver modified to suggest that the fighter is either not there or is somewhere else. In groups, F-35s could "overcome enemy air defenses, to include destroying S-300/400/500-class SAMs."

Which prediction about stealth is right? Watts wrote that current defense leaders' decision to press on with the F-35 implies "that they do not believe that the era of stealth aircraft is about to come to an end."

There's no question, though, that the US increasingly depends on "relatively unimpeded access to the global commons in both space and cyberspace" to fight the way it has gotten used to doing for the last 20 years. And there's similarly no doubt that other countries—notably China—have recognized this dependence and are pulling out all the stops to attack it if they feel it necessary to do so.

China is "investing in everything from jamming to counternetwork attack (the offensive form of cyber warfare), anti-satellite (ASAT) systems, and directed energy weapons," he observed.

One work-around to the dependence on space and networks for precision targeting might be to invest in systems able "to find *imprecisely* located targets on their own," Watts suggested, offering the Low-Cost Autonomous Attack System, or LOCAAS, as an example. Developed under the Defense Advanced Research Projects Agency, LOCAAS could fly to and loiter in an area where a target was thought to be, then search for the target autonomously with a laser radar, striking when it does.

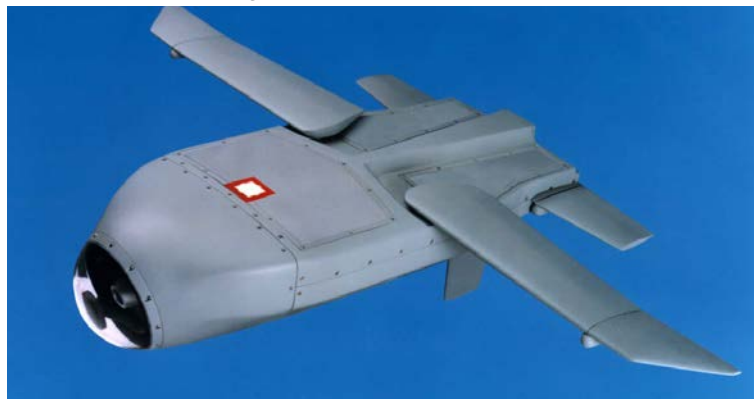


Photo by Lockheed Martin

Live in' La Vida LOCAAS?

However, "due to unease among senior airmen with autonomous battlefield robots, the Air Force walked away from LOCAAS," as did the Army with similar technology in its Non-Line-of-Sight Launch System and the Loitering Attack Missile.

"The reticence regarding LOCAAS and LAM appears to stem from a cultural inclination to maintain tight control over kinetic attacks, combined with an intellectual failure to grasp the importance of being able to address imprecisely located targets," Watts asserted.

"How soon the US military services will be forced to begin adapting to these new realities is by no means set in stone," Watts wrote. While "the best guess" is that a response will be "unavoidable within 15 to 20 years," the "new ways" of warfare have not yet been tested in battle.

"Until such a test occurs, US military institutions may be able to continue clinging to "traditional" ways of fighting and avoid the fundamental changes implied by the maturation and proliferation of precision strike," he said. It would take a catalytic event to force rapid investment in radical change, he added. ■

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EOD Airmen Killed in Afghanistan

TSgt. Kristoffer M. Solesbee, 32, of Citrus Heights, Calif., and SSgt. Joseph J. Hamski, 28, of Ottumwa, Iowa, died in operations in Afghanistan, Defense Department officials announced May 27.

The two airmen died of wounds inflicted when enemy forces attacked their unit with an improvised explosive device, in the Shorabak district of Kandahar province May 26.

Both airmen were explosive ordnance disposal technicians. Solesbee was assigned to the 775th Civil Engineer Squadron at Hill AFB, Utah, while Hamski was a member of the 52nd CES at Spangdahlem AB, Germany.

Dempsey To Chair Joint Chiefs

President Obama introduced the final two leaders in his new national security team in May, nominating Army Chief of Staff Gen. Martin E. Dempsey as the new Chairman of the Joint Chiefs and Adm. James A. Winnefeld Jr.—currently head of NORAD and US Northern Command—as vice chairman.

Obama selected US Joint Forces Command boss Gen. Raymond T. Odierno to be Army Chief of Staff to succeed Dempsey, who had only been in the job a few weeks.

Dempsey and Winnefeld “will make an extraordinary team,” Obama said during remarks at the White House. “Between them, they bring deep experience in virtually every domain—land, air, space, sea, cyber.”

If approved by the Senate, Dempsey will replace Adm. Michael G. Mullen, who is stepping down this fall, and Winnefeld would succeed Marine Corps Gen. James E. Cartwright, whose term ends this summer. Mullen and Cartwright have served in their current posts since 2007.

Hostage To Lead ACC

The Senate has approved the nomination of Lt. Gen. Gilmary Michael Hostage III for promotion to the rank of general for the purpose of assuming his next post as head of Air Combat Command at JB Langley-Eustis, Va.

Hostage has overseen the air campaigns in Afghanistan and Iraq since August 2009, as commander of US

Air Forces Central Command. He will replace Gen. William M. Fraser III, who has headed up ACC since September 2009. As of mid-June, it had not been announced whether Fraser will go to a different position or retire.

The Senate also has confirmed the nomination of Maj. Gen. David L. Goldfein to receive a third star as he heads to his new assignment, replacing Hostage in Southwest Asia as chief of AFCENT. Goldfein has been ACC’s director of operations since August 2009.

First USAF Production F-35A

The Air Force accepted the first of 1,763 planned F-35A production aircraft from prime contractor Lockheed Martin, May 9.

The airframe, AF-7, is actually the second production F-35A to roll off Lockheed’s assembly line in Fort Worth, Tex. Though AF-6 was constructed first, AF-7 was the first to complete acceptance testing. “AF-6 is close behind” in completing the acceptance process, Lockheed spokeswoman Laurie Quincy noted.

Lockheed’s industry team built AF-6 and AF-7 as part of Lot 1 F-35 low-rate initial production. Both aircraft are slated to support F-35 flight testing at Edwards AFB, Calif., before moving to Eglin AFB, Fla., and becoming part of the joint F-35 schoolhouse.

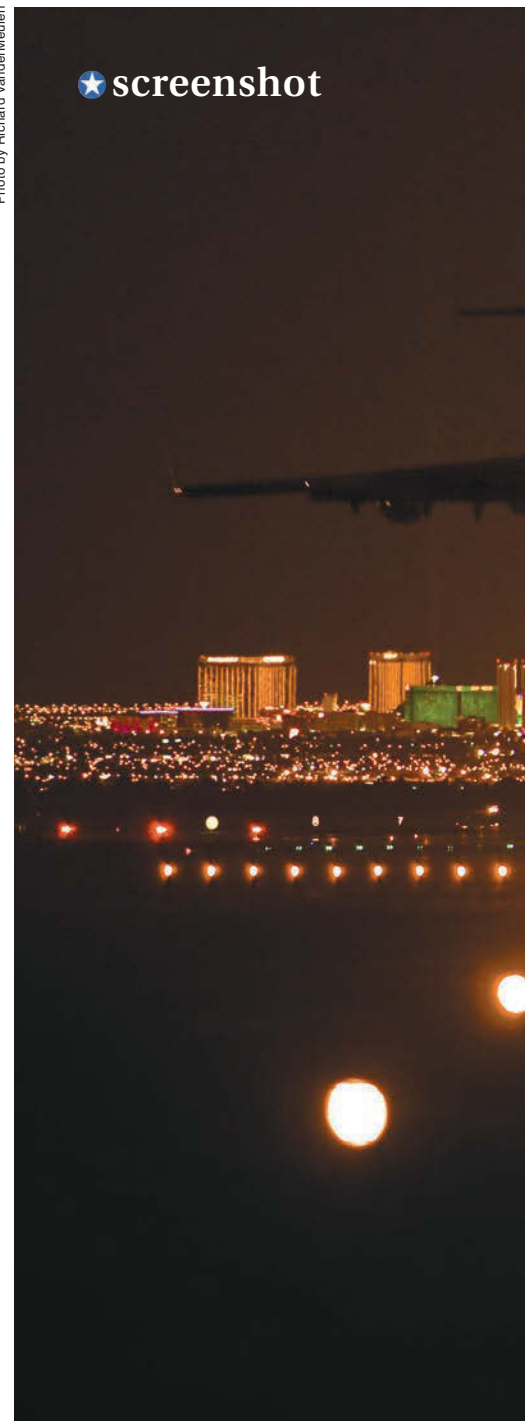
AF-8, the first F-35A built under Lot 2 LRIP, made its maiden flight May 10. It will be the first F-35 production aircraft to fly directly to Eglin.

Early Lightning Jolt, Maybe

The Air Force may be able to deploy some F-35A strike fighters in combat even before it’s formally declared ready for operations, Lt. Gen. Herbert J. Carlisle, Air Staff lead for operations, plans, and requirements, told lawmakers May 24.

“If the combatant commanders said, ‘We need this capability,’ then we would clearly provide it,” he told the Senate Armed Services Committee’s air-land panel. The Air Force anticipates reaching F-35A initial operational capability sometime between 2017 and 2018. The first officially combat-ready F-35As will likely incorporate Block 3 mission software suites, said Carlisle.

Photo by Richard VanderMeulen



Before this milestone, the Air Force expects to have “on the order of a hundred airplanes” in the earlier Block 2B configuration delivered to operational units, he explained, adding that the aircraft will still possess “very impressive” capabilities. Those units will have been trained in F-35 tactics, techniques, and procedures, and the logistics infrastructure will be maturing, he said. Depending on the

circumstances, “we would, with all the safety considerations, be ready to go,” said Carlisle.

SBIRS Satellite on Station

The Air Force’s first Space Based Infrared System geosynchronous satellite, GEO-1, has reached its intended operational orbit and is performing well, lead contractor Lockheed Martin announced May 24.

“Successfully reaching orbit and conducting deployments is a tremendous milestone for the SBIRS GEO-1 spacecraft. Thanks to a very talented and dedicated team, this first-of-its-kind spacecraft has performed flawlessly,” said Col. Roger W. Teague, USAF’s director of infrared space systems, in the Lockheed release.

USAF and its industry partners launched GEO-1, a sophisticated early warning satellite, atop a United Launch



06.07.2011

A C-17 prepares to touch down on the runway at Nellis AFB, Nev., backlit by the Las Vegas skyline. This was mission No. 6 of seven in the mission employment phase that culminates six months of training at the US Air Force Weapons School. Ninety-three out of 108 students who entered weapons school Class 11A have since graduated and become weapons school “patch wearers.”

John R. Alison, 1912-2011



Sent to Hengyang, China, Alison joined the 75th Fighter Squadron, under the 23rd Fighter Group, which owed its nickname to Chennault's "Flying Tigers." Alison showed an innovative spirit. He attacked Japanese bombers making a nighttime raid, despite the P-40's lack of night-flying gear. His airplane severely damaged and his arm wounded, Alison nevertheless downed three bombers before having to ditch in a nearby river. He was awarded the Distinguished Service Cross.

In another battle, Alison took off while his airfield was under attack, then shot down one Japanese fighter while vectoring reinforcements from other bases. For this action, he received the Silver Star.

During more than a year with the unit, Alison was credited with six aerial victories and one ground kill. Chennault wrote that Alison's air combat record—both as a pilot and squadron commander—was "brilliant."

In 1943, to assist the British with commando attacks on Japanese forces in Burma, Arnold sent Alison to be co-commander of Project Nine, which would resupply ground forces and conduct nighttime raids using cargo aircraft, gliders, and a novelty at the time: the helicopter. Arnold instructed Alison: "To hell with the paperwork: Go out and fight."

Carving airfields out of teak jungle, Alison in March 1944 led the deployment of more than 9,000 troops, thousands of horses and mules, and over a half-million pounds of supplies to landing fields in Burma in just six days, providing both the transportation and airborne heavy artillery to support British forces.

On the first night of Operation Thursday, Alison himself flew a glider full of troops into combat—despite having never flown one before—landed hard, grabbed a rifle and grenades, and jumped out to do battle. The operation marked the genesis of the air commandos, one of the US military's first special operations units.

Three weeks later, he was summoned back to his base in India. There, he had two identical messages waiting for him, one from Arnold, the other from Gen. Dwight D. Eisenhower. Both said, "Report to me without delay."

Arnold allowed Alison a delay to talk to Eisenhower, who was preparing the D-Day invasion and wanted Alison's expertise on the use of assault gliders.

Arnold, in turn, wanted Alison to grow the air commandos, which he did, organizing two more groups for the invasion of the Philippines and in support of air operations against Japan from Okinawa.

When the war ended, Alison joined the Air Force Reserve, rising to the rank of major general. He was President Truman's assistant secretary of commerce for aeronautics, and later joined the Northrop Corp. as a senior vice president. Alison is credited with convincing the Air Force to buy the T-38 trainer/F-5 fighter, moves which likely saved Northrop from being consolidated into another contractor. He retired from the company in 1979.

He was inducted into the National Aviation Hall of Fame in 2005.

Alison was AFA President in 1954-1955 and Chairman of the Board the following year. He remained an active member and advisor to the organization until his death.

Retired Maj. Gen. John Richardson Alison, a highly decorated and influential World War II ace who helped found the air commandos, served a key role in Lend-Lease, and was a major figure in the Air Force Association, died June 6 at the age of 98.

Born in Florida in 1912, Alison grew up with a keen interest in aviation. He got his Army commission in 1935—a year before graduating from the University of Florida—and in 1937 earned his wings. He was posted to Langley Field, Va., where he flew many aircraft, ranging from B-10 bombers and biplanes to the Curtis P-40.

Alison's skill in demonstrating the P-40 for a delegation of Chinese Nationalists sold them on the airplane. Claire L. Chennault said that when Alison landed, the delegation said it wanted "100 of these," pointing to the fighter. Chennault, their advisor, said, "No, ... you need 100 of these," and pointed to Alison.

Alison's skill in the P-40 prompted the Air Corps to send him and Lt. Hubert A. Zemke to Britain to facilitate the Lend-Lease supply of P-40s and to teach Royal Air Force pilots to fly it. They did so well that by 1941, the two were sent on a secret mission to teach Russia's air force how to assemble and fly Lend-Lease P-40s.

When World War II broke out, Alison requested combat duty, but was posted to Basra, Iraq, supervising the transfer of Lend-Lease North American B-25s, Douglas A-20s, and other aircraft to Russia. Alison got to fly them all. He reported directly to Army Air Corps chief Gen. H. H. Arnold, who eventually relented to Alison's constant requests for a combat assignment.



Alliance Atlas V booster from central Florida, May 7. The government-industry team successfully executed a series of six apogee engine burns, propelling the spacecraft to its geosynchronous orbital slot.

Once on orbit, the team deployed the satellite's solar arrays, light shade, and antenna wing assemblies in preparation for activating its infrared sensors to begin early orbital testing.

Supremely Unsatisfying

The Supreme Court has unanimously sent the Navy's 20-year-old A-12 stealth bomber case back to the lower courts. The May 23 decision nullified a lower court ruling against contractors General Dynamics and Boeing (formerly McDonnell Douglas), which would have required them to repay \$1.35 billion to the Navy for work the service never accepted.

The court stated that the government could not prevail by invoking a "state secrets" privilege, barring the companies from discovery of crucial facts needed to make their case.

Apparently the ruling does not, however, give the companies leeway to charge comparable losses to the government. Justice Antonin Scalia wrote for the court that when state secrets are involved, "the proper remedy is to leave the parties where they were on the day they filed suit," and so "we leave the parties where they are." He acknowledged, "Neither side will be entirely happy with this resolution."

The A-12 was the Navy's planned successor to the A-6 Intruder carrier-based attack aircraft that the companies were developing under a fixed-price contract. When the project far exceeded budgets, falling more than two years behind schedule, then-Defense Secretary Richard B. Cheney ordered its termination in January 1991.

The A-12's cancellation ultimately led to the creation of the F-35 Joint Strike Fighter program.

USAF Detachment Rotates to Poland

The United States and Poland have agreed to establish an Air Force aviation detachment in Poland next year, and it

Mobility Leads Combat Assets in Readiness

Despite "robust and dynamic" operational requirements, mobility air forces maintain exceptionally high readiness levels, though combat assets are coping less well, asserted Lt. Gen. Loren M. Reno, USAF deputy chief of staff for logistics.

The mission capability rate for USAF mobility assets currently is holding at 82.7 percent despite heavier utilization demands in Southwest Asia, he told members of the Senate Armed Services Committee's readiness panel May 18.

Meanwhile, the readiness of combat air forces aircraft is deemed "adequate," despite flying older aircraft longer and accumulating flight hours more quickly than first envisioned.

The mission capability rate for CAF assets is now 75 percent, having declined three percent over the past five years.

CAF aircraft availability rates have declined almost five percent during that same span, settling today at 65.5 percent, Reno told the committee. However, the MC rate for combat platforms in Southwest Asia remains high, at 84 percent. "This is to be expected due to the focus on warfighter support," he said.

will begin training with the Polish Air Force by early 2013.

"The aviation detachment will strengthen joint interoperability through regular training exercise rotations in Poland, largely with US F-16 or C-130 aircraft," stated a White House fact sheet released May 28. It was released as President Obama concluded a visit to Poland, where he met with Polish President Bronislaw Komorowski and Prime Minister Donald Tusk.

"The aviation detachment that is being finalized will be significant, and we're proud that we've gotten that completed," said Obama during a joint press conference with Tusk in Warsaw the same day.

F-16s from the California Air National Guard will rotate to Poland this month to train with Polish F-16s in preparation for Poland's hosting of the European soccer championship in June 2012.

Continuing Iraqi Presence?

Although the current agreement with Iraq calls for US military personnel to leave the country by year's end, Defense Secretary Robert M. Gates said he sees benefit in keeping between 8,000 and 15,000 troops deployed there to continue training Iraqi forces.

The Iraqis "still have a lot of work to do with logistics and things like intelligence,"

he told soldiers at Fort Leonard Wood, Mo., May 19. "They basically have no air defense capability."

Gates said Iraqi officials see benefits to keeping a modest US presence, but the idea remains "political dynamite" for them. "So the question that is unsettled at this point is whether the Iraqi leadership will come together, and all the different factions will hold hands and jump off the cliff together, in terms of seeking authority and going forward with a continuing US presence," he summed up.

New JSF Engine Contract

Pratt & Whitney received a \$1.13 billion contract from the Defense Department to supply 37 F135 engines for the F-35 strike fighter in Lot 4 low-rate initial production (LRIP).

"This contract provides our customer with a 15 percent savings on the conventional takeoff and landing/carrier variant, compared to LRIP 3, and demonstrates our commitment toward meeting aggressive cost-reduction goals," said Bennett Crosswell, the company's military engines president.

"It also speaks to the maturity of our engine, which builds on the proven technology of our F119 engine." The contract contains fixed-price and cost-plus-incentive-fee elements and also covers spare parts and sustainment support.

Of the LRIP 4 engines, 18 will be for F-35A CTOL aircraft and 19 for F-35B short takeoff and vertical landing aircraft.

Engine deliveries are slated to begin in late 2011. Pratt delivered the first Lot 3 engine in early May.

Bye-Bye, Black Sheep

Airmen at Holloman AFB, N.M., held an inactivation ceremony for the 8th Fighter Squadron, May 13.

The "Black Sheep" are standing down, after less than two years of oper-

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Now With Fewer Nukes

The State Department released the aggregate numbers of US and Russian strategic nuclear arms June 1. According to data current as of Feb. 5, the United States has 1,800 nuclear warheads on 882 deployed launchers (i.e., ICBMs, submarine-launched ballistic missiles, and heavy bombers), while Russia has 1,537 warheads on 521 deployed launchers. The United States has a total of 1,124 deployed and nondeployed launchers; Russia has 865.

Under the terms of the New START arms control agreement, the two nations were required to reveal their respective inventories by late March, with US inspectors concluding their first visit to a Russian SS-19 ICBM base April 16.

There no major surprises during the first inspection, said James N. Miller, principal deputy undersecretary of defense for policy. "I can say that the inspection went about as expected," Miller told a Senate Armed Services Committee panel in May.

The United States exhibited a denuclearized B-1B to Russian officials in March, and a nuclear capable B-2A in April, while the Russians exhibited an RS-24 road-mobile ICBM for US officials. Russian officials are due to inspect a US missile site in the near future.

New START took effect on Feb. 5, for a duration of 10 years. Both states are required to have no more than 1,550 deployed nuclear warheads, 700 deployed launchers, and 800 deployed and nondeployed launchers within seven years.

The two nations will update the inventory totals every six months while the treaty is in force.

ating F-22s, due to the Air Force's Raptor fleet consolidation plan, which calls for Holloman to give up its two squadrons of F-22s for two F-16 training squadrons.

"We flew 2,500 sorties and over 3,000 hours. That's more than 10 sorties a day, with less than nine F-22s," said Lt. Col. Craig Baker, 8th FS commander, in highlighting his unit's accomplishments during the ceremony.

The inactivation takes effect on July 15. Some of the 8th FS F-22s will go temporarily to Holloman's 7th FS, while others will bolster the ranks of F-22 units at JB Elmendorf-Richardson, Alaska; JB Langley-Eustis, Va.; and Nellis AFB, Nev.

The remaining Holloman F-22s will eventually shift to Tyndall AFB, Fla. This is the second time in the 61-year history of the 8th that the unit has been inactivated. The first inactivation was in April 2008, with the retirement of the F-117 Nighthawk.

Over the years, the Black Sheep have flown 15 types of different aircraft.

Waste Not

The Air Force authorized Northrop Grumman to proceed with work on the US military's next generation weather monitoring satellite. The Defense Weather Satellite System received \$428 million in funding.

DWSS will use hardware and knowledge developed under the now-canceled National Polar-orbiting Operational Environmental Satellite System, or NPOESS, which Northrop led.

USAF charged the company with transitioning work from the NPOESS contract to the new DWSS program. "We have defined an effective program plan that leverages the high level of maturity achieved on the spacecraft and sensors that are already in production," said

Linnie Haynesworth, Northrop Grumman's DWSS program director, in the company's release May 25.

DWSS satellites will replace the Defense Meteorological Satellite Program constellation in providing time-sensitive support of military operations. First launch of a DWSS spacecraft is anticipated in 2018.

Coming to Romania: Missile Defense

The United States and Romania jointly designated Deveselu Air Base near Caracal, Romania, to host land-based Standard Missile-3 interceptors, starting from about 2015, forming part of the US contribution to NATO's ballistic missile defense architecture.

The BMD site, encompassing about 430 acres, will consist of a radar deck-house, command element, and SM-3 interceptor launch modules, according to State Department officials.

Collectively known as the Aegis Ashore System, the fixture comprises part of the second phase of the Obama Administration's BMD phased adaptive approach, designed to protect Europe and the United States from missile threats emanating from the Middle East. "The site has many advantages, including existing infrastructure and advantageous geography," said Ellen Tauscher, undersecretary of state for arms control and international security,



Real Life Savers: Two HH-60G Pave Hawk helicopters take off June 11 from Bagram Airfield, Afghanistan, on a rescue mission. Pararescue airmen from the 83rd Expeditionary Rescue Squadron saved the lives of two wounded Afghan police. On average, it takes the 83rd ERQS just 10 minutes from the time they receive an alert call to get a helicopter in the air.

USAF photo by SSgt. John Wright

The War on Terrorism

Operation Enduring Freedom—Afghanistan

Casualties

By June 14, a total of 1,608 Americans had died in Operation Enduring Freedom. The total includes 1,606 troops and two Department of Defense civilians. Of these deaths, 1,262 were killed in action with the enemy, while 346 died in noncombat incidents.

There have been 12,002 troops wounded in action during OEF.

Afghan Light Lift

The Air Force awarded Cessna Aircraft an \$88.5 million contract to provide 32 light lift aircraft to the Afghan Air Force under the Afghanistan Basic Trainer/Lift Family program.

With this foreign military sale, Cessna will deliver six T-182Ts and 26 C-208Bs, based on the company's 182 Skylane and 208 Caravan civil models. Together, these aircraft will provide light airlift for AAF counterinsurgency operations.

USAF is simultaneously considering procurement of an additional 15 Cessna aircraft to support the training of USAF air advisors at JB McGuire-Dix-Lakehurst, N.J., holding open the possibility of purchasing a further 24 aircraft sometime in the near future, according to online aviation publication Flightglobal.

C-17 Lands at Shindand

A C-17 touched down for the first time at Shindand Air Base in western Afghanistan June 1, following refurbishment of the base's all-weather concrete runway last December.

By later this summer, the Shindand flight line will be able to support two C-17s around-the-clock and simultaneous Afghan Air Force activities, ushering in a new era of air mobility support for coalition operations in west Afghanistan.

Originally built by the Soviets in 1961 and damaged in the early days of Operation Enduring Freedom, the runway is 8,530 feet long and 90 feet wide.

Chopper Shop Parts

Five airmen with the 438th Air Expeditionary Wing in Kabul aided the Afghan Air Force in recovering part of an AAF Mi-17 helicopter which crashed in the mountainous east-central border region of Nuristan.

With the assistance of Army Pathfinders, the airmen documented the crash site, stripping reusable sections from the aircraft, which were then sling-loaded under a US Army CH-47 Chinook helicopter for recovery. Airmen and soldiers destroyed components deemed unrecoverable on site.

Nine Afghan personnel were injured in the crash May 11, though none were killed. The Afghan Air Force is convening a board of inquiry into the mishap. "This board is made up of various specialties of the AAF," said Maj. Jay Troxell, 438th AEW safety officer. USAF airmen will play a strictly advisory role in the investigation, which was expected to wrap up last month.

Air Force has tested and certified the A-10, C-17, F-15, and F-22 to operate on the JP-8-HRJ blend.

Fleetwide certification is on track for completion in 2013, say Air Force officials. "Over the past five years, the Air Force has certified more than 99 percent of its aircraft to operate on various blends of synthetic and traditional fuels, and we are moving ahead in certifying biofuels as well," said USAF Undersecretary Erin C. Conaton during an Air Force Association-sponsored speech in Arlington, Va., May 11.

Path to a New Gateway

The Air Force Center for Engineering and the Environment at Lackland AFB, Tex., is planning a new \$21.8 million facility at the base to serve as the primary in-processing and information center for USAF recruits entering basic military training.

"The building will be the first thing that Air Force recruits and their families see," said Ben Kindt, AFCEE capital investment execution branch chief.

The 70,000-square-foot building will feature modernized information stations, a multistory glass atrium, and an outdoor 3,000-seat auditorium to support BMT graduation activities.

Its front entrance, dubbed the "Gateway to the Air Force," will sport six pillars representing the Air Force's core values (Integrity First, Service Before Self, and Excellence In All We Do) and operational domains (air, space, and cyberspace).

Golden BUFFs

Air Force Global Strike Command's B-52H fleet has surpassed 50 years of continuous service in the tactical and nuclear strike roles.

On May 9, 1961, Boeing delivered the first B-52H model to Strategic Air Command's 379th Bomb Wing, based at Wurtsmith AFB, Mich. Named *State of Michigan*, serial No. 60-001 was the first of 102 B-52Hs delivered to USAF, 74 of which remain in the total active inventory today.

Intended to carry the GAM-87A Skybolt ballistic missile, the B-52H boasted improved range and performance over previous models, incorporating new Pratt and Whitney TF33 engines.

With continuing upgrades, the B-52H is slated to serve beyond 2040, meaning the last ones will be 80 years old or more when they retire.

More Special Super Hercs

The Air Force has added 48 MC-130J special operations aircraft to its HC/MC-130J recapitalization program of record, increasing the intended buy from 74 to 122 airframes.

Thirty-two of the newly added MC-130Js will supplant Air Force Special

speaking of Deveselu in Bucharest, May 3.

Grand Forks Welcomes Global Hawk

Airmen at Grand Forks AFB, N.D., gathered with local community leaders and industry representatives to celebrate the arrival of the first Northrop Grumman RQ-4 Global Hawk remotely piloted aircraft at the base. "What a great day for Grand Forks and North Dakota—this is cutting-edge technology," said Maj. Gen. Thomas K. Andersen, Air Combat Command's requirements director, during the ceremony June 1.

The event marked the start of a new era there after the base's KC-135 tanker mission concluded last December after 50 years of operations. A Global Hawk Block 20 arrived from Beale AFB, Calif., for the ceremony, though only Block 40 models fitted with the Northrop-Raytheon

Multiplatform Radar Technology Insertion Program (MP-RTIP) radar will be stationed at the base.

The first Block 40 aircraft could arrive by this month, according to the *Grand Forks Herald*.

Thunderbirds' Bio-Fuel Sensation

The Air Force Thunderbirds became the Defense Department's first air demonstration team to use an alternative fuel blend during a performance.

Thunderbird No. 5 and No. 6 ran on a mix of half traditional JP-8 fuel and half hydrotreated renewable jet fuel during performances for the Joint Services Open House at JB Andrews, Md., May 20 and 21.

The HRJ mix is derived from the seeds of the camelina plant, but other forms of biomass, such as beef tallow, can also be used as a fuel source. To date, the

Senior Staff Changes

RETIREMENTS: Lt. Gen. Glenn F. **Spears**, Maj. Gen. Randal D. **Fullhart**, Maj. Gen. John M. **Howlett**, Maj. Gen. Richard E. **Webber**, Brig. Gen. Scott D. **Chambers**, Brig. Gen. Richard A. **Hersack**.

PROMOTION: To Brigadier General: David J. **Buck**.

NOMINATIONS: To be General: Gilmory Michael **Hostage III**. **To Be Lieutenant General:** David L. **Goldfein**, Bradley A. **Heithold**, Mark F. **Ramsay**. **To be Brigadier General:** Giovanni K. **Tuck**.

CHANGES: Brig. Gen. David W. **Allvin**, from Cmdr., 438th AEW, Kabul, Afghanistan, to Vice Cmdr., 618th Air & Space Ops. Ctr., AMC, Scott AFB, Ill. ... Brig. Gen. James S. **Browne**, from Cmdr., 325th FW, AETC, Tyndall AFB, Fla., to Dir., Ops., AFGSC, Barksdale AFB, La. ... Maj. Gen. Floyd L. **Carpenter**, from Cmdr., 8th AF, ACC, Barksdale AFB, La., to Spec. Asst. to the Cmdr., AFGSC, Barksdale AFB, La. ... Maj. Gen. (sel.) Samuel D. **Cox**, from Cmdr., 618th Air & Space Ops., Ctr., AMC, Scott AFB, Ill., to Dir., Strategy, Policy, Prgms., & Log., TRANSCOM, Scott AFB, Ill. ... Brig. Gen. Carlton D. **Everhart II**, from Vice Cmdr., 618th Air & Space Ops. Ctr., AMC, Scott AFB, Ill., to Cmdr., 618th Air & Space Ops. Ctr., AMC, Scott AFB, Ill. ... Lt. Gen. David S. **Fadok**, from Vice Cmdr., Air University, AETC, Maxwell AFB, Ala., to Cmdr., AETC, Maxwell AFB, Ala. ... Brig. Gen. Morris E. **Haase**, from Dir., Force Structure, Rqmts., Resources, & Strat. Assessments, SOCOM, MacDill AFB, Fla., to Dep. Cmdr., JTF, Horn of Africa, AFRICOM, Camp Lemonnier, Djibouti ... Maj. Gen. (sel.) Russell J. **Handy**, from Cmdr., 9th Air & Space Expeditionary Task Force, Baghdad, Iraq, to Dir., Ops., Plans, Rqmts., & Prgms., PACAF, JB Pearl Harbor-Hickam, Hawaii ... Maj. Gen. Ronnie D. **Hawkins**, from Vice Dir., DISA, Arlington, Va., to Dep. Dir., C⁴ Sys., Jt. Staff, Washington, D.C. ... Maj. Gen. James M. **Holmes**, from Principal Dir., Middle East Policy, Office of the Undersecretary of Defense, Policy, OSD, Pentagon, to Dir., Strat. Planning, DCS, Strat. P&P, USAF, Pentagon ... Lt. Gen. Gilmory Michael **Hostage III**, from Cmdr., AFCENT, Southwest Asia, to Cmdr., ACC, JB Langley-Eustis, Va. ... Maj. Gen. Michell D. **Johnson**, from Dir., Strategy, Policy, Prgms., & Log., TRANSCOM, Scott AFB, Ill., to DCS, Ops. & Intel., SHAPE, NATO, Casteau, Belgium ... Maj. Gen. Richard C. **Johnston**, from Dir., Strat. Planning, DCS, Strat. P&P, USAF, Pentagon, to Asst. Dep. Undersecretary of the AF, Intl. Affairs, Office of the Undersecretary of the AF, Pentagon ... Brig. Gen. James R. **Marrs**, from Sr. Mil. Asst. to the USD, Intel., OSD, Pentagon, to Dep. to the DCS, Intel., Intl. Security Assistance Force, CENTCOM, Kabul, Afghanistan ... Brig. Gen. Robert D. **McMurry Jr.**, from Dir., Iraq Security Assistance Mission, US Forces-Iraq, CENTCOM, Baghdad, Iraq, to Dep. Dir., Spt., Office of Security Cooperation-Iraq, CENTCOM, Baghdad, Iraq ... Brig. Gen. Kenneth J. **Moran**, from Dir., Enterprise Log. Directorate, ESC, AFMC, Wright-Patterson AFB, Ohio, to Spec. Asst. to the Cmdr., AFMC, Wright-Patterson AFB, Ohio ... Maj. Gen. Robert P. **Otto**, from Dir., ISR Capabilities, DCS, ISR, USAF, Pentagon, to Cmdr., AF ISR Agency, Lackland AFB, Tex. ... Maj. Gen. H. D. **Polumbo Jr.**, from Dir., Strategy, P&P, AFRICOM, Stuttgart, Germany, to C/S, AFRICOM, Stuttgart, Germany ... Lt. Gen. (sel.) Mark F. **Ramsay**, from DCS, Ops. & Intel., SHAPE, NATO, Casteau, Belgium, to Cmdr., 18th AF, AMC, Scott AFB, Ill. ... Brig. Gen. Timothy M. **Ray**, from Dir., Ops., AFGSC, Barksdale AFB, La., to Cmdr., 438th AEW, Kabul, Afghanistan ... Brig. Gen. John D. **Stauffer**, from Dep. to the DCS, Intel., Intl. Security Assistance Force, CENTCOM, Kabul, Afghanistan, to Vice Dir., Intel., Jt. Staff, DIA, Pentagon ... Maj. Gen. (sel.) Thomas J. **Trask**, from Dep. Dir., Theater Plans & Synchronization Element, CENTCOM, MacDill AFB, Fla., to Dir., Force Structure, Rqmts., Resources, & Strat. Assessments, SOCOM, MacDill AFB, Fla. ... Brig. Gen. David C. **Uhrich**, from Dir., C⁴, JFCOM, Norfolk, Va., to Dir., Comm., ACC, JB Langley-Eustis, Va. ... Maj. Gen. (sel.) Joseph S. **Ward Jr.**, from Dir., Budget Ops. & Personnel, Office of the Asst. SECAF, Financial Mgmt. & Comptroller, Pentagon, to Commandant, Jt. Forces Staff College, NDU, Norfolk, Va. ... Brig. Gen. Stephen W. **Wilson**, from Dir., Jt. Integration, DCS, Ops., P&R, USAF, Pentagon, to Cmdr., 8th AF, ACC, Barksdale AFB, La. ... Maj. Gen. (sel.) Timothy M. **Zadalis**, from Dir., Air Plans, Intl. Security Assistance Force Jt. Command, US Forces-Afghanistan, CENTCOM, Kabul, Afghanistan, to Dir., Intel., Ops., & Nuclear Integration, AETC, Randolph AFB, Tex. ■

Operations Command's MC-130H/W fleets, service officials said. The other 16 airframes will undergo postproduction conversion to AC-130J gunships, according to AFSOC.

Plans for the original 74 HC/MC-130Js remain unchanged: Air Combat Command will acquire 37 HC-130J combat rescue tankers, replacing its 1960s-era HC-130P fleet, while AFSOC is to receive 37 MC-130Js, retiring its legacy MC-130E/P inventory.

Because of the added 48 airframes, projected cost for HC/MC-130J program procurement rose more than 60 percent from \$8.8 billion to \$14.1 billion, according to the Pentagon's most recent

selected acquisition reports sent to Congress in April.

4G Would Impair GPS

A new US 4G wireless broadband network would interfere with Global Positioning Satellite signals, said Gen. William L. Shelton, head of Air Force Space Command. Data from hardware testing appears to confirm initial concerns about the interference.

"Although the data is still being analyzed, I would tell you that the empirical data appears to be consistent with the analytical data," Shelton told the Senate Armed Services Committee's strategic forces panel, May 11. "We have concerns"

for civil, commercial, and military applications involving GPS, Shelton added.

A telecommunications company, LightSquared, based in Reston, Va., is seeking Federal Communications Commission approval to establish a broadband network, featuring thousands of cellular towers and space-based augmenters.

The towers could disrupt the GPS signal, a fear seemingly confirmed by tests using various GPS receivers with LightSquared equipment at Kirtland AFB, N.M., said Shelton at the hearing.

Big Day for Phantom Ray

Boeing's Phantom Ray unmanned aircraft flew for the first time under its own power on April 27, taking to the skies at NASA's Dryden Flight Research Center on Edwards AFB, Calif.

On its 17-minute first flight, Phantom Ray climbed to an altitude of 7,500 feet, achieving a speed of 205 mph, validating basic airworthiness, Boeing announced.

The aircraft was intended to be an Air Force demonstrator as the X-45C, but that program was terminated. Boeing completed the aircraft and is flying it at its own expense as a technology demonstrator and testbed.

"Autonomous, fighter-sized unmanned aircraft are real, and the UAS [unmanned aircraft system] bar has been raised. Now I'm eager to see how high that bar will go," said Craig Brown, Boeing's Phantom Ray program manager.

Boeing will continue expanding the vehicle's flight envelope. Company officials say they see a wide variety of potential roles for the aircraft, including intelligence gathering, air defense suppression, and electronic warfare.

The aircraft completed taxi testing in March, arriving at Edwards in December, atop NASA's modified Boeing 747 shuttle carrier aircraft.

AESA Antenna for the B-2

Northrop Grumman received a \$372 million contract in May to design the B-2 bomber's new active electronically scanned array antenna. The new antenna will vastly improve the B-2's ability to send and receive battlefield information securely over satellite links.

Part of Increment 2 of the stealth bomber's three-increment extremely high frequency satellite communications upgrade, the AESA is the largest effort undertaken to augment the B-2's original lethality to date, according to the company.

"This important enhancement will ensure that the B-2 retains its strategic communications capabilities well into the future," said Dave Mazur, Northrop's B-2 program manager.

When the upgrade is complete, B-2s will be able to communicate up to 100

times faster than they can today, said Northrop Grumman.

Good Fences, Good Neighbors

The Air Force wants to establish a ground-based radar in Australia, forming part of a future Space Fence surveillance network. The site would be operated jointly by the US and Australia, said Maj. Gen. John E. Hyten, Air Force acquisition director for space programs.

The Space Fence would comprise “two ground-based radar sites” providing “timely information on launch detection, maneuvers, and breakups to support protection of space assets,” Hyten told the Senate Armed Services Committee strategic forces panel May 11.

Slated to begin operations in 2015, the S-band fence is due to replace a 1960s-era VHF-based Air Force Space Surveillance System, the terrestrial network currently monitoring space objects, which is “rapidly becoming unsustainable,” according to Hyten.

The Air Force in January awarded contracts to Lockheed Martin and Raytheon for preliminary design work on their respective concepts.

MALD From a Cage

Raytheon announced deployment of two instrumented Miniature Air Launched Decoy-shaped rounds from the ramp of a C-130 transport using a new company-funded launch system May 25.

The test at Yuma Proving Grounds, Ariz., marked MALD’s first deployment from a cargo aircraft.

The MALD Cargo Air Launched System, or MCALS, houses up to eight MALDs in a cage-like launcher. Loaded on a standard cargo pallet, the launch system is placed on a transport aircraft, and rapidly ejects MALD drone decoys at a predetermined altitude.

“MCALS opens the door for the non-traditional use of a high-capacity aircraft to deliver hundreds of MALDs during a single combat sortie,” said Harry Schulte, Raytheon’s vice president of air warfare systems.

In addition to the decoy configuration, Raytheon is also developing a MALD variant for stand-in jamming of enemy radar.

Fueling Ingenuity

Officials at Wright-Patterson AFB, Ohio, christened the Air Force Research Lab’s new Assured Aerospace Fuels Research Facility with a ribbon-cutting, May 23. AFRL researchers, along with scientists from the University of Dayton and the Battelle Memorial Institute, will use the \$5 million facility to investigate blends of synthetic jet fuel partially derived from coal, algae, and various animal- and plant-based biomass, such as beef tallow or switch grass.



USAF Photo by A1C Laura Goodgame

Haters to the Left: Soon to be deployed, airmen train for dismounted patrol at Eielson AFB, Alaska. The 354th Civil Engineer Squadron, EOD flight, trains airmen in the fundamentals of tactical troop movement and countering improvised explosive devices.

The facility will enable production of up to 15 to 20 gallons of synthetic fuel per day for testing, the *Dayton Daily News* reported.

The Air Force uses roughly 2.5 billion gallons of jet fuel annually, accounting for roughly 10 percent of the US market. Service officials seek to reduce US dependence on foreign energy sources through USAF’s use of synthetic fuel blends.

IFF To Leave Laughlin and Vance

Randolph AFB, Tex., was chosen as the preferred site for consolidation of USAF Introduction to Fighter Fundamentals training units, Air Force officials announced May 3.

Due to a decrease in IFF output requirements from 450 airmen to 380 per year, the Air Force is downsizing from five training locations to three.

IFF training at Laughlin AFB, Tex., and Vance AFB, Okla., will end as part of the change, leaving Randolph, Columbus AFB, Miss., and Sheppard AFB, Tex., as the three remaining schools.

As the preferred alternative, Randolph “would accept 15 additional T-38 [Talons] and train approximately 80 additional students annually,” said Kathleen I. Ferguson, USAF’s deputy assistant secretary for installations.

Since Sheppard is already operating at full capacity for IFF, Columbus is the only “reasonable alternative” if Randolph isn’t chosen due to a negative environmental impact assessment, according to a USAF news release.

New Schoolhouse Needed

Increased demand for tactical air control party personnel and air liaison officers, and a lack of space at the schoolhouse at Hurlburt Field, Fla., is driving the Air Force to seek new TACP-ALO training base arrangements.

Under the basing criteria announced May 4, service officials will look at factors such as mission and training requirements, facilities and infrastructure, support capacity, environmental impacts, and cost, in drawing candidates from the USAF and Army installation pool within the continental United States.

“These criteria will help to ensure that all aspects for basing of this important training are considered,” said Kathleen I. Ferguson, USAF’s deputy assistant secretary for installations.

Air Force officials anticipate releasing the list of candidate bases this summer. After that, a formal environmental impact analysis will begin and surrounding communities will have the chance to provide input.

Iraq Airlift Inactivates

The Air Force inactivated the 777th Expeditionary Airlift Squadron at JB Balad, Iraq, May 15.

The “Dueling Dragons” began operations from Balad in February 2006 as “the most forward-deployed” C-130 unit supporting operations in Iraq, a US Air Forces Central news release said. According to Balad officials, the busy squadron moved more than 500,000 passengers and 79,000 tons of cargo in 43,000 airlift sorties since its inception, flying the C-130E, -H1, and -H3 aircraft.

Unit members came together at Balad’s flight line to celebrate their accomplishments, casing the unit colors in a ceremony, May 6.

“The Dueling Dragons’ can-do attitude allowed us to seamlessly support warfighters, airlift personnel, equipment, and supplies throughout [US] Central Command’s area of responsibility,” said Lt. Col. Dennis King, 777th EAS commander, during the ceremony.

The 386th Air Expeditionary Wing, deployed at a base in Southwest Asia,

will absorb the squadron's former mission.

Seymour Johnson Associate Unit

Air Force officials activated the newly formed 414th Maintenance Squadron in a ceremony at Seymour Johnson AFB, N.C.

The unit is one of two Air Force Reserve Command squadrons that will partner with the active duty 4th Fighter Wing at Seymour Johnson and the 20th Fighter Wing at Shaw AFB, S.C., to maintain those units' F-15Es and F-16CJs, respectively.

"The unfurling of a unit's guidon is a rare event that many of us have never been a part of before," said Maj. Lydia Black, who assumed the squadron's command during the May 26 stand-up ceremony.

The 414th MXS, together with its sister squadron, will be part of the new 414th Fighter Group that is due to stand up Aug. 5 at Seymour Johnson. The group is due to add a total of 279 airmen to the maintenance force at the two bases by 2014.

Air Defense Handoff

The 20th Fighter Wing at Shaw AFB, S.C., turned over air defense responsibility for the southeast United States to the South Carolina Air National Guard's 169th FW at McEntire Joint National Guard Base, Shaw officials announced, May 16.

F-16s from Shaw stood air sovereignty alert from Aug. 1, 2006, to May 9, 2011, after an earlier two-year stint directly following the 9/11 attacks.

"Shaw's role in the alert mission was to defend the Southeast Air Defense Sector and the 79 million American citizens within that sector from airborne threats," said Col. James Sears, commander of Shaw's 20th Operations Group.

The South Carolina Air Guardsmen also fly F-16s. The ASA mission requires three dedicated, armed alert aircraft—two primaries and one spare—at an alert

F-22 Fleet Grounded

Air Combat Command grounded the F-22 fleet in May, following reports about potential malfunctions with the aircraft's onboard oxygen-generation system that provides the pilot with breathable air in flight.

"The safety of our airmen is paramount, and we will take the necessary time to ensure we perform a thorough investigation," responded ACC officials when queried. According to the command, the investigation will focus on pinpointing the cause of pilot "hypoxia-like" events reported through Air Force safety channels, then devising, testing, and fielding the appropriate solutions.

Oxygen system malfunctions can cause a pilot to black out in flight, posing a potentially life-threatening situation for airmen. In one incident, a pilot at JB Elmendorf-Richardson, Alaska, scraped the underside of an F-22 on trees during a landing approach, but was unable to recall the incident afterward, news agency Bloomberg reported.

The grounding came six months after a fatal F-22 crash in Alaska. Since the November crash is still being investigated, ACC officials declined to specify whether the oxygen system may have been a factor in the loss.

In January, ACC restricted the flight ceiling for F-22 training, however, prohibiting pilots from flying above 25,000 feet due to oxygen system concerns. The normal operational ceiling for the F-22 is in excess of 50,000 feet.

As of June 11, the Raptors were still grounded.

location, with two pilots and associated maintenance and support personnel on duty at all times.

Distinguished Half-Dozen

Six rescue airmen from Moody AFB, Ga., received the Distinguished Flying Cross with Valor Device for extraordinary achievements during missions in Afghanistan.

Gen. William M. Fraser III, head of Air Combat Command, presented the medal to Maj. Charles McMullen, Capt. Nathan Dennen, Capt. Daran Gaus, Capt. Evan Roth, MSgt. Jerrod Morse, and SrA. Brett Taylor in a ceremony at Moody, May 20.

All serve with the 41st Rescue Squadron, an HH-60G Pave Hawk unit. Gaus, Roth, and Morse were recognized for their role in rescuing two wounded soldiers, one of whom was badly injured, in the face of intense enemy gunfire. McMullen, Dennen, and Taylor were honored for their actions in a separate mission.

Your Tanker Host: Bulgaria

KC-135 tankers supporting NATO operations in Afghanistan temporarily shifted operations to Burgas Airport, on Bulgaria's Black Sea coast. With the runway at their usual staging base in the region closed for routine maintenance, members of the 621st Contingency Response Wing from JB McGuire-Dix-Lakehurst, N.J., arrived at Burgas May 9 to prep the airfield for operations.

Within three days of their arrival, KC-135s and airmen of the 927th Air Refueling Squadron, deployed from MacDill AFB, Fla., began flying daily sorties. "We have been able to complete 100 percent of our tasked missions," said Lt. Col. Andrew H. Stephan, commanding the expeditionary KC-135 contingent.

Tankers were expected to continue refueling aircraft going into, or coming out of, Southwest Asia from their temporary base in Burgas through the end of May.

News Notes

■ Rep. Trent Franks (R-Ariz.) introduced a measure into the House version of the Fiscal 2012 defense authorization bill to permanently transfer the Air Force Memorial in Arlington, Va., from the Army to Air Force administrative control.

■ The Air Force Museum Foundation accepted a \$10 million donation from Lockheed Martin, May 9, in support of constructing a 200,000-square-foot expansion at the National Museum of the US Air Force in Dayton, Ohio. The expanded space is due to open in 2014.

■ First Lt. Ryan McGuire became the first amputee to complete Air Force pilot training May 20. After losing his leg

below the knee in a boating accident in 2009, McGuire was allowed to return to flight training. Currently transitioning to the C-17, he will be posted to JB Lewis-McChord, Wash.

■ Two C-130Js of the 37th Airlift Squadron at Ramstein AB, Germany, dropped more than 400 Bulgarian and US paratroopers in Exercise Thracian Spring in Plovdiv, Bulgaria, which ran April 26 to May 6. Crews also conducted low-level and night vision training during the exercise.

■ Boeing delivered its first C-17 to the United Arab Emirates in a ceremony at the company's plant in Long Beach, Calif.,

May 10. UAE has ordered six C-17s, four of which will be delivered this year, with the final two slated for handover in 2012.

■ The Italian Air Force's first two Boeing KC-767 tankers entered service in a ceremony at Pratica di Mare air base near Rome, May 17. Boeing is building a total of four KC-767 tankers to replace the current 707-based fleet.

■ High winds caused an Air Force Tethered Aerostat Radar to slip its mooring at an Army installation near the Mexican border, May 9. The blimp crashed into a residential neighborhood south of Tucson, Ariz., causing property damage but no injuries. ■

Airpower in 12 Boxes

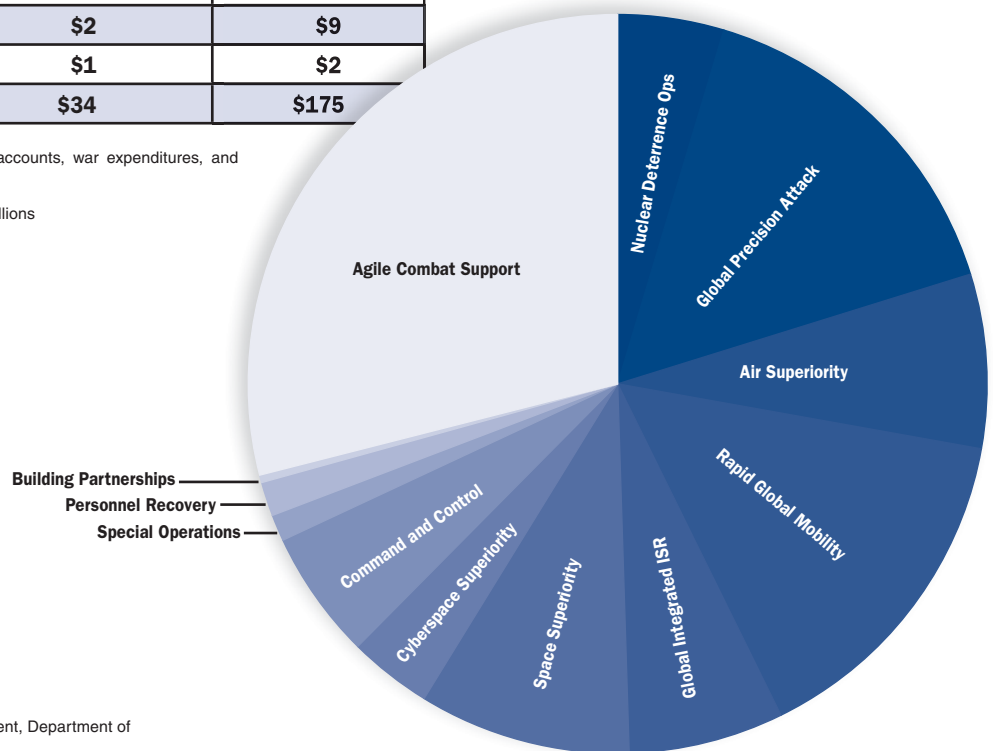
The Air Force has 12 “core functions,” the essence of the service’s reason for being. They are assigned by the Secretary of Defense and accepted by the joint community. Core functions are used to provide a framework for investment and

training. In its most recent official posture document, USAF set out the chart depicted here, specifying the amounts it intends to spend now and in the future on the various functions.

Spending on USAF’s 12 Core Functions

Air Force Core Function	*FY12 PB Request (\$B)	**FYDP (\$B)
Nuclear Deterrence Ops	\$5	\$28
Global Precision Attack	\$16	\$94
Air Superiority	\$9	\$46
Rapid Global Mobility	\$16	\$90
Global Integrated ISR	\$8	\$41
Space Superiority	\$12	\$56
Cyberspace Superiority	\$5	\$22
Command and Control	\$6	\$34
Special Operations	\$1	\$7
Personnel Recovery	\$2	\$9
Building Partnerships	\$1	\$2
Agile Combat Support	\$34	\$175

FYDP SHARES



Figures in this table exclude various “non-blue” accounts, war expenditures, and classified programs.

*Fiscal Year 2012 President’s Budget Request in Billions

**Future Years Defense Program in Billions

Source: Fiscal Year 2012 Air Force Posture Statement, Department of the Air Force, Feb. 17, 2011, Washington, D.C.

By Robert S. Dudley

Off the Rails

"Belatedly, the President and his allies are trying to establish congressional endorsement for the war through a nonbinding Senate resolution approving 'the limited use of military force by the United States in Libya.' ... These 'sense of the Senate' resolutions are most often used to commemorate noncontroversial events such as ... National Train Day, not to authorize a war."—**Sen. Richard G. Lugar (R-Ind.), Senate Foreign Relations Committee, in the Washington Post, June 5.**

Ships in the Night

"If the military drifts away from its people in this country, that is a catastrophic outcome we as a country can't tolerate, can't afford, in no way. It's a different lash-up, which I think would be very bad for us as a nation."—**Adm. Michael G. Mullen, Chairman of the Joint Chiefs of Staff, remarks to Defense Writers Group, Washington, D.C., June 2.**

Why They Blabbed

"Let the record show that, when I was first briefed in 2007 about the brightening prospect of pursuing bin Laden through his courier network, a crucial component of the briefing was information provided by three CIA detainees, all of whom had been subjected to some form of enhanced interrogation."—**Gen. Michael V. Hayden, USAF (Ret.), former CIA director, writing in the Wall Street Journal, June 2.**

Small, Superb, but Limited

"I've said repeatedly that I'd rather have a smaller, superbly capable military than a larger, hollow, less capable one. However, we need to be honest ... about what those consequences are: That a smaller military, no matter how superb, will be able to go fewer places and be able to do fewer things."—**Secretary of Defense Robert M. Gates in lecture at the American Enterprise Institute in Washington, D.C., May 24.**

Track Record

"The first three drawdowns came at the end of wars—World War II, Korea, and Vietnam. ... The end of the Cold War then accelerated defense reductions. What these transitions in

defense spending have in common is that DOD suffered a disproportionate loss of capability as a result. Each time, we had to rebuild much of the capability we lost, often at great expense and under urgent circumstances. Each time, our industrial base struggled to rapidly reverse course. In other words, we have gone zero-for-four in managing the drawdowns to date."—**Deputy Secretary of Defense William J. Lynn III in remarks in New York, May 11.**

Willie Sutton in Washington

"We have to put [budget-saving] initiatives in place over the midterm that will then start to generate cash in the out-years. Part of this is understanding where the money is. Two of the big places the money is in is health care, and it's in pay and benefits."—**Adm. Michael G. Mullen, Chairman of the Joint Chiefs of Staff, session of the Defense Writers Group, in Washington, D.C., June 2.**

The Critical Link

"We ... depend on the Reserve component to keep the Air Force connected to local communities. ... At a time when only about one percent of Americans serve in the US military, the impact you have on your local communities is even more significant. In many cases, you are the only military members the community sees and knows."—**Secretary of the Air Force Michael B. Donley, remarks to Air Force Reserve Command conference, Washington, D.C., May 16.**

Maybe Not Immediately ...

"I think that there may be a false perception that there are a whole bunch of secret super-effective air assets that are in a warehouse somewhere that could just be pulled out and that would somehow immediately solve the situation in Libya. That's not the case."—**President Obama, remarks at press conference at Lancaster House in London, May 25.**

This Law Is Optional

"No President has ever recognized the constitutionality of the War Powers Act and neither do I. So I don't feel bound by any deadline."—**Sen. John McCain (R-Ariz.), remarks during Washington, D.C., news conference**

about the deadline for pulling US forces from Libya, May 11.

Father Knows Best

"India doesn't need more than five weapons to hurt us badly, and we wouldn't need more than 10 to return the favor. ... India and Pakistan understand the old principle that ensured peace in the Cold War: mutually assured destruction. The two can't afford a nuclear war, and despite our saber rattling, there is no chance of a nuclear war."—**Abdul Qadeer Khan, so-called "father" of Pakistan's nuclear bomb, writing in Newsweek, May 23.**

Club Dead

"One thing we're hoping is that more tourists will come to visit now. They are already there, in fact. Even if we don't make it into a museum, people will still come. This could be a blessing in disguise for us."—**Mohammed Azfar Nisar, regional official in Abbottabad, site of Osama bin Laden's hideout in Pakistan. Quoted in Wall Street Journal, May 7.**

Brer Rabbit Comes to DOD

"I am surprised by the sophistication of the US military, including its weapons and doctrines. ... I can tell you that China does not have the capability to challenge the United States."—**Gen. Chen Bingde, PLA chief of the general staff, news conference at the Pentagon, May 18.**

Sen. Straight Talk, Now ...

"Over [about 15 years], Congress has authorized and appropriated funds for 113 F-35 jets. Lockheed has, however, delivered just 11. ... Some of us saw this train wreck coming."—**Sen. John McCain (R-Ariz.), remarks at Senate Armed Services Committee hearing, May 19.**

... And Then

"We want to increase funding for the F-35 Joint Strike Fighter, an aircraft and weapon system that in the view of many experts—including my view—would be far more capable [than the F-22] of meeting the emerging threats of the future."—**Same senator, Senate floor speech praising the F-35 when his immediate objective was to kill the F-22, July 13, 2009.**



100,000 FLIGHT HOURS

PROVEN TO BE A SAFE INVESTMENT.



The V-22 Osprey has achieved a critical milestone: 100,000 flight hours. Even more significant is its demonstrated capability, effectiveness and safety in real combat environments. In fact, during the past decade, the V-22 has been the safest, most survivable tactical Marine Corps rotorcraft. We salute both the Marine Corps and the U.S. Air Force on the success of their V-22 operations and this special accomplishment.

Bell Helicopter
A Textron Company

BOEING

DOD's new space strategy addresses a realm where all the trends are negative.

United Launch Alliance photo by Pat Cortery

Five Roads to Space Dominance

By Robert S. Dudley

Gen. William L. Shelton worries a lot these days about US vulnerability in space. "It's difficult to defend," said the head of Air Force Space Command. He once calculated the size of his theater—the void between Earth's surface and the geosynchronous orbit belt. It worked out to 73 trillion cubic miles.

"How," he asks, "do you protect 73 trillion cubic miles?"

Space, while vast, is also a crowded and dangerous place, teeming with problems. Once, it was dominated by two superpowers; now, nearly 60 nations and dozens of companies operate 1,100 spacecraft up there. The US also tracks 21,000 pieces of lethal, fast-flying "space junk," and that's a fraction of the total. Nations—from Iran to Cuba, from Ethiopia to Libya—can and often do jam satellite links.

Worse, all trends are negative. Officials forecast a tripling of space debris

AIR FORCE Magazine / July 2011





Left: A Space Based Infrared System satellite is launched aboard an Atlas rocket from Cape Canaveral, Fla. Above: Capt. John Hough (l) sets up satellite communication equipment for a night mission during an exercise. Defense officials are nervous about what they see when they peer into the future of space-based capabilities.

by 2030. In 2015, roughly 9,000 space-based transponders will be drenching a limited radio-frequency spectrum. There will be kinetic “ASAT”—anti-satellite weapons—plus microwave, laser, and cyber weapons. “It may be a pretty tough neighborhood,” warned Shelton. To top it off, the US space industry is sagging.

When USAF, Pentagon, and intelligence officials peer into the future, they don’t like what they see—near-existential threats for a nation whose military power hinges on space-based surveillance, reconnaissance, navigation, communications, and weather systems.

That prompted creation of the National Security Space Strategy, unveiled in February. It directs major changes in how the US handles space problems. The 14-page document gives a high-level view of US space goals and lays out five key “approaches” for sustaining US space power over the next decade.

Since the paper’s release, more details have emerged from the speeches, interviews, and testimony of several top officials. These include Shelton; William J. Lynn III, deputy secretary of defense; Gen. James E. Cartwright, the vice chairman of the Joint Chiefs of Staff; Gen. C. Robert Kehler, head of US Strategic Command; and Gregory L. Schulte, the Pentagon’s senior official for space policy, to name a few.

These viewpoints help fill out the strategy’s five key approaches, which range from “soft power” endeavors to the hardest of hard-power military options.

One: Create Rules of the Road

If the space strategy’s own words are any guide, Washington will emphasize diplomacy to generate multilateral “transparency,” “confidence building measures,” and the like.

The US would encourage other space operators to share spaceflight data, develop space object databases, set global data standards, and warn of space object collisions.

This, it is said, will produce new “norms of behavior” in space, yielding more stability and less selfish behavior by space operators. The specific goals: greater spaceflight safety, less unintentional signals interference,

more-efficient use of crowded orbit slots, less mistrust, and fewer debris clouds.

Who will develop the rules of the road for spacefarers?

Not the US, evidently. Lynn, the Pentagon’s second-ranking official, has on several occasions declared the US is taking a hard and close look at adopting the European Union’s Code of Conduct for Outer Space Activities, now in draft form.

On June 13, the Administration went further. Frank Rose, a deputy assistant secretary of state, said the US would soon decide whether to enter negotiations with the EU on US participation in the code.

That is not a universal view. A group of 37 Republican senators, led by Sen. Jon Kyl (R-Ariz.), demand to know the Obama Administration’s intentions with respect to the code. Their Feb. 2 letter says they are “deeply concerned” that it could be “highly damaging” to sensitive US space programs.

Critics note the code enjoins signatories to “refrain from the intentional destruction of any on-orbit space object or other activities which may generate long-lived space debris.” Nowhere does that passage exempt legitimate cases of self-defense, they point out.



An artist's conception of a satellite being damaged by "space junk." Currently, the US tracks 21,000 pieces of potentially dangerous, fast-flying space debris—and that's just a fraction of what's up there.

Jeff Kueter, president of the George C. Marshall Institute, warned: "If the code is approved by the United States, it is difficult to foresee the United States initiating a kinetic kill or other ASAT program."

Though the code would not have legal force, it can exert de facto influence on US space programs, say the critics.

One who worries about these types of pressures is retired USAF Gen. Bruce A. Carlson, head of the National Reconnaissance Office. He says Washington officials, when asked to take action to protect US space assets, often answer: "Oh, no, can't do that. That would be provocative, or it would be escalatory."

The pursuit of global rules, and especially the EU code, may also open the door to another problem: space arms control.

The US space strategy flatly states: "We will consider proposals and concepts for arms control measures." It adds that agreements must be "equitable, effectively verifiable, and enhance the national security of the United States and its allies."

For decades, presidents and congresses have turned thumbs down on the idea of space arms control, seeing it as a snare that could needlessly encumber a key US advantage.

That danger has not gone away. Russia and China have proposed a comprehensive ban on space weapons. The US rejects it, but some worry Washington, by declaring its openness to space accords, could be dragged into a public debate, with damaging diplomatic results.

Not all of the NSSS safety proposals are controversial. Example: The Pentagon wants US Strategic Command to provide more space situational awareness data to allies and US companies.

STRATCOM, which tracks debris clouds and the course of satellites, has become the world's premier provider of collision warning. It has forged agreements with 19 launch providers and satellite owners.

Shelton, speaking in April at the National Space Symposium in Colorado Springs, Colo., voiced support for steps that help to define and encourage good behavior in space, particularly with respect to the generation of space debris.

"You can't do much with what's there already," he said, "but you certainly can do a lot about minimizing what's going to be there in the future."

Two: Strengthen US Capabilities

Equally important to the strategy: Pentagon plans to acquire improved types of space capabilities, produced in better ways.

The US looks to turn decisively away from practices common in the Cold War and early post-Cold War years. Then, the military built massive spacecraft, often ascribing multiple missions to a single orbital vehicle.

As Lynn observed, "We chose not to let cost restrict our ambitions." This tended to result in a few exquisite spacecraft, at very high expense, frequently delivered years behind schedule.

Today, according to Shelton, that's history. Relying on a few vulnerable

systems has become too dangerous. USAF, he said, will seek spacecraft with "adequate" capability but at lower cost and with—especially—greater "passive resilience."

To Shelton, the key would be a "fault-tolerant" design, meaning one in which single-point failure does not bring down an entire constellation. Ideas include higher orbits, more numerous spacecraft, the distribution of mission systems over linked satellites, and on-orbit spares.

"We can't tolerate loss of mission critical capability," said Shelton.

Others see a crying need for systems flexible enough to meet emerging requirements through rapid infusions of new technologies. The JCS vice chairman, Cartwright, bluntly asserted that new platforms should be designed with lives of no more than 10 years and be produced in larger numbers.

"I don't need the 30-year platform," he said. "I need an 18-month change cycle [for satellites], to be able to adapt these things to what's really facing us on the battlefield."

Carlson, for his part, rejects the notion that launching a few more, smaller satellites adds to security in space. He asked, "Do you think that somebody that's got ASATs, microwave weapons, and lasers is going to worry about whether you have two or five satellites?" Still, his appears to be a minority view.

Plans also call for improvements in launch. The problem is not performance; Space Command has reeled off 76 straight launch successes with the Evolved Expendable Launch Vehicle (EELV) program, using Atlas V and Delta IV boosters. "Unfortunately," explained Shelton, "the costs are going through the roof."

One problem: EELV's second- and third-tier suppliers have difficulty finding parts, pushing up prices. The situation has been aggravated by small, inefficient purchases.

Now, the Pentagon is pushing Congress to approve regular, block EELV purchases, the better to allow contractors to plan ahead and gain economies of scale.

Once, USAF bought single boosters to match up with planned launches of completed payloads. Now, says Secretary of the Air Force Michael B. Donley, USAF has "decoupled" the launcher from any specific payload.

"We can buy the launchers on a more routine basis," said Donley, "and wait longer to make decisions about

which payloads get married to which launchers.”

US officials hope that these steps and others serve one of the strategy’s key objectives: revival of a struggling US space industrial base. It notes that DOD needs a “robust, competitive, flexible, healthy” space industry, one that delivers spacecraft “on time and on budget.”

Today, that definition does not apply. US industry’s share of global space commerce has dropped, in just 10 years, from some 70 percent to about 30 percent.

Air Force programs have been plagued by cost overruns and delays. Failure was epitomized by USAF’s planned transformational satellite communications system, canceled in 2009 after expenditure of \$3 billion.

USAF has proposed a solution it calls “Evolutionary Acquisition for Space Efficiency” or EASE. Principal elements are block buys, fixed-price contracts on mature systems, and a stable engineering line for technology insertion on a regular cycle.

Equally important is the strategy’s push to transform and liberalize US space export policy. “Our system of export control is so prohibitive that it has actually become a selling point for non-US manufacturers,” Lynn observes.

ITAR, the Cold War-era International Traffic in Arms Regulation, is a confused and confusing setup that often needlessly undercuts US sales abroad. The Pentagon wants to streamline and rationalize the process.

Kehler, the commander of US Strategic Command (and former commander of Air Force Space Command), noted that ITAR was meant to protect US security. He warned, “There is a danger here that export controls ... can in fact create the opposite situation, ... where our industry is no longer competitive.”

Three: Create New Partnerships

Nowhere is the strategy’s departure from American space tradition clearer than in its push for US participation in space coalitions and other combinations.

Until now, the US has been pretty much a lone wolf in space, acting by itself or, at best, with a very few close allies. Now, the strategy calls for partnerships with “responsible nations,” “international organizations,” and “commercial firms,” all of which have acquired significant space expertise.

The US would provide access to its space systems. The payoff: reliance on others’ space systems to boost US capabilities and contain its costs while reducing America’s own vulnerabilities.

This is already happening. Example: The US has initiated an effort to change STRATCOM’s USAF-led Joint Space Operations Center at Vandenberg AFB, Calif., into a combined space operations center featuring foreign partners.

“Ultimately, the USSTRATCOM commander will become a coalition commander, just like his counterparts ... at Central and Pacific Commands,” said Schulte.

Kehler, for one, is a big supporter. “We need to build a culture of information

sharing,” said the STRATCOM boss. “There is no way a global command ... can be successful if we limit information sharing. ... We should share information to the point of being uncomfortable.”

To that statement, Cartwright offers unqualified support.

“We are now in the era of coalitions,” he said. “We don’t fight as a country anymore, as a single entity. We are always part of a coalition.”

This effort will entail unprecedented, perhaps painful, change in the handling of classified information, Cartwright warned. “I say to him [a coalition warrior], ‘You watch my flank, but I can’t tell you what’s coming over there, because it’s a secret.’ ... It’s just crazy. You can’t do that.”

Partnerships are possible in mission areas such as communications, environmental monitoring, maritime surveillance, and even missile warning. In store is the exchange of data, services, personnel, operations, and technologies.

Already, Australia has put up money to buy one “ball” in the Pentagon’s six-ball Wideband Global SATCOM constellation, meaning it will be allowed to share in use of the system. USAF has begun negotiations with other allies to do the same thing.

Elsewhere, Secretary of Defense Robert M. Gates has signed groundbreaking statements of principles with three nations—Australia, Canada, and France—for expanding sharing of space situational awareness data. Missile warning data is provided to friends and allies via USAF’s Shared Early Warning System program.

Commercial entities, too, would have a place in the new order. Shelton said the Air Force is giving strong consideration to military payloads hosted on commercial satellites, single-mission small satellites, and military-commercial partnerships in some areas.

For example, the satellite firm Iridium has promoted “hosted payloads,” essentially leasing space on its satellites to customers that include US agencies. Washington also buys Radarsat imagery from a Canadian firm and X Band and UHF Band communications from a British firm.

The coalitions and partnerships, though useful in time of peace, are pointed specifically toward what the strategy paper calls “collaborative sharing of space capabilities in crisis and conflict.” This requirement has led



Gen. Robert Kehler (l), then head of Air Force Space Command and now STRATCOM commander, and Brig. Gen. Trulan Eyre, 140th Wing commander, step to their aircraft. Kehler feels STRATCOM must build a culture of information-sharing between allies.



An artist's conception of "space mines." The space strategy says the US must retain the option to respond in self-defense to attacks on our assets in space.

to calls for creation of combined space doctrine, procedures, and training.

The shift is not without problems. Kehler noted that there are "significant questions" about how best to balance the need to limit access to information with the need to share information, both being vital to national security.

Lynn noted there will probably be core capabilities at "the very high end" that the US will always hold to itself.

Some space officials fret that space partnerships will inevitably expand to bring into the tent more and more nations that are merely US friends or acquaintances, rather than true committed allies, posing concerns about reliability.

That complaint cuts no ice with Cartwright.

"Everybody worries, 'Gee, if I partner with somebody, will they, at some selected time, turn their share of the system off or shut it all down?'" said Cartwright. "I mean, at some point, you have to trust, and you have to put things together."

All signs are this will be a slow and deliberate process. Still, said Cartwright, this nation's fiscal woes have pushed the proverbial horse out of the barn.

"We right now may still want to believe we're going to go it alone," he said. "It's not affordable. We can't do it for all of the things that we expect

as a nation to get from space. We need to start partnering."

Four: Bolster Deterrence

In the new strategy, a critical initiative calls for forging a tougher framework to deter any malefactor from initiating an attack in space.

The threat is real: According to Lynn, some nations have jammed satellites. China and Russia have destroyed satellites in low Earth orbit. Others have technologies such as laser weapons that can disable or damage space platforms.

Worse, some foes might well view space attacks against US targets as low risk in nature, as there would be no visible death and destruction to fire up public calls for retaliation.

The new deterrent structure is four-layered. According to Schulte, each of the first three "approaches" contribute: Global norms establish red lines of behavior. Spacecraft "resilience" increases an attacker's problems. Space coalitions force an enemy to ponder the danger of an attack on many nations, not just one.

These steps alone, however, are deemed insufficient to stop a determined aggressor. For that, explained Schulte, the strategy has a fourth layer: "We retain the option ... to respond in self-defense to attacks on space."

The US has a known capability to shoot down spacecraft. However, few

believe any US response would take the form of tit-for-tat retaliation against a foe's space forces. War in space would create huge amounts of dangerous debris. It could draw in other nations. It would also invite wider attacks on US systems.

"We also need to think differently about deterrence," said Schulte. "We must not assume that attacks in space can or should be deterred by the threat of retaliation in space."

Fortunately, the Defense Department has other options.

Cartwright put it in these words: "It [a threat of response] doesn't mean that you have to respond *in space*, number one. Number two, all of space is not *in space*. There's a large amount of it that is part of the terrestrial systems. ... Those are vulnerable areas."

Further, deterrence comes in different flavors. "There's an in-kind deterrence, which is what space-type deterrence is ... about," he said. "And then there's a broader deterrent strategy, which allows all of the mediums to be part of the coherent strategy."

Translation: Any serious attack on US space-based systems could well attract a harsh US response by air, sea, or land, and at any point on the globe. Indeed, this kind of threat appears more credible than the one narrowly focused on space.

"We retain the right to respond in however we would choose to—whatever we would choose to be the appropriate means," warned Lynn.

"The basic concept of deterrence has not changed," said Kehler. "Mostly, it has to do with uncertainty, if an adversary believes ... the uncertainty too high, or the risk of punishment is too high."

He goes on, "Deterrence is very much operative when it comes to space. I think options are always on the table."

Experts consider it highly improbable that any foe would attempt an attack in space as an end in itself. Rather, it would be a precondition for some larger goal—a conventional attack, say, or an attempt to cow a US ally. Given this fact, say these analysts, the biggest deterrent comes from demonstrating that, even after the loss of some important space assets, the US would still be strong enough to prevail in combat.

Five: Prepare to Win, Period

The strategy's final "approach" can be summarized thus: The United States must prepare itself to absorb a severe attack on its space systems, operate effectively in a degraded environment, and still prevail in combat.



Left: Vladimir Putin, then Russia's president, holds a model of a Soyuz booster rocket after a successful launch of a military satellite in 2004. Above: A Long March rocket launches a satellite from southwestern China. Nearly 60 nations now operate spacecraft.

"We must deny and defeat an adversary's ability to achieve its objectives," even without a fully functioning space network, asserts the strategy paper. This is a tall order.

One of the simplest and least-expensive tools entails regular training of troops and officials to prepare them for the rigors of operating in such an environment. Lynn said the armed services and government agencies now are holding so-called "day without space" exercises, simulating the loss of certain capabilities.

The objective is to develop workarounds, and troops are slowly learning how to "fight through" impediments.

These preparations, says the strategy, must extend to the people relying on space information, operating space systems, and analyzing space-derived information.

The strategy enjoins space leaders to come up with cost-effective ways to provide some protection for space systems. This may entail hardening of satellites against electronic attack, but the publicly released document, which is unclassified, does not give specifics.

As for land-based space infrastructure, Shelton reported, "We are always looking carefully at our ground stations, trying to determine how vulnerable they are, both to physical attack and cyber attack." The space commander said, "We've taken some steps"—no details provided—"to make them less vulnerable."

He did say, "I worry more about physical attacks at this point than I do cyber attacks."

The Pentagon is considering a wide-range of so-called "cross-domain" solutions to compensate for vital space assets. The term refers to mission-effective air, land, sea, or even space alternatives.

The US might seek a significant increase the number of reconnaissance aircraft and terrestrial communication platforms as substitutes for space-based systems.

Already, say Pentagon officials, the US has moved to back up some of its space capabilities with high-flying unmanned aerial vehicles such as Global Hawk. "Space problems do not always require a space solution," said Schulte.

In many cases, the US will develop multiple ways to do the same job. Take, for example, the Global Positioning System, which delivers position information vital to precision attack. The Pentagon may want to rely on a combination of on-orbit spares, interoperability with Europe's own Galileo satellite system, and a number of land- or air-based backup systems.

One widely discussed option is the Pentagon's high-profile Operationally Responsive Space effort. The idea is to develop means to rapidly replace certain critical space systems or provide different types of satellites to meet emerging needs.

The ORS office is a four-year-old, joint project based at Kirtland AFB, N.M. It seeks faster, cheaper ways to get space assets on orbit to meet current military needs. Director Peter M. Wegner has declared his intent to make ORS "the focal point" for finding ways "to respond rapidly in a crisis."

Plans called for launching ORS-1, the project's first purpose-built satellite, in 2011.

Shelton sees value in the ORS project but says "the jury's out" on the question of whether it will ease the dangers of space attrition.

"Let's say somebody manages to knock out my satellite," explained Shelton. "I've got one in ready reserve, and I'm going to launch it. Unless I've dealt with what knocked the first one out, I'm just launching into that same environment. That doesn't make a lot of sense to me."

Moreover, Shelton has doubts about spending scarce dollars to put into satellites in reserve on the ground. "I think there is still a lot of debate to come on ORS," he said. "On the overall concept, I think we're still going to have some debates."

Robert S. Dudley is a former editor in chief of Air Force Magazine (2002-2010). His most recent piece was "Douhet" in the April issue.

Nothing in Afghanistan is easy, but airpower makes it possible.

Grinding Out Success

By Marc V. Schanz, Senior Editor

US combat forces often describe Afghanistan as the hardest place on the planet to fight a war. Without airpower, that task would be almost inconceivably more difficult and deadly.

“The fight is, I think, ... easier than Iraq,” said Army Maj. Gary Pina, the chief of fires for Task Force Currahee, based at Forward Operating Base Sharana, Paktika province, and composed of elements of the 4th Brigade Combat Team, 101st Airborne Division (Air Assault), from Fort Campbell, Ky. It is rare to see the close combat and pitched street battles many remember from places such as Ramadi or Fallujah, he noted. Afghanistan is a large and not very dense country—and offers a lot of space for the enemy to hide and to carry out operations.

“We don’t really have a population issue. ... We have a terrain issue,” he

said, noting that Paktika’s mountains and valleys are prime movement areas for groups coming and going from Pakistan. Whether tracking individuals or putting firepower on top of the enemy, air assets are critical to the balance of power between the coalition and the enemy.

Talking with airmen across Afghanistan, stories vary, but all contain a common thread: This conflict is now a part of their lives. Deployment after deployment, for nearly a decade, has made the mission intensely personal.

In the mountains of Paktika province by mid-March, the spring and summer fighting season was already ramping up for the troops and airmen at another forward operating base, Orgun-E.

By then, SrA. Eric Shaner, a joint terminal attack controller with 2nd Battalion, 506th Infantry Regiment, 101st Airborne, could cite some of the developing threats. Reports from the FOBs and outposts nearby suggest the

SrA. Kendall Wilson watches for trouble in the desert surrounding a runway in Afghanistan. Wilson is part of a Fly Away Security Team, which provides security for aircraft in remote, unsecured locations.



USAF photo by TSgt. Emily F. Alley



An HH-60G Pave Hawk returns from a mission at a forward operating base. Rotary lift in Afghanistan is an in-demand commodity.

Taliban are gearing up, he said. “[FOB] Tillman took several rounds today, and they’re not far from a pretty major trafficking route.”

Soon, patrols would be going out to contact tribal officials and find out if any local villages had received “night letters” from Taliban militants—basically threats against cooperating with the Afghan government and coalition forces, and a prime measurement for tracking enemy influence in the region. JTACs will often accompany troops into the villages, or stake out the high ground, to help maintain a good connection with aerial assets and watch for any trouble.

Shaner is assigned to the 817th Expeditionary Air Support Operations Squadron supporting Task Force Currahee in Afghanistan’s restive east and moves around to support units wherever he and his fellow JTACs are needed. There are never enough JTACs to go around to meet the requirement for clearing missions, air assaults, and even engaging tribal leaders.

“It’s not easy. We’re roving assets; we move around to where we are needed. Sometimes they need us on an operation in the field. Sometimes we’re back a bit farther from the fight,” said SSgt. James Eggleston, a 10-year veteran JTAC and enlisted battalion air liaison for the White Currahee element at Orgun-E.

Shaner and Eggleston are dots of blue in a sea of green, and both simultaneously professed their love of the job while also noting its difficulties. Being physically isolated from their support structure takes a toll, and cultural clashes with senior Army NCOs are routine,

they said. But their role is to link the efforts in outposts and FOBs across the country with the airpower flying high overhead—and it is demanding work.

A Small Community

A JTAC’s typical physical mission load is between 80 to 90 pounds of equipment. This includes everything from spare radio batteries to mortar tubes, and most of the JTACs have multiple leg and ankle injuries over their deployments to show for it.

Both Shaner and Eggleston count friends and fellow JTACs among the killed and injured in this war, and pointed out that the enemy continues to find ways to combat the upsurge in troops.

Army officers and JTACs in Paktika frequently mentioned last October’s

Battle of Margah, a firefight at a small combat outpost, on the eastern side of the province, between Army troops and well-armed insurgent fighters swarming the position.

The Taliban had counted on catching the outpost by surprise, and waited for weather the enemy thought would affect air support, several JTACs and Currahee officers noted. But a pitched battle followed, with mortars, artillery, small arms, and air strikes from USAF fighters and Army helicopters holding back the horde. By the next day, five Americans were wounded (none were killed), while 92 enemy fighters lay dead.

Capt. Leif Nordhagen, an A-10 pilot and flight commander with the 74th Expeditionary Fighter Squadron at Kandahar Airfield, is one of the pilots frequently called on to defend ground forces under attack, such as the one at Margah.

Nordhagen and the rest of his squadron arrived mere weeks before describing the pace of operations to a reporter. The 18 Warthogs in Nordhagen’s unit were steadily ramping up operations, and each of the unit’s pilots would fly three to five sorties a week. Often they were flying routine top cover missions, only to be chopped off to respond to troops-in-contact calls at some point in their four- to five-hour missions.

Warthog pilots and support crew are closely associated with this war. Most of these airmen have been in Afghanistan before, many several times—both at Bagram up north and at Kandahar.

“It’s a small community, and we’ve all done this before,” Nordhagen said. “We do this a lot, but we all love this mission—the maintainers, the pilots,



Capt. Travis Kuenzi and 1st Lt. Alexander Hanna run the engine start-up procedure on a C-17 before an air delivery mission in Afghanistan.



everyone.” Over years of combat, relationships have developed between the A-10 community and the JTACs on the ground who often have to dial up pilots when faced with difficult circumstances.

In Afghanistan, the A-10 fleet is in high demand, as one of USAF’s premier close air support platforms. The aircraft rack up a lot of flight hours and expend a large number of munitions.

A typical deployment to Afghanistan will add 800 to 1,000 flying hours to every aircraft, noted 1st Lt. Michael Murphy, the officer in charge of the 74th Expeditionary Aircraft Maintenance Unit. A prior-enlisted airman who came from a background in munitions, Murphy pointed out the long line of 30 mm shells from the Warthog’s famous seven-barrel gun that ring the top of the walls in the EAMU’s shop just off the flight line.

“They were from the last deployment,” said Murphy, who deployed from Moody AFB, Ga. Each shell signified 1,000 rounds fired in combat, with the previous rotation firing off approximately 147,000 rounds. “They stay busy,” Murphy said, adding that each aircraft will average a full phase inspection per deployment to make sure everything is working correctly.

The war has taken its toll, and the signs are unmistakable, from the skins of aircraft to the memorials to fallen comrades. Nordhagen, and several other airmen operating out of the west ramp side of Kandahar Airfield, wear a patch

honoring Pedro 66—the call sign of an HH-60 Pave Hawk that crashed in June 2010 during a sortie in Helmand province. Five airmen died. The A-10 community works closely with rescue crews and the pararescue jumpers who man the often dangerous casualty evacuation and combat search and rescue missions across the country.

Things Will Blow Up

Just down the way from Nordhagen’s squadron, the new barracks of the 55th Expeditionary Helicopter Maintenance Unit is home to a memorial for Pedro 66: The Pave Hawk’s wheel chocks hang on a wall in the squadron’s break room, above a list of the crew who died in the crash last summer. First Lt. Andrew Marsh, the OIC for the maintenance shop, said the Pave Hawks are put through the wringer daily, as rotary lift in Afghanistan is an in-demand commodity and the dry, dusty environment makes keeping these aircraft healthy even more challenging. The dust in Afghanistan is finer than the sand ginned up back at Davis-Monthan AFB, Ariz., he noted, and engines will wear out much faster, having to work with the sharp changes in altitude in addition to the dust.

Nearby, a dry-erase board with the squadron’s aircraft and mission numbers showed just how busy they’ve been since late 2010, when their deployment kicked off. Sixty-eight saves, 356 sorties, 276 flight hours, in just over three months.

Maj. Chris Richardson of the 26th

Two F-16s on the flight line at Bagram Airfield, Afghanistan. Expeditionary airmen are familiar with both Bagram and Kandahar from repeated deployments.

Expeditionary Rescue Squadron commands the detachment of HH-60s at Kandahar standing alert for combat search and rescue and medical evacuation missions daily. The “Pedros” of the 26th ERQS, along with the “Guardian Angels”—the PJs and rescue specialists of the 46th ERQS—are on call daily to respond to scenarios ranging from combat medical evacuation missions, to extracting wounded from an overturned armored vehicle, to transporting Afghan civilians for medical care.

Trained in the specialized mission area of personnel recovery and combat search and rescue, often these airmen are pressed into rotation along with Army helicopters to perform casualty evacuation missions (CASEVAC) across Afghanistan.

“Some days, it will be quiet. Days on end, even. Then things will blow up,” Richardson said of the 12-hour-at-a-time watch he and his crews perform. The squadron’s main element resides at Helmand’s Camp Bastion, an area of southern Afghanistan that has seen a great deal of violence in the last year-and-a-half, as US and coalition forces move into the traditional stronghold of the Taliban.

“Every day, we are working in a 60-minute window,” Richardson said,



TSgt. Jonathan Oliver, a joint terminal attack controller, goes over the operation plan and maps on a remote mountaintop in Laghman province. JTACs often stake out the high ground to maintain good contact with air assets.

and when calls come down, crews are geared up and on the flight line in eight minutes. Some of the crew members on alert joked that they could be wheels up even faster if the barracks—like a firehouse—had a pole to slide down from the second floor.

Down here in Regional Command South, the area around Kandahar, and RC Southwest in nearby Helmand, crews can usually meet that time frame.

Unlike Army “dust off” helicopters, which are unarmed, Pave Hawks are not emblazoned with a red cross. They are heavily modified for CSAR, with .50-caliber heavy machine guns, refueling capability, and enhanced self-defense systems. The Army’s Apache Longbow attack helicopter weighs in at 16,000 pounds, while a Pave Hawk, with a full kit, will tip a scale at 22,000 pounds.

“We’re basically a big flying ambulance,” said SSgt. Matt Champagne, a PJ with the 46th ERQS, as he inspected one of the Pave Hawk cabins on the flight line. “Only, we shoot back.”

The cabin is a cramped place when fully prepared, filled with medical supplies, personnel recovery gear, and special tools for sorties ranging from high-altitude rescue to water recovery.

Yes, Champagne noted, even in arid Afghanistan, water recovery will occur, noting that sorties have gone out to recover armored vehicles that have overturned in canals. Rivers in Afghanistan rage in the spring months after snowpack melts, making water missions even more difficult. He indicated a diamond-tooth saw in the

cabin as well, used to cut the doors off mine-resistant, ambush-protected vehicles.

The Business at Hand

A mid-March visit to Kandahar was calm, but only days before, multiple calls had come in. This is the nature of the war, aircrews and PJs said. Mass casualty events such as suicide bombings, Afghan citizens injured, enemy wounded, flipped vehicles, marines and soldiers pulled from the battlefield with multiple missing limbs—everyone had a story, and most had recent ones to boot.

“We are here to help everyone; we’re not just sitting around waiting to go get

a pilot,” said Capt. Stephen Colletti, the detachment commander for the 46th ERQS element at Kandahar. A prior-enlisted PJ, he anticipated his airmen would be even busier in the coming months, as the fighting season promised to rage again. It’s not easy to keep skills balanced, but airmen in this work are used to pressure.

“I want my people kept interested. We thrive on pushing ourselves,” Colletti said. “These guys ... are not normal cats. We don’t need normal.”

There are three active duty HH-60 squadrons in the US, Richardson noted, and everyone in them has been steadily deployed, for months at a time, for the better part of the last decade to Iraq and Afghanistan. “We have volunteers, we have [Reservists] and [Air Guardsmen]. But our squadrons have to make sure we don’t get people stuck” in one position, he added. Complicating this is the need to balance out the experience with getting new folks trained up back home.

“We’ve sent guys [on temporary assignment] just to get them away for a little while,” Richardson said. “You don’t want to burn up the A-team, but you also have to know that this is a commitment.”

Back in 2008, Richardson said, eight Pave Hawk pilots said no to generous bonus pay to re-up, after years of grinding rotations. “It’s hard. And I can understand when someone’s had enough. But this is the business at hand, and we’ve got new blood that needs the stink of theater on them, too. It’s not something that has an easy answer.”



Supplies float to the ground on parachutes in an airdrop to a remote operating base in Afghanistan.



USAF photo by SrA. Sheila deVera

SrA. Hilarie Maine checks an AIM-120 missile secured to the wing of an F-16 during a preflight check at Bagram. Without sharp ground crews, Afghanistan's challenging environment would be virtually impossible to work in.

The strain of this war is also visible on airmen fighting far from the flight line at Kandahar.

The isolated locations of FOBs and combat outposts across Afghanistan are crucial to ferreting out Taliban and insurgent support networks and strongholds, senior officials point out. They are at the end of a long logistical chain, more often than not held together by tactical airlift to keep these locations supplied. In addition to calling in air strikes, JTACs are often tasked to “pop smoke” and help guide in frequent airdrops of supplies from C-130s delivering materiel, ranging from plywood to fuel and food, to locations otherwise all but inaccessible.

Early on the morning of March 23, the night shift of the 772nd Expeditionary Airlift Squadron at Kandahar filed into its hut to update the mission board.

Squadron Commander Lt. Col. Craig Williams and others went over the previous shift's missions, and prepped today's. One of the previous shift's crews just came off what they dub the “pain train”—a long multistop route up through Afghanistan, stopping in Kyrgyzstan, before coming back down to Kandahar Airfield.

“We've got four lined up today,” said Lt. Col. John Fox, the 772nd's assistant director of operations. The squadron was closing in on 50 airdrops for the month already, a new record pace for the year. The squadron had on the ramp four C-130J models, which can carry up to 20 bundles for airdrop per flight. In May, the squadron bumped up to eight aircraft to handle the expanding workload.

Today's flight, a two-ship formation, would fly up to a drop zone in northwest Afghanistan, stop at Bagram to replenish pallets in a few hours, then turn and perform one more drop before landing back at Kandahar. Each bundle weighed about 1,200 pounds, and there were strict procedures about how to ingress for a drop, with the aircraft dipping as low as 2,000 feet above ground while watching for the purple smoke of the JTAC marking the zone.

An Unheralded Front

At the drop signal, a blade cuts the restraints holding in the pallets, and nearly a third of the weight of the aircraft pours out toward the earth in a matter of seconds. “As long as those coordinates are correct, we'll get it in the right place,” Williams said.

Loads are turned fast during stops, said Capt. William McLeod, the OIC of the 451st Expeditionary Airlift Maintenance Squadron. We drop, we gas up, and go often in less than two hours, he said.

The tempo runs Hercs through the ringer as well, he conceded, noting the belly of the aircraft and the propeller blades bearing scars of frequent pummeling on nonpaved runways. Fox gave credit to McLeod's maintainers for keeping the aircraft running daily.

“Without good maintainers, all you have is a bunch of static displays,” Fox quipped.

Beyond daily combat operations, many airmen in country are involved in a mission likely to persist for many years—despite force levels and drawdown timelines.

On the other side of Kandahar's runway was a quartet of Mi-17 helicopters, bearing the roundels of the Afghan Air Force, and several airmen, Lithuanian troops, and Afghans worked on another parked in a nearby hangar. Here, USAF air advisors with the 738th Air Expeditionary Advisory Group guide AAF counterparts to build skill and proficiency in helicopter operations.

It is an often painstaking and halting process, many of them note, and filled with just as much success as frustration. “It's hard to do this [sort of thing] in a combat zone,” said Lt. Col. Fred Koegler, a veteran of three advisory tours in Southwest Asia. “We're in a [situation] where I have to balance things. We are trying to enable a ‘train first’ mindset, rather than just [letting people] fly off into operations.”

Even this mission is not without risks. In April, an Afghan pilot shot and killed eight USAF air advisors at Kabul Airport.

In his first six months with the squadron, Koegler said, his airmen had worked to improve simple tasks such as aviation English competency, improving communication, command and control, and accountability, from officers to NCOs. Many of the pilots and crews are older and have experience flying Mi-17 aircraft, even since the late 1980s, during Afghanistan's communist period, and even for the Northern Alliance, which fought the Taliban for years.

But building a sustainable program is not easy, as the metrics are often difficult to track—although anecdotes abound.

“Trust is a big part of all of this,” Koegler said. “In Afghanistan, trust is often as big a part of the solution as geography.” Mission areas are growing, he said. Now Afghans regularly perform troop movement, flood response, and some aeromedical evacuation activity.

Last December, in north Helmand province, some elements of the Afghan military brought one of their helicopters up for display in a youth shura, or meeting of young leaders, he noted.

The kids “asked about how they could fly a helicopter. It was a huge response,” Koegler said. “This is one of those things we can do. We can put that opportunity out there, to show folks ... there are other options to the Taliban.”

This may be the unheralded front line of the war in Afghanistan, because a successful US drawdown requires local forces to effectively take over myriad missions now performed by US and NATO forces. ■

A quick symphony of planning allowed USAF's heavy bombers to strike 150 targets in Libya.



At Whiteman AFB, Mo., a ground crew prepares B-2s for combat sorties to Libya.

USAF photo by Kenny Holston

Bombers Over Libya

By John A. Tirpak, Executive Editor



Airmen from the 28th Aircraft Maintenance Squadron brave bad weather to ready a B-1 at Ellsworth AFB, S.D., for a mission over Libya.

In March, five Air Force bombers—three B-2s and two B-1Bs—attacked targets in Libya as part of NATO’s mission to protect civilians from government attack in that country’s uprising and civil war.

On the first night of the operation, March 19, three B-2s of the 509th Bomb Wing struck 45 targets at an airfield in Ghardabiya, Libya. Photos of the airfield released by the Pentagon the next day showed hardened aircraft shelters at that base struck with great precision. All were collapsed or showed blackened trails emanating from their entrances, confirming that whatever was inside exploded and burned.

The B-2s flew directly from Whiteman Air Force Base in Missouri and recovered there as well, as they had done in previous operations in Afghanistan and Serbia.

Just days later, B-1Bs destroyed ammunition depots, combat aircraft and vehicle maintenance facilities, command and control buildings, and Libyan air defense sites. The B-1s, too, attacked Libya directly from their base in the continental US, but recovered in Europe before striking at more targets en route to home base.

Collectively, the bombers destroyed nearly 150 targets. All the aircraft re-

turned home unscathed. The missions marked a number of organizational and operational firsts for the Air Force, especially with regard to how USAF coordinates the planning and execution of long-range strikes.

The operation marked the first global strike mission under the direction of US Strategic Command and its relatively new air component, Air Force Global Strike Command. It was the first combat operation for US Africa Command, another relatively young organization. It was also the first combat operation run for STRATCOM out of its own global strike air operations center, the 608th Air and Space Operations Center (AOC) at Barksdale AFB, La.

Reaching Out

Both types of bombers have seen extensive combat over the last 20 years, and in that regard, the missions were unremarkable. The bombers, the crews, and the weapon of choice—the satellite guidance-assisted Joint Direct Attack Munition—performed flawlessly. Although B-2 stealth bombers have often carried out combat missions originating and ending at their home base of Whiteman, the Libya strikes marked the first time B-1Bs have mounted attacks directly from the continental US.

Moreover, the missions highlighted how the Air Force, now involved in combat air operations in three different theaters, had to choose its platforms very carefully. It was necessary to select aircraft not already involved in other missions, which could carry the required amount of firepower, and, most importantly, carry the required load without overtaxing the supply of aerial tankers. The availability of tankers—in the right place and at the right time—was critical in enabling the bomber missions.

The missions verified that a Byzantine series of hand-offs among various regional and combat commands could actually work seamlessly under real-world conditions, as promised.

The operation “validates the structure that we’ve built with Global Strike Command and Strategic Command,” said 8th Air Force Commander Maj. Gen. Floyd L. Carpenter. The Mighty Eighth “has been doing long-range aviation since the beginning of time,” but the 608th AOC “has never gotten to do this in reality,” Carpenter said in an interview. “So we spend a lot of time planning, and now we’ve proved that we can execute the plan as well.”

There had been some dry runs of bomber missions supporting AFRICOM, he noted. “Luckily, we had actually been working with AFRICOM quite a bit before all this happened.”

Over the last year or so, “we had been doing exercises with B-2s and B-52s flying out to the Atlantic” until they came into radio contact with—and under the control of—AFRICOM, he explained.

“We reached out to them,” because AFRICOM had no assets of its own, and STRATCOM wanted to be sure the new command knew it could call on bombers when needed, Carpenter noted. After several of these training missions “to let them understand how it works and get used to talking [with the] fliers,” communications procedures were ironed out.

“So the communications piece was pretty well established” before Operation Odyssey Dawn was launched, he said.

Unlike Afghanistan, however, there were no bombers routinely in the air over Libya. The AOC planning cell at AFRICOM had not originally anticipated the long transit times bombers would need to make the journey from the continental US to attack targets a hemisphere away.

“Long-range aviation ... timelines are much different than they are ... in-theater,” Carpenter said. “We had to get AFRICOM thinking ... further ahead,” he said. “That was a lesson learned.”

Tapping the B-1Bs through US Joint Forces Command, however, was a seamless effort. The process through which a combatant command asks JFCOM for forces “has been well oiled for a long time,” he reported.

Col. Michael A. Tichenor, commander of the 608th, said his AOC had been tipped by counterparts in Europe—where EUCOM and AFRICOM have co-located AOCs—to watch the news and be prepared if called upon to supply combat power.

“Those guys e-mailed me” in late February with the message, “‘Just to let you know, we’re churning on these types of options,’” he said. The 608th got to work immediately, mainly answering AFRICOM’s and EUCOM’s questions and shaping the scope of potential bomber missions. At first, it was unclear whether EUCOM or AFRICOM would be the lead command, but once it was decided that AFRICOM would be in charge, potential missions began to take solid shape.



USAF photo by SSGT Marc I. Lane



Airman Michael Doto readies a JDAM for loading onto a B-1B at Ellsworth prior to a mission to Libya. B-1s were chosen for the mission because of their ability to carry a larger weapon load than the venerable B-52.

It was a highly “iterative” process, with many plans built, rearranged, dropped, and resurrected as political events unfolded and the nature of the mission evolved, Carpenter said.

Tichenor said AFRICOM began developing a plan to establish the no-fly zone, which demanded that Libyan fighters and air defenses be struck quickly and comprehensively. The 617th AOC at AFRICOM concluded there were limited assets available in Europe, “and there are just a lot more targets on the ground than they can service,” Tichenor said. This cinched the need for CONUS bomber support.

“Tanker planning ... ends up being the real story,” he added. “How can I

get the tanker support so I can get the bombers over there? ... They take a lot of gas.”

Evolving Situation

Maj. Jason Smith, crisis action planner for the 608th, said three B-2s required four aerial refuelings each. The number of refueling aircraft “depends on whether they used KC-135Rs or KC-10s, ... so it’s in the neighborhood of 15 to 20 tankers” needed for the B-2 mission.

The B-2s were chosen for the first night because just three of them could carry enough bombs to hit all the required targets, which fit in with the tanker assets available.

“The B-2 can carry 16 2,000-pound weapons,” Tichenor said. The B-2 is also relatively fuel efficient, reducing the number of tankers needed.

Barksdale put Whiteman on alert to get pilots into crew rest, to prepare their aircraft, and build the required bombs, Tichenor said. Stealth was a secondary consideration in picking the B-2s for the first mission.

“The air defenses in Libya just weren’t that worrisome,” he explained. However, it is now standard operating procedure that if stealth aircraft are going to attack a target, they will be supported by Navy EA-6B Prowler or EA-18G Growler electronic warfare and defense suppression aircraft, “whether they need it or not.” The electronic attack aircraft flew from undisclosed ground bases in the region.

The 617th AOC was responsible for building the air tasking order and deconflicted the bombers from other aircraft and Tomahawk Land Attack Missiles launched at Libya from US and British naval vessels. Some TLAMs were directed at targets adjacent to ones selected for the B-2s.

Post-attack imagery was available to all the AOCs almost immediately, Tichenor said, showing the bombs all to have been good hits, making for textbook mission results.

The B-2s were kept on alert for a second strike, but the political situation evolved again. At first, NATO wanted to establish a no-fly zone to prevent Qaddafi from using his aircraft to attack civilians. However, as an open Libyan rebellion emerged and began to seize



An Illinois Air National Guard KC-135 taxis on the ramp at Scott AFB, Ill., preparing to launch for operations over Libya.

territory, NATO shifted gears and also targeted Qaddafi's ground forces, which were attacking civilians and rebels alike.

That led to a requirement for additional bomber strikes. The B-2s, however, were by this time participating in exercises and coping with an operational readiness inspection.

"The B-2s were very busy," Carpenter said, so focus shifted to having either the B-52 or the B-1 hit the new target set. The choice was easy to make: The B-1s could carry double the number of bombs that the B-52s could carry, and tankers were still in short supply.

AFRICOM, he said, was asking for more B-2 strikes, but it's the AOC's job "to educate them: You really don't want to ask for a platform; you want to ask for ... an effect on the ground." The AOC did the math and presented various "COAs," or courses of action, to the combatant command.

Into High Relief

These COAs also spelled out "which one is most effective, the cheapest, the least risk, all those kinds of things," Carpenter noted. The B-1 was the platform of choice for the second—and, as it turned out, third—big bomber run.

With the approval of JFCOM—and with only two days' notice—two B-1Bs of the 28th Bomb Wing from Ellsworth AFB, S.D., were readied for an extra long mission: They would fly directly from home base to Libya, attack targets, then recover at a base in theater (which USAF officials declined to name). After the crew rested and the B-1Bs were rearmed and refueled, they took off

A Lengthy Chain of Command, Executed Perfectly

Requests for the bombers needed to attack targets in Libya originated with US Africa Command, in whose theater Operation Odyssey Dawn—the name of the mission to prevent Muammar Qaddafi from attacking his own people with heavy military equipment—would be carried out.

■ AFRICOM, lacking any combat assets of its own, requested forces from US European Command (fighters, tankers, and support aircraft) and US Strategic Command, which has responsibility for both long-range conventional and nuclear strike, among other missions.

■ STRATCOM then turned to Air Force Global Strike Command, which "owns" the dual-role (conventional and nuclear) B-2 and B-52 bombers. AFGSC in turn handed off the job to 8th Air Force at Barksdale AFB, La., and it in turn relied on the 608th Air and Space Operations Center, the hub of mission planning for 8th Air Force and STRATCOM.

■ While STRATCOM could command the B-2s and B-52s, the 608th had to request permission to use the conventional-only B-1Bs from US Joint Forces Command. JFCOM then directed Air Combat Command to "chop" the B-1Bs to STRATCOM.

■ Once in the region of Libya, the bombers all temporarily belonged to AFRICOM, which had tactical control of the aircraft during their time in the combat zone.

In the midst of the communications traffic up and down this elaborate chain of command, there were directives and messages from the Joint Staff, peppered with nonstop communications between AFRICOM and EUCOM's air operations centers, the one at Barksdale, and the 618th Tanker Airlift Control Center at Scott AFB, Ill., which manages the air refueling assets. Air National Guard or Air Force Reserve Command units flew many of the participating tanker missions.

Neither the B-2s nor B-1Bs overflew any other country on their way to Libya. All the flying was done over water. For the B-2s, there were four refuelings per bomber en route to Libya, and four each on the way home.

again two days later, attacked targets in Libya, then flew home to Ellsworth. Total combat flight time: 24 hours.

Although the specific targets are classified, Air Force officials allowed that ammunition depots, aircraft and vehicle maintenance facilities, and buildings related to command and control and air defense systems were struck by the

B-1Bs. At no point were either the B-2s or B-1Bs tasked to attack individuals or combat ground vehicles.

Using B-1Bs already deployed to US Central Command was ruled out early, Tichenor said.

"Those B-1s that are over there" are fully subscribed by CENTCOM taskings, he said. "I'm sure, had the urgency been high enough, you could have used them," but it wasn't, at that point.

Although the B-1s carried Sniper pods, they, too, used JDAMs to attack "just under a hundred targets," Smith said.

Carpenter said the two bomber missions bring into high relief that STRATCOM's primary mission is deterrence.

"We talk strategic deterrence, and everybody [makes] a nuclear connotation to that, and I don't necessarily think that's 100 percent correct." The missions demonstrate that no target is too far away, and "that, to me, is just a way of showing presence [and] of offering some deterrent capability," Carpenter said. It also underscored the value of building ties between the commands long before combat so that they'll be in place "when we have to do operations like this." ■



SSgt. Tyson Thibeault (l) and SrA. Hursel Johnson prep a KC-135 for fuel at Ramstein AB, Germany. Some 15 to 20 tankers were used for the initial B-2 bomber missions to Libya.

USAF photo by SrA. Caleb Pierce

Generals Petraeus and Hostage detail the crucial role of airpower in Afghanistan.

Committing Everything to the Battlefield

By Marc V. Schanz, Senior Editor



The war in Afghanistan is creeping toward its 10-year mark, and while the size and tenor of the conflict has changed significantly over the decade, US and NATO air and space forces enabled a surge in effort since 2009. With the infusion and dispersal of tens of thousands of troops into the country, to take combat directly to the Taliban and its allies, air assets have become integral to any long-term success, said the top airman in theater.

The United States Air Force has “committed everything we’ve got to the battlefield,” said Lt. Gen. Gilmory Michael Hostage III, commander of US Air Forces Central Command, in an interview. In addition to the steep increase in close air support sorties, Hostage noted the “tremendous” increase in intelligence-surveillance-

USAF photo by SSgt. Craig Seals





USAF photo by SSgt. Samuel Morse

Above: An A-10 takes off from Bagram Airfield, Afghanistan. Close air support sorties in Afghanistan have increased since 2009. Left: More than 1,000 pounds of seized munitions, mines, and weapons go up in a controlled detonation outside of Bagram.

reconnaissance and airlift, specifically airdrop, missions, and the crucial role they have played in the conflict.

Airlift is “great leverage” in Afghanistan, Hostage said, as it gets supplies and troops off explosive-ridden land routes—and is how a large counterinsurgency campaign in a harsh environment such as Afghanistan is even possible. “Logistics is what really wins conflicts,” Hostage said. “If you can’t sustain that force, you wind up losing.”

The infrastructure in Afghanistan in most places is “heinous,” he noted, and without the ability to put troops out into



USMC photo by Sgt. Mallory VanderSchans

General Petraeus (r) visits US and British troops at Forward Operating Base Wahid in Helmand province. The ISAF commander said the responsiveness of CAS in theater is “exceptional.”

the hinterlands and reliably resupply them via air, any effort to take combat to the enemy would be stifled.

Hostage’s tenure at AFCENT has tracked with the massive upsurge in troops, materiel, and combat in Afghanistan. He took over as AFCENT boss in August 2009 just as the major shift in forces from Iraq to Afghanistan was hitting stride.

From Great to Exceptional

Hostage at first saw persistent problems with the integration of air forces in theater into the wider counterinsurgency effort, but organizational improvements fortuitously dovetailed with a period of great violence. Kinetic close air support strikes have risen precipitously in Afghanistan—a tricky proposition in a COIN campaign.

CAS sorties in Afghanistan went from 20,359 in 2008 to more than 33,679 in 2010, according to AFCENT numbers. However, despite the spike, the number of weapons releases has held fairly steady with 5,215 in 2008, compared with 5,101 releases recorded in 2010.

“The basic reality is, we hit what we aim at. We’re very careful about when and where we drop bombs,” Hostage said. US and coalition forces have been able to adhere to the tactical air strike directives put forward by then-ISAF Commander Army Gen. Stanley A. McChrystal, followed by current commander Gen. Army Gen. David H. Petraeus, he noted. “The [tactical] directive was really laid on the backs of the ground force commanders, to make sure the targets they want destroyed they really wanted destroyed,” Hostage said.

Close contact between airmen and ground commanders to ensure weapons are employed precisely is even more important in an environment like Afghanistan, where the enemy seeks to use the presence of civilians as protection from the advantage of airpower.

“The enemy absolutely gets a vote,” ISAF commander Petraeus told *Air Force Magazine* in a late May interview. From force-on-force tactics to different improvised explosive device detonation techniques, the Taliban and their allies have constantly shifted tactics as US forces have poured into the country to challenge them in their strongholds. Even as battles have raged in areas such as Helmand province, the greater precision afforded by ISR, air-to-ground coordination, and better use of real-time intelligence has reduced collateral damage from air strikes to an absolute minimum.

“We are constantly adapting to the enemy’s tactics. ... They know some of our capabilities, and they try to reduce our ability to exploit them,” Petraeus said.

Petraeus, who is slated to soon leave active duty and assume leadership of the CIA, praised Hostage’s work as AFCENT commander. The Senate confirmed Hostage in May for promotion to full general, and to be the next head of Air Combat Command. Petraeus said Hostage has empowered the air component coordination elements (ACCES) and air and space expeditionary task force (AETF) commanders “appropriately, and they have had a relatively small forward footprint and have used very effective reachback.”

For example, the responsiveness of CAS in theater has gone from “great to exceptional,” Petraeus said—this at a time



SrA. Kyle Zangl leads Lt. Gen. Michael Hostage, AFCEC commander, on a tour of the Central Command region's theater distribution center at Manas, Kyrgyzstan. Hostage noted in his interview that logistics "wins conflicts."

time when combat has surged and yet both ground commanders and airmen have shown a great deal of restraint in close combat situations. "I cannot think of a significant civilian casualty event [from air attack] on my watch out here. There have been some in the past, but not on my watch."

Previously, US and allied air forces were under the control of a country-based ACCE, a senior USAF official in charge of coordinating airpower assets (one for Iraq, one for Afghanistan).

"In talking with the ACCEs, I got a sense that they felt underutilized in their ability to contribute anything," Hostage said. The nature of airpower is such that it works well when there is centralized command and decentralized execution. However, ACCEs had little staff and no authority to help out ground commanders, who were looking for fixes on the battlefield, he noted.

The ground commander "was looking for solutions; he wanted someone to make decisions," Hostage said, and under the ACCE construct, this was very difficult. Requests often reached all the way back to Hostage's office at the combined air and space operations center (CAOC) in the Middle East, thousands of miles from the conflict.

First verbally, then with written changes, Hostage allowed the ACCEs in theater to make decisions. He told Gen. Army Raymond T. Odierno, who was US Forces in Iraq commander, and McChrystal that he "was empowering airmen to make decisions."

"I would cash any check that ACCE wrote, because I wanted the [ISAF commander] to understand he could solve his problem," Hostage said.

As time progressed, the ACCE's job became enmeshed in the ground commander's decision-making process, leaving the CAOC to manage the movement of assets theaterwide. "Our job was to make [ground commanders] successful," Hostage said. Staffs grew in both Iraq and Afghanistan, and instead of clustering at a headquarters, they spread out across both countries to be "sensors" for what was happening on the battlefield.

In October 2010, the 9th Air and Space Expeditionary Task Force was established, with two senior airmen given statutory authority over air operations in Iraq and Afghanistan (the AETF-Iraq and AETF-Afghanistan commanders).

Beyond the Combat Mission

Now, for airmen on the ground, there is no question who they work for, Hostage said. Integration for Afghanistan operations occurs in Kabul, not thousands of miles away, and the communication piece between ground commanders and AFCEC leadership has improved as a result.

There is a fundamental difference between the culture of USAF and the ground forces, but Afghanistan requires a great deal of responsiveness and communication between the air and ground to realize progress.

"Air by its very nature is used to being able to reach back, to adjust, to project, to move ... as the battle requires," Hostage said. Ground culture is more driven by the "fundamental needs" of the commander in a tactical situation, being able to control all of the forces at his disposal around him.

It's a constant effort to be responsive to what commanders need, to prioritize

air as best we can, Hostage said. As the decision-making process is built now in theater, the ground force commander decides which engagements get airpower, and then airmen build a tasking order laid against those priorities. In the past, someone detached from the battle made this call, Hostage noted.

"I give up some of my efficiency to do it this way, because they may think the asset that is farthest away from the [troops in contact] is what they need. But what's important is, are their needs being met," he added.

Beyond the combat mission in Afghanistan, both Petraeus and Hostage pointed to the importance of training and advising Afghan forces—even in light of the April 27 shooting at Kabul Airport, by a reportedly disgruntled Afghan pilot, claiming the lives of eight airmen and a US contractor. "Obviously, we have sought to learn from this," Petraeus said, noting a thorough after action review and an investigation are still under way.

The advisory effort has resumed, and is going forward, Petraeus added, with some additional security measures and procedures in place. "Those Americans who gave their last measure in that case would have wanted to continue their work," Petraeus noted. The advisory effort, both with the Afghan air arm and the ground forces, in addition to US contributions will likely include non-US partners that can make unique contributions, such as the expertise in operations of the Mi-17 and Mi-35 helicopter inherent in many forces of NATO allies formerly in the Eastern Bloc.

"It's a matter of risk. They were in a relatively safe environment, so that means their guard was a bit down," Hostage said of the incident, noting it was a worst-case scenario. "But this is what we're trying to do," and success "ultimately represents our ticket home," he said of USAF advisors.

"It is very appropriate to describe our warriors as 'pentathlete warriors'" Petraeus remarked. "They never know if they are going to be greeted with a handshake or a hand grenade."

In a counterinsurgency battle, a 2,000-pound bomb or a small-arms round can do more harm than good if used improperly. "There is always a need to balance patience versus keeping your teeth in the jugular, versus breaking contact and fighting another day," Petraeus added. "There is a constant awareness of circumstances, of second-, third-, and fourth-order effects, on the ground or in the air." ■

Dog Is My Copilot

With respects to Daniel M. Sheehan

USAF photo



"Ace," a squadron mascot in the 4th Fighter-Interceptor Wing, in the intake lip of an F-86 Sabre at Kimpo AB, South Korea. The pup debriefs Capt. Eugene Kemp, a Sabre pilot who had just returned from a 1953 sortie in MiG Alley.

Bruce Carlson says NRO intelligence is helping solve some of the military's thorniest problems.



Problem Solvers at the NRO

By John A. Tirpak, Executive Editor

The National Reconnaissance Office—for decades, a shadowy organization nearly synonymous with “top secret”—is reaching out to the military services, in an effort to let the fighting forces know what the NRO’s capabilities are and how it can help the military accomplish its missions.

“It’s remarkable how many people don’t know what we can do,” said Bruce A. Carlson, NRO director. The retired Air Force four-star general said even he, as former head of Air Force Materiel Command, was not fully “familiar with those capabilities.”

The NRO gathers intelligence through satellites—it has long been out of the aerial reconnaissance business—and processes the data through various other filters to derive a multidimensional,

multispectral picture of areas of interest. The organization also invests in science and technology, developing new sensors, computer algorithms, satellites, and systems to meet the nation’s need for raw information. Other elements of the national Intelligence Community do the analysis.

Red Dot

It’s not Carlson’s aim to bring the NRO further into the open, but he does have representatives dispersed around the world in regional operations centers, attending “every meeting that they can possibly be in,” to listen and, when possible, say, “Hey, we can help you on that.”

Carlson himself visits overseas theaters—he was in Afghanistan in early spring—to let the senior leaders know his organization and its assets are available

to them. He follows up these meetings by sending deputies to put those commitments into practice.

In Afghanistan, for instance, “today’s expectation is that everyone who walks out of the tent into combat will have the absolute latest intelligence,” Carlson asserted. “Not something that’s eight hours or 10 hours old, but the latest intelligence.”

The NRO does “two things really well,” Carlson said in an interview with *Air Force Magazine* in his Chantilly, Va., office. One is to design, build, and operate satellites. The other is to use its considerable technical talent to “solve really tough problems.”

Case in point: the struggle to locate improvised explosive devices, or IEDs, the bane of US ground forces in Iraq and Afghanistan.



Photo by United Launch Alliance

An NRO payload is launched aboard a Delta IV Evolved Expendable Launch Vehicle at Vandenberg AFB, Calif. Carlson is seeking a balance between large, “battleship” satellites and small, nearly disposable ones.



USAF photo by Daniel Rohan

Bruce Carlson, NRO director, says the office developed a system called Red Dot to notify ground forces about possible IEDs.

combining aerial imagery with a signals intelligence pickup—say, a push-to-talk radio transmission—the ability to locate a target “gets a lot better,” Carlson noted. He could not elaborate further due to classification.

An Evolving Mission

The NRO provides many custom-built or “niche” capabilities for all the services in theater, he added, in activities ranging from full combat to logistics and communications. At any given time, about 60 NRO personnel are in Afghanistan, rendering intel aid.

Processing data—fusing geolocation with movement and signals information, for instance—makes the raw information provided to users much more potent than it was in years past, Carlson said, and the fusion makes it possible to get much more out of existing assets. He noted that the NRO has done a good job getting satellites to work years longer than they were designed to—some being “old enough to vote”—but the “ones and zeros [that they transmit] haven’t changed.” By manipulating those data, satellites built for one purpose are being routinely used to supply other kinds of information.

“We’ve been able to increase the accuracy and timeliness [of] information significantly,” he said.

By good luck, sometimes Carlson’s liaison people are in the right place at the right time. He had an officer dispatched to the US 7th Fleet in Japan when the massive Sendai earthquake and tsunami hit. The connection allowed the NRO to supply the Navy and Japan with “relevant information to help them deal with this incredible disaster.”

Carlson said he’s “not satisfied with the degree of our connectivity with the services,” and has put the NRO to work to try to anticipate the services’ needs and be ready with solutions. The Air Force is transforming itself “from ... what was a fighter and airlift force” to one dominated by remotely piloted aircraft, he observed.

“It’s a different force than it was five years ago, so I’ve got to change my support to them. And so we’ll always be evolving, and my goal is to create an organization that can evolve quicker than it has in the past.”

In Guam, for example, the NRO is anticipating a growing pace of Global Hawk operations, and is working to establish “the links necessary to support the missions they’re going to be performing.” Moreover, when USAF prepares to fly a Global Hawk, “you’re going to want to have some pretty good intelligence information before you take off, or during the trip,” to get the greatest value out of the mission.

Another of Carlson’s goals is to get NRO’s spending for science and technology back up to what he called the “traditional level” of around eight percent of the organization’s budget. When he arrived at the NRO two years ago, the level for S&T had fallen to 5.7 percent of the budget, but he’s been able to grow it by half a percent each year, and “we are on track” to achieve the eight percent figure, he said.

The operation is getting much more efficient, he observed.

“We’re in the middle of the most aggressive launch campaign ... of the last 25 years,” and doing it with “about half the infrastructure [and] half the people

“We have a system called ‘Red Dot,’” Carlson said, which “tells people in Humvees or MRAPs [mine-resistant, ambush-protected vehicles] where there’s a possible IED ahead. And that takes an incredible amount of integration of signals and imaging” and all-source inputs in order to put—literally—a red dot on a computer display in a vehicle “that says, ‘Look around the next corner,’ or ‘Avoid this area.’”

Another capability NRO provides to the Afghanistan theater is something called CEGS, for Communications intelligence External Geofusion System. It integrates “things that we listen to, and the pictures we take,” Carlson said.

The system fuses “space with airborne and terrestrial sensors,” and it’s a project in which the NRO is closely coordinated with the National Security Agency. By



NRO photo

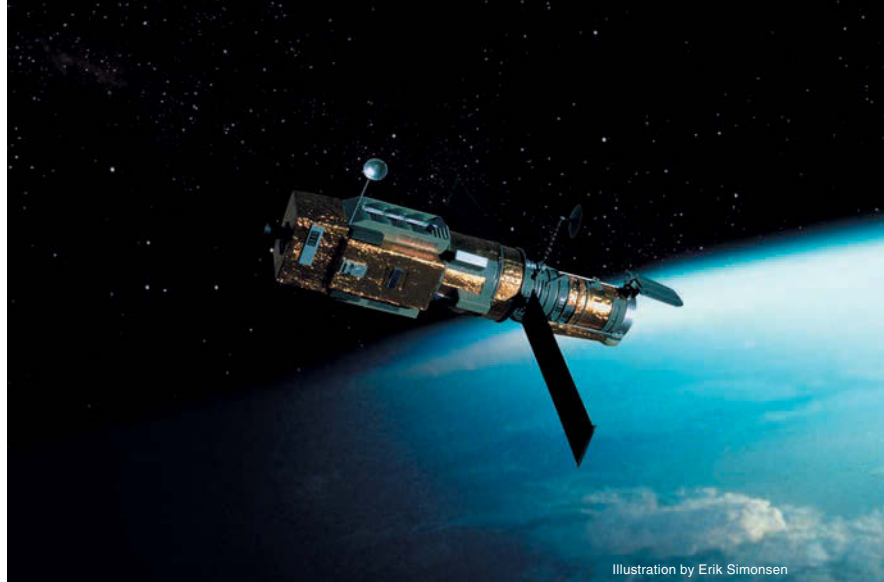


Illustration by Erik Simonsen

Left: An NRO satellite is launched from Vandenberg in April. Above: An artist's conception of an imaging intelligence satellite on orbit. The NRO is actively working to better filter out "noise" to concentrate on actionable intelligence.

... they had" the last time the NRO was putting assets into space at this rate.

The NRO seeks to pursue technology that is "complementary" and not duplicative of efforts under way with Air Force and Navy agencies, such as the Air Force Research Lab and the Naval Research Lab, and NASA, Carlson noted.

"If there is something that both of us are working on, ... we divide it up in a way that one plus one doesn't equal two; one plus one equals three." However, "we are not completely integrated. I don't want that. What I want to do is highlight a few places where we can make a difference and focus on those things."

Asked what technologies NRO is most interested in pursuing, Carlson said he needs solar power cells that are more efficient and easier to produce. Constant investment in new sensors is also a given.

"We hope that there are some breakthroughs in space transportation," he said. "We're not investing enough money in that right now. ... I don't have the kind of money to do that, ... but I'd like to see rockets that are a lot less expensive and that can be produced more quickly."

The reconnaissance office is also keen on miniaturization because it can lead to reduced launch costs. Nowadays, NRO frequently launches two satellites on one rocket, "but if I could get six or eight, that alone would decrease the cost of launch."

That said, Carlson is not on the bandwagon for "smallsats"; less capable but less costly and more easily replaced satellites.

"We build satellites to requirements," he said. Some are large and some very

small. The latter are often used to test out nascent technologies.

Prioritizing Intelligence

Sometimes, however, "you have to have a large aperture," Carlson said, whether for radar or an optical instrument, "just to get the kind of signal-to-noise ratio that you need. If you're going to see something from a good long way away, you have to have a large antenna," and that drives the need for large satellites.

Operational smallsats have their place, too, but generally, they have to be closer to the Earth, he pointed out. At low altitudes, though, "you're in a more strenuous or severe environment, and as a result, they just don't last as long." Moreover, small satellites, by virtue of being more tightly packaged, create other risks: Components can vibrate or give off heat in ways that may affect adjacent elements.

There needs to be a balance between the big battleship satellites and the small, nearly disposable ones, he noted.

All these considerations are part of trade studies undertaken when a satellite is in the conceptual stage.

"We know how to do that," Carlson said. "We're doing it right now, with the Senate Intelligence Committee, and we're working on an architecture that they want us to evaluate, and we're showing them what the trades will be."

Nevertheless, NRO is always looking for technologies that will make satellites "more produceable or more affordable" or "more effective or more powerful. And

when we can fund those niche technologies, we go after them in a big way."

While the NRO has interest in near-space platforms—aerostats or long-endurance robotic aircraft that can be parked at high altitude—Carlson said other agencies are pursuing that technology, and NRO doesn't want to be duplicative. However, he's sure that NRO sensors will be involved, should near-space vehicles be fielded.

"I certainly see us in that business being a partner," he said. "We have the kind of sensors that can do great things" for whoever pursues the technology. "In fact, we're part of the ... stuff that's ongoing now; we're very much integrated into it."

Senior Pentagon leaders have asserted that so much intelligence is being collected now that only a small fraction can be analyzed and acted on in a timely fashion. Carlson said NRO is "not in the analysis business," but added that his agency recognizes the problem and is doing something about it.

"There are some solutions," he said. "One is called preprocessing: sorting out the noise from the signal. Because when you collect that much stuff—whether it's in the [electro-optical] band, the [infrared] band, [or] electronic band, ... some of it is just noise." The NRO is actively working to better "filter" those products.

"Then, when you decide what you're going to process, how do you prioritize it? And you can do a lot of this today with machines." Finally, he said, the processing can be refined even further. "We can just do a lot more with the ones and zeros than we ever could before. That is continuing to evolve at a faster and faster rate." Putting raw data through those three steps is something he wants to do "before I hand the data off to the organization that's going to analyze it." That will ensure that the first thing the analysts get "is the thing they want the most." ■



The Air Force Special Operations Training Center is discovering new ways to turn out highly trained airmen.

Left: Capt. Keith Weber and 1st Lt. Daniel Duck practice basic skills on a simulator at the Air Force Special Operations Training Center. Below: Students train inside the center's C-130 fuselage.

AIR COMMANDO U

By Amy McCullough

An assignment to the Air Force Special Operations Training Center at Hurlburt Field, Fla., does not make you an air commando. That title must be earned through countless hours of grueling training.

On any given day, however, AFSOTC may “transform” the white sandy beaches of Pensacola into the dun-colored terrain of Mogadishu, Somalia. Before long, the operational aviation detachment, tasked with supporting the local government, comes under attack. Sniper fire rings out and the deafening sounds of explosions pierce the once quiet, muggy air. The trainees are forced to work together to defend the team and extract themselves from the situation as the “country” implodes around them.

A few miles away, airmen assigned to the special tactics training squadron, which falls under AFSOTC, swim laps in an Olympic-size pool with their hands tied behind their backs. As they attempt not to panic, they kick their feet and bob to the surface to catch a breath before sinking back down. Lap after lap they swim in the warm water, defying the urge to break their hands free.

AIR FORCE Magazine / July 2011

AFSOTC photos





SrA. Eli Terry, a candidate for the combat controller career field, performs calisthenics at Hurlburt Field, Fla. The combat controller career field is one of the most physically taxing of all specialties.

In a classroom around the corner, a captain and a staff sergeant stand in front of their instructor, conversing in Arabic, Tagalog, or one of the other core languages taught at AFSOTC's language center.

Before AFSOTC opened its doors on Oct. 6, 2008, the burden of training future air commandos fell on the operational squadrons, which since Sept. 11, 2001, were already stressed with an exceptionally high operational tempo. Training often lagged behind because the operational mission always took priority.

The activation of the training center marked a fundamental shift in the resourcing and organization of Air Force special operations training. For the first time in Air Force Special Operations Command's history, all education and initial special operations forces training fell under a single commander. The move standardized the training and created efficiencies in a command already operating on a bare bones budget.

"I'm not a big reorganization guy, [but] we recognized that with the force growth AFSOC was going through and the new missions we faced—ISR,

CV-22, etc.—that we needed a dedicated training structure," AFSOC commander Lt. Gen. Donald C. Wurster said. "Ten years from now when we look back, AFSOTC will be the most important thing we did."

No Fat Here

Today AFSOTC is responsible for recruiting, assessing, selecting, indoctrinating, training, and educating air commandos. It pushes through more than 6,000 students each year in more than 20 Air Force specialty codes and conducts all mission qualification training for more than a dozen types of aircraft, including the AC-130H/U gunship, AFSOC's newest tactical airlifter the MC-130J, and common foreign military aircraft such as the Mi-17. It also trains combat aviation advisors, medical element personnel, special tactics battlefield airmen, and AFSOC security forces.

Col. Mark B. Alsid, AFSOTC commander, said he is proud of what the center has accomplished without pulling funding from operational units. The center will train more than 900 students for flying qualification, which includes all aircrew for any of the flying programs. AFSOTC will also train more than 1,200 students for ground training, which includes special tactics, SF, and CAA and the language lab. In total, they

will educate and indoctrinate more than 4,000 students in initial SOF and joint training under its \$60.8 million Fiscal 2011 budget.

"We've collectively swept all the different training budgets under us to include the simulators and everything. Right now, we are resourced adequately and there is no fat here. We have just enough dough to get away with what we need," Alsid said. "We take great pride in the fact that we are resource neutral and manpower neutral because there were a lot of people who thought we wouldn't be able to do it."

In August 2010, AFSOTC activated the 371st Special Operations Combat Training Squadron. In addition to serving as the formal school for small unmanned aerial systems and irregular warfare integrated skills training, the squadron is also responsible for AFSOC recruitment, assessment, and selection.

The command attached 13 experienced special operators to Air Force recruiting stations across the country. Although their primary responsibility is recruiting qualified AFSOC candidates, the liaisons also follow the students once they enter training and serve as mentors along the way. "One of the things that we've never done well as a command, ... is recruit the right people. When you recruit the right people, the chances of

them making it through training [are] greater,” Alsid said.

Right now the focus is on bringing in new battlefield airmen, although this could change based on the needs of the command. Alsid said the effort already is “paying itself back in spades.”

Since Fiscal 2009, when the command first unleashed its recruiting liaisons, the washout rate for the combat control specialty course has dropped from the mid-to-high 70th percentile to the low 40th percentile, said CMSgt. Antonio D. Travis, AFSOTC chief enlisted manager. “That doesn’t sound like a lot, but when you look at 100 people and you are bringing in an extra 30, that’s phenomenal,” Travis said. “We’ve only been tracking data since our liaisons have been out in the field, but we believe ... this is going to show dividends throughout the pipeline as well.” The first week of training at the combat control school at Pope AFB, N.C., for example, also has a historically high washout rate, but Travis said this too is beginning to decrease. However, it’s still too early to determine by exactly how much.

The first AFSOTC classes to undergo the new standardized training are just now coming through the pipeline, so officials are still in the early stages of sorting through data, which they hope will one day be used to accurately

predict exactly what it takes to become an air commando. For example, if a person does a ruck march in one hour and 47 minutes, perhaps that means he is less likely to succeed than a person who makes the same march in one hour and 45 minutes, Travis said. “All these data points are being ironed out. ... If everything goes the way that we believe, we should be able to, within the first 30 minutes or so of a physical assessment test, be able to tell that this person has a high probability of success.”

Virtual Reality Training

Alsid said his goal is to reach an 85 percent success rate—something he openly admits will not be easy.

The training center is using technology to improve the quantity of training time available as well as the quality. Lt. Col. Shawn Brady, commander of the 19th Special Operations Squadron, said the size of the squadron nearly tripled overnight when AFSOTC stood up, but the budget stayed relatively flat. Instructors had to come up with “new and ingenious” ways to train that didn’t eat up additional funding, such as the introduction of a C-130 fuselage that can be used to train maintainers, loadmasters, and other AFSOC personnel who aren’t part of an aircrew.

AFSOTC shares its aircraft with operational units based at Hurlburt, but because most of AFSOC’s birds are deployed downrange, it can be challenging to find training time even with the development of the new center. With the introduction of the fuselage, roughly 80 percent of the work formerly done on the flight line can now be done inside, said Ray Doyle, a contractor with Lockheed Martin who works with the students at the 19th SOS.

The goal is to remove all loadmaster and static special tactics training from the flight line to free up training time for aircrews, said Brady. The fuselage is fully functional, and the training cadre has the ability to blacken out the warehouse to simulate night missions and to transition the aircraft to represent different aircraft. The 19th SOS is about a year away from making the fuselage a virtual training device, Brady said. Once this is complete, aircrews operating on a simulator in another part of the building could practice flying into enemy territory during brown-out conditions, while loadmasters, operating in the back of the fuselage, offload a Humvee in a hot

A training crew launches its cargo from an EC-130J at the 193rd Special Operations Wing. Airmen don’t become air commandos until they have been through grueling training.



USAF photo by SSGT. Julianne M. Showalter



SrA. Andrew Tilley (l) and SrA. Abeoul Toure (r) develop their “buddy breathing” skills during water confidence training at Hurlburt.

landing zone. The two teams would be able to communicate just as they would in a live mission, he said.

A similar concept has been funded for the static gun room, which includes a 25 mm Gatling gun, a 40 mm cannon, and 105 mm Howitzer. A cardboard control panel stands next to each weapon system, and some of the ammo dates back to 1942. Before they ever step foot on an aircraft, AC-130 aerial gunners spend weeks learning how to break the weapons apart so they can study the internal workings of the guns and learn what types of fuses are used. They are taught how the weapons could malfunction and the proper procedures to clear them out, but they never interact with aircrews while in the static room.

That is about to change. In the next six months, officials intend to switch out the old handmade panels with new state-of-the-art virtual panels that will allow the gunners to communicate with aircrews on the flight line. The change will essentially turn the old static gun room into the back end of a gunship, allowing officials to eliminate two real-world flights.

“We will be able to throw a lot more at them earlier, but not to the point where it will be negative training. This will just make them a lot better,” Brady said. “The enemy can do crazy things,

and once these guys leave training they are basically going right into combat. This is extending the umbilical cord from the back to the front end where the pilots and engineers are.” Not only will the gunners be able to talk to aircraft in real time, but officials also intend to tie in other aircraft, such as the CV-22, so they all can execute a mission together just as they would in an operational environment.

Searching for Flatline

Brady said he doesn’t see the 19th SOS’ growth flatlining anytime soon, because the center is preparing to absorb the training pipeline for AFSOC’s newest bird, the MC-130J. Lockheed Martin rolled out the first Combat Shadow IIs during a ceremony at its Marietta, Ga., facility at the end of March and AFSOC is expected to take possession this summer.

The first class of combat-ready crew members has completed training and is assigned to the 522nd SOS, at Cannon AFB, N.M.

AFSOTC is on track to train seven mission-ready crews by November 2011 with an annual production plan of five crews per year prior to the first MC-130J combat deployment in December 2012. To do that, officials are utilizing the Air National

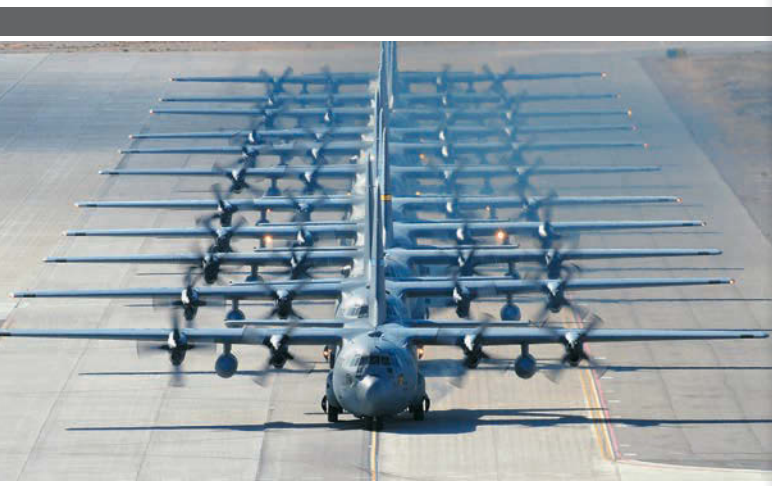
Guard’s 193rd Special Operations Wing, based out of Harrisburg, Pa., which provides mission qualification training for AFSOC’s MC-130 recapitalization program (since the unit’s Commando Solo airframes are also J models). Until AFSOTC gets its first aircraft, AFSOTC instructors are using the 193rd SOW’s EC-130Js to train students on MC-130J tactics, techniques, and procedures, Alsid said. Once Cannon starts receiving its aircraft, MC-130J training at AFSOTC will start to wind down.

As the training center evolves, officials are working to revamp its curriculum. They are shelving courses no longer relevant to today’s battles and bringing in more veterans of combat in Iraq and Afghanistan to bring home the lessons learned.

“At some point, ideally, we are going to flatline, and I would say we are just about there,” Alsid said. “It’s been a huge undertaking and very emotional because people aren’t as open to change, but I’m really happy with how that transition is going, but it’s still a work in progress.” ■

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TSgt. John Chapman earned the Air Force Cross for his heroism in the mission to recover Navy SEAL Neil Roberts.

To the Top of Takur Gar

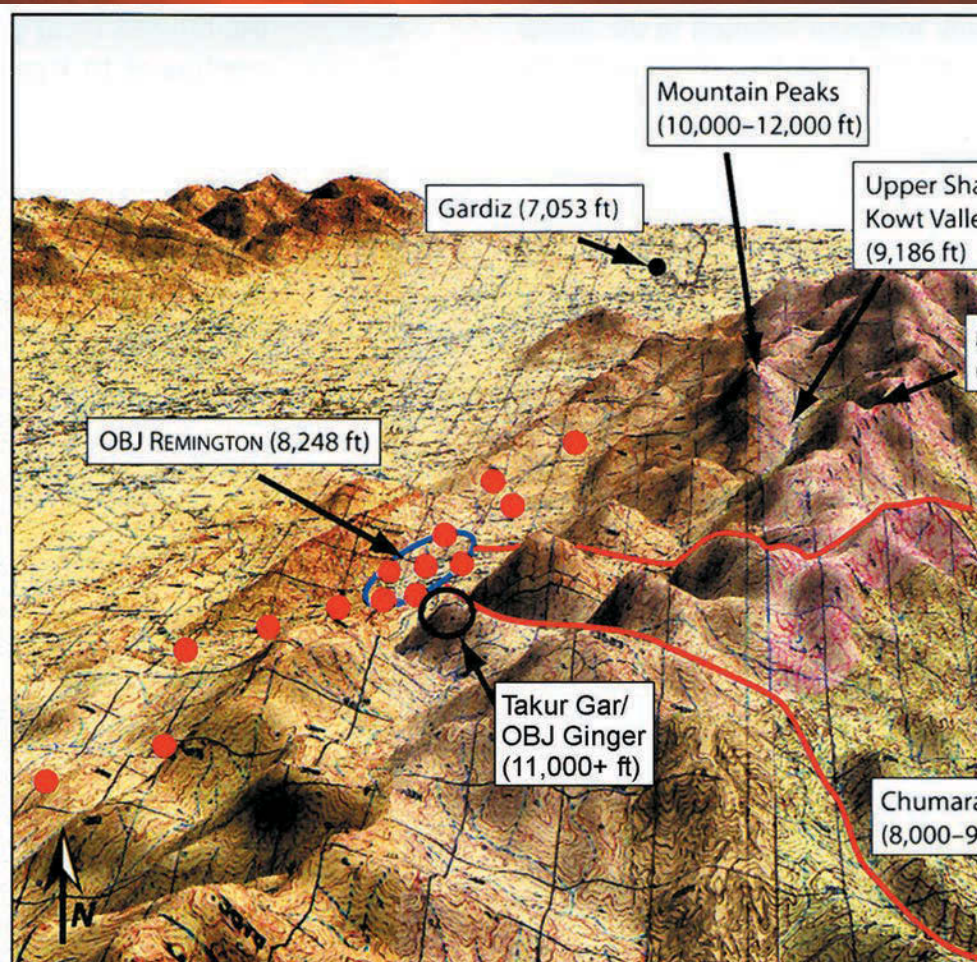
By James Kitfield

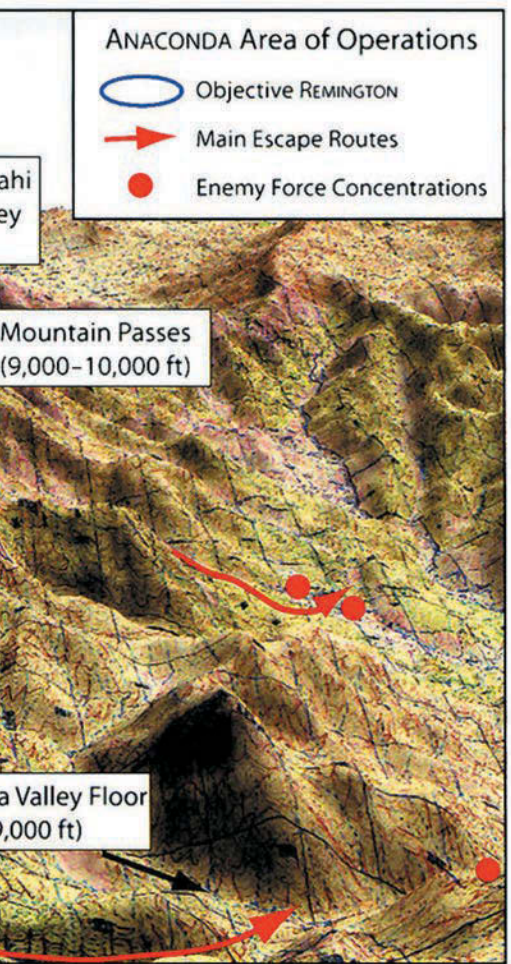
The night was frigid as the MH-47E Chinook approached Objective Ginger, a knife-like ridge that ran along the spine of an 11,000-foot mountain called Takur Gar.

It was March 4, 2002, and the US military was heavily engaged in Operation Anaconda, rooting out remnants of al Qaeda holed up in a series of cave complexes and bunkers lacing the hillsides of the Shah-e-Kot Valley, in the eastern highlands of Afghanistan. The joint special operations reconnaissance and targeting team inside the helicopter knew Objective Ginger represented valuable high ground with a commanding view of the entire Anaconda battlespace.

The al Qaeda fighters secretly dug in atop Takur Gar knew it, too.

As the Chinook—dubbed Razor 3—approached the snow-covered landing zone, Air Force TSgt. John Chapman, a combat controller, and the Navy SEAL (Sea, Air, Land) team he was accompanying felt a mixture of cold air and engine backwash pouring through the open rear





Chapman, deployed from the 24th Special Tactics Squadron out of Pope AFB, N.C., immediately went to work. He quickly established communication with an AC-130 gunship, directing it to provide the team with close air support. He also had to determine how secure the immediate area was. "These actions limited the exposure of the aircrew and team to hostile fire," Chapman's Air Force Cross citation reads. He also requested and coordinated a helicopter to extract the stranded team, and requested the AC-130 join an unmanned MQ-1 Predator already searching for Roberts.

Informed that al Qaeda fighters had already captured Roberts and taken him away, Chapman and the SEAL team made a fateful decision. They decided on the spot to retrieve their fallen comrade Roberts. They were going back up to the top of Takur Gar.

Before the aircraft could touch down, machine gun fire erupted and the thud of impacts raked the fuselage. Then came an explosion and a sickening lurch as a rocket-propelled grenade scored a direct hit, severing hydraulic lines and severely damaging the helicopter.

The pilots from the 160th Special Operations Aviation Regiment veered sharply away from the hot landing zone and struggled to get the aircraft back under control, scanning the terrain through night vision goggles as they searched for some place to bring the crippled helicopter down. Even before they could land at an alternate site, the entire team realized that in the chaos and confusion, one of the SEAL team members—Petty Officer 1st Class Neil C. Roberts—had been knocked from the helicopter and had fallen into a hot landing zone under control of the enemy. Thus began a sequence of events that led to the deadliest military engagement in the war on terrorism up to that point, involving countless acts of heroism and, ultimately, the death of seven US troops.

The special operators were soon on the ground after the aborted first run, having landed on a flat patch of hillside roughly four miles away. They were now faced with a mission that had crushing new urgency.

Left: An Army map shows the mountainous terrain where the Battle of Roberts Ridge was fought. Above: TSgt. John Chapman and a Navy SEAL team went back to Takur Gar to retrieve a fallen comrade.

This choice at the impromptu landing zone was not out of the ordinary for the gung ho combat controller, but it would lead to his becoming one of only five enlisted airmen since Vietnam to earn the Air Force Cross, second only to the Medal of Honor in the recognition of "extraordinary heroism" in combat.

Fateful Decisions

John A. Chapman grew up in Windsor Locks, Conn., a small town of 12,000 situated on the Connecticut River. Early on, he showed the athleticism and nerve that would earn him "All State" in diving three out of his four years in high school, and make him a standout on the soccer team. To his tight-knit family and circle of friends, he seemed to personify the "All-American Boy," a happy-go-lucky athlete with an easy smile and winning manner.

After a short stint at the University of Connecticut, Chapman enlisted in the Air Force in 1985 seeking adventure. When he didn't find enough of it working in front of computers in the 1987th Information Systems Squadron, he volunteered for the elite combat control team (CCT) career field, beginning the grueling year-long combat controller



Chapman in Afghanistan. John Chapman's father said that his son knew the career path he had chosen was a dangerous one.

training program at Lackland AFB, Tex. He was not heard to complain about the lack of adventure in his life thereafter.

The storied combat controller career field grew out of a disastrous mass airborne assault on the island of Sicily during World War II. Roughly 700 paratroopers were mistakenly dropped out at sea over the Mediterranean, and many of the aircraft involved nearly flew into each other. Given the obvious need for more accurate airdrops during airborne campaigns, the US Army created the "Pathfinders," scouts and recon specialists who would find their way to an objective before the main assault forces and provide visual guidance, with flares, high-powered lights, and smoke pots, to inbound aircraft and jumpers.

When the Air Force became a separate service in 1947, the Pathfinders went with the air arm to provide the nascent service expertise in air traffic control and navigation for airborne operations. The Pathfinders were later renamed combat control teams.

To Afghanistan

MSgt. Ron Childress was an instructor at the CCT school when Chapman arrived. "Generally, I tend to remember

guys for one of two reasons: Either they are real good or real bad. John Chapman was one of the real good ones," he said in an interview. "I liked that he was a quiet, unassuming guy, but with that cocky attitude that all good combat controllers have. We became good friends."

Not even a gifted and committed athlete like Chapman found CCT training easy. There was the highly technical Combat Control Operator Course in air traffic control, air navigation, and communication procedures. There was a rigorous, weeks-long course at the Air Force Survival School at Fairchild AFB, Wash., where Chapman and his classmates received instruction in how to survive on their own in harsh climates and conditions. At the Army's Airborne School at Fort Benning, Ga., Chapman learned basic parachuting skills necessary for infiltration behind enemy lines. Pope's Combat Control School instructors taught Chapman and his teammates small unit tactics, fire support, demolition, and land navigation.

After initial training, combat controllers go on to the graduate-level Special Tactics Advanced Skills Training, which includes training in free fall parachuting at the Army Military Free Fall Parachut-

ist School at Fort Bragg, N.C., as well as the Air Force Combat Dive Course, taught at the Naval Diving and Salvage Training Center in Panama City, Fla.

To earn the signature red beret of an Air Force combat controller, Chapman had to complete one of the most rigorous training regimes in the entire US military. Each combat controller is an airpower-savvy commando who can run, jump, or swim with members of any other special operations unit and act as their conduit for close air support, air insertion and extraction, and other airpower functions. "I remember putting some combat controllers through some tough scuba training, and an observer asked me, 'What are you trying to do, train them to be SEALs?'" Childress said. "And my answer was, no, I'm training them so that they don't slow the SEALs down."

Chapman persevered through this extraordinarily difficult training course, becoming one of only seven members of his training class to graduate into combat control. Besides mastering skills such as establishing aircraft landing zones and parachute drop zones and calling in ordnance from ground-attack aircraft, Chapman ultimately became

a military free fall parachutist, a static line jumpmaster, and a military scuba dive supervisor.

“John loved his job. We all did, because no combat controller thinks he actually works for a living,” said Childress, speaking of the adventure and camaraderie that goes with the combat control badge and motto, “First There.”

“For John and me and all other combat controllers, the coolest part of the job is you can watch Fox News and know where you’re going to be sent tomorrow,” Childress said. “We even used secret code words with our wives that alerted them to turn on the television to see where we were going to deploy.”

Then the Sept. 11, 2001, terrorist attacks occurred. Chapman, his wife, Valerie, and daughters, Madison and Brianna, were stationed at Pope at the time. No one had to hear a code word to turn on their televisions, nor guess that Chapman and the rest of the 24th STS were likely to deploy to a landlocked country of towering mountains, verdant river valleys, and vast deserts called Afghanistan.

The Mission

Less than an hour after Razor 3 made its forced landing, Chapman and the five SEALs were picked up by another MH-47E helicopter. It dropped off Razor 3’s crew at a staging area at Gardez and sped back to the top of Takur Gar. The pilots received updates on the suspected whereabouts of the al Qaeda fighters who had taken Roberts prisoner. As the helicopter approached the selected landing zone it was still dark, but once again the US team began taking enemy fire. This time the pilots were able to set the helicopter down, at least long enough to offload the commandos. Chapman and the SEAL team were alone in the dark and bitter cold, on a mountain swarming with al Qaeda fighters.

Chapman and the team immediately found themselves in another ambush, with blistering automatic weapons fire pouring in from multiple directions. Chapman shouted into his radio over the din of the firefight, trying to call in close air support to keep the enemy at bay while the SEAL team assaulted an enemy position. Seeing that the team was effectively in a kill zone—taking enemy fire from three directions—Chapman advanced on a dug-in enemy position, firing his weapon. He and a SEAL killed two of the al Qaeda fighters in the process. When he reached the



Petty Officer 1st Class Neil Roberts, a Navy SEAL, fell from a helicopter because of enemy fire and was executed by al Qaeda terrorists.

enemy position, Chapman turned his fire on a second enemy machine gun nest which was raking the SEAL team and exchanged fire with the al Qaeda fighters at close range.

With the enemy momentarily distracted by Chapman’s assault, the leader of the SEAL team broke contact and retreated down the mountain with two wounded team members. The sun was just rising over Takur Gar by the time the SEAL team repositioned down the slope.

Roberts Ridge

At that moment, a rapid-reaction rescue force of Army Rangers arrived in another MH-47E. The would-be rescuers wound up in a similarly compromised position, however, because their Chinook was quickly forced into a crash landing after being hit by enemy fire. As the Rangers scrambled out of the downed helicopter, four were killed and others were wounded. Another USAF combat controller assigned to the Rangers, SSgt. Gabriel P. Brown, took cover behind a rock and used his radio to call in close air support. But since the al Qaeda fighters were in such close proximity to the downed helicopter, he waved off an aircraft from a bombing run with 500-pound bombs, instructing it to strafe the enemy positions instead (eventually, a precision guided bomb destroyed the main al Qaeda bunker).

In the intense, 15-hour firefight that ensued on Takur Gar, seven US service

members were killed in action, including SrA. Jason D. Cunningham, an Air Force pararescue jumper who exposed himself to enemy fire numerous times while treating the wounded, before being shot and killed. Cunningham would also receive the Air Force Cross for what became known as the Battle of Roberts Ridge. Unbeknownst to the rescuers, al Qaeda fighters had executed Roberts.

By the time night fell on March 4, close air support and the determined fighting of the joint special operations team of Army Rangers, Navy SEALs, and Air Force combat controllers and pararescuemen had driven the al Qaeda fighters off Roberts Ridge. US commanders estimated between 40 and 50 enemy fighters were killed in the firefight.


Chapman was found where he had succumbed to numerous wounds after exchanging fire at close range with the al Qaeda machine gun emplacement. Two dead enemy fighters lay nearby. The leader of the SEAL team who was able to evacuate his wounded down the mountain later credited Chapman with saving the lives of his entire rescue team.

For his actions at Roberts Ridge, Chapman was posthumously awarded the Air Force Cross on Jan. 10, 2003. “Through his extraordinary heroism, superb airmanship, aggressiveness in the face of the enemy, and the dedication to the service of his country, Sergeant Chapman reflects the highest credit upon himself and the United States Air Force,” his citation reads.

To mark the occasion, his father, Gene Chapman, sent a letter to the commander of the 24th STS, Lt. Col. Kenneth Rodriguez. “Over the years on hunting trips and anytime we were able to sit and chat, [John] let me know that though he couldn’t talk about it, it was a dangerous path he had chosen,” Gene Chapman wrote. “I told him I thought of all you folks as heroes. ...

“We may look at what John did and say he is a hero, but then we are not one of his team or the other teams that go in where angels wouldn’t tread,” the elder Chapman wrote. “John is proud to be part of you, and if you could ask him right now, he would tell you what he did was for his family, friends, and the teams he worked with,” his father continued. “Most of all, he did what he did for his country.” ■

James Kitfield is the defense correspondent for National Journal in Washington, D.C. His most recent article for Air Force Magazine, “The Long Road to Missile Defense,” appeared in the March issue.



Lt. Col. Ken Ashley breaks away from the 309th Fighter Squadron flagship, flown by Lt. Col. Stephane Wolfgeher, during a training mission over the Barry Goldwater Range Complex in Arizona.

USAF can't get enough new pilots into F-16s, but not for lack of effort at Luke Air Force Base.

Feeling the Pinch

By Aaron Church, Associate Editor

Photo by Jim Haseltine

Four F-16s roll out onto the runway and light their afterburners for takeoff; three more are awaiting clearance to taxi; another four are being armed with practice munitions; and another quartet is about to land. Another 50 or so Fighting Falcons—though most prefer the nickname “Vipers”—populate sun shelters on the apron, as maintenance crews scurry around prepping them for missions or performing standard checks.

This is Luke AFB, Ariz., home to the Air Force's largest and busiest fighter wing. The scene playing out is not that of a unit at war, but the standard pace of training; the base launches upward of 150 sorties most days of the year. Although it seems a veritable beehive of activity, for Luke's 56th Fighter Wing, the base has become uncharacteristically calm as of late.

With the drawdown of F-16s in the combat air force, “Luke is a little quieter,” admitted Brig. Gen. Jerry D. Harris Jr., 56th Fighter Wing commander.

“There's a lot less flying going on than there has been in the past,” Harris said in April, calling the base a “sleepy hollow.” Luke recently lost 63 F-16s—a third of its force—dropping from 201 fighters to 138. Even so, Harris is quick to point out the 56th is still the largest fighter wing in the Air Force.

“When I tell people that Luke's a ‘sleepy hollow,’ that's still putting 130, 150 sorties up every day,” he noted. Compared to most wings' 60 to 70 sorties daily, Luke remains easily twice as busy as a typical Air Force fighter wing.

100 Pilots Per Year

If all goes to plan, though, Luke stands to lose two more fighter squadrons. Holloman Air Force Base in New Mexico was left without a fighter mission after USAF decided to strip it of its F-22s. To fill the gap, two of the 56th Fighter Wing's four training squadrons are preparing to pack up and move to Holloman over the coming months. The squadrons will stay under the command of Luke's 56th, but the population on base will decline to four squadrons—practically barren by Luke standards.

Harris said, “For us to drop down to 80 [aircraft], that is an impact—that's thousands of people that have left Luke and moved somewhere else” due to the base realignment process and the combat air forces reduction, called the CAF redux for short.

Luke is the longtime home of F-16 initial training and provides specialized instruction in all variations of the Falcon art. Thunderbird demonstration pilots start

here, as do aggressor pilots, and senior leaders come for refresher courses in the F-16. While the wing has tried to cope with the loss of aircraft through wise use of resources, the move is not without cost, and pilot production is lagging demand.

“We shoot to generate about 72 basic B course students per year, but we're a little less than that this year and for [Fiscal 2012] because of the Holloman transfers,” said Lt. Col. Charles J. DeLapp, commander of the 56th Training Squadron at Luke.

“We can't give those guys a 10-month course and have them move at the same time,” explained DeLapp, who oversees academics for the wing. Already with 33 percent fewer aircraft, Luke manages to fly 80 percent of its previous flight schedule. Demand for pilots remains high: Over the past few years, the Air Force has steadily requested around 100 new F-16 pilots per year.

This year, “we've been able to produce around 70, so a little deficit there compared to the requirements,” noted DeLapp.

Luke is working to find ways to boost production, but with fewer F-16s, “we're pretty much at maximum capacity unless we start reducing the [flight] syllabus,” he added. With almost perfect weather, there is little room for growth in terms of flying days.



Photo by Jim Haseltine

portive local communities, and close proximity to multiple training ranges will guarantee its future.

Relentless

“We have such a fantastic community surrounding the West Valley, we have the world’s best training airspace with the Barry Goldwater training complex and the military operating areas that are to the northwest, and the fantastic weather associated with Arizona. ... We can fly 330 days of the year,” said Harris.

Undoubtedly, those reasons persuaded USAF to pick Luke as a preferred alternative site for F-35 training last year. While it’s a vote of confidence for the base, there are no guarantees that F-35s will bed down in Arizona. The F-35 will definitely have an effect on the base, however, as the increasing delay in bringing the strike fighter into operational service extends the demand for F-16 pilots.

“I’m pretty confident that the Air Force is going to be flying the F-16 for decades into the future, ... so we have a valid amount and type of training that will go on for awhile,” Harris asserted.

At the training squadrons, the pace is anything but sleepy. Students, instructors, and aircraft are pushed relentlessly to perform at the highest level. In the 309th Fighter Squadron, the challenge to students, especially “B coursers,” is the most obvious.

Straight from undergraduate training in the T-38, 1st Lt. Jonathan Kay soloed an F-16 for the first time last year.

“I was drenched in sweat, but I was smiling ear to ear,” said Kay, grinning

Above: Maj. Brandon McBrayer checks for his wingman on a training sortie. He is wearing the Joint Helmet Mounted Cueing System. Right: Prepped and ready to go, an F-16 of the 309th Fighter Squadron awaits a training sortie in a shaded shelter at Luke.

At one point, pilots at Luke flew six-day weeks because they had fewer aircraft, as one squadron was grounded for bulkhead cracks. Long term, however, “it becomes pretty tough for guys,” DeLapp conceded.

Training new F-16 pilots accounts for 70 percent of flight operations on the base, but Luke’s squadrons also qualify instructors, convert pilots from other airframes, and teach forward air controllers. The instructors even introduce would-be F-22 pilots to air refueling and the brutality of 9+ Gs in an F-16 two-seater before turning them loose in a single-seat Raptor.

Despite the lull, base leaders believe Luke’s confluence of excellent weather, plenty of reserved training airspace, sup-

Staff photo by Aaron Church





Capt. Tim Lawlor, an instructor pilot, walks 2nd Lt. Ryan Stott through the maneuvers they will fly later in the day during a training sortie. From planning to debrief, a training mission takes about seven hours.

at the thought. Sitting at the end of the runway was “a combination of ‘This is awesome,’ and ‘Boy, I hope I don’t do anything stupid,’” he recalled. In less than eight months, Kay progressed from takeoff, landing, and managing simple emergencies in the F-16 to selecting targets with a LANTIRN pod in simulated ground attacks.

Quick mastery of skills is essential. After 23 days of ground and simulator instruction, students are handed off to one of four USAF squadrons flying at Luke, such as the 309th Fighter Squadron—known as “Mad Mallards.” Momentum builds quickly: In 145 days, students like Kay fly an average of 62 sorties, punctuated with academic prep and 44 simulator sessions.

“Last week, I stepped [to an aircraft] five times [and] flew four [sorties], so there’s just enough time to take what I learned from that last flight, try to incorporate it into the next one, and be ready to go again,” observed Kay. From planning to debrief, a sortie takes about seven hours, leaving little time for reflection.

Reading up on infrared theory between a simulator session and a class, Kay was mentally a day ahead, even on a nonflying day.

“They talk about being a pit bull on a leash,” Kay said, preparing for his first laser guided bomb drop the next day. “I want to get out there; I want to fly this. ... I don’t want to stop. I don’t want to lose my momentum,” he said.

With a mere six sorties in the F-16, students pass an instrument check ride and move to basic fighter maneuvers. Immediately, this knowledge is put to use in the air-to-air phase. Flying as an

instructor’s wingman, students tangle with multiple opponents in a series of dogfights of escalating difficulty.

Ordnance on Libya

In the final air-to-ground phase, Kay and his classmates will learn to fly with night vision goggles, drop six live 500-pound bombs, one inert LGB, one inert Joint Direct Attack Munition, fire 6,500 rounds of 20 mm cannon shells, and expend “a bunch of training ordnance,” noted DeLapp.

At the tail end of the B course, students must pass a basic suppression of enemy air defenses course module, easing the transition to SEAD-tasked units.

“When we kick them out of here, they are almost ready to go to combat,” emphasized DeLapp.

These are no idle words—a 309th FS “Duck” was recently reassigned to Aviano AB, Italy. Arriving on base, he “got through his mission qualification, had his mission check ride, [and the] very next day was dropping ordnance in Libya,” DeLapp related.

Luke is a challenging environment for instructor pilots as well. With top quality instructors “stacked up like cordwood,” DeLapp said, the bar is high.

“Our middle-of-the-road instructor would be the best at unit A or unit B,” said DeLapp. “When you get them all in one spot, it becomes a little bit of a challenge to tell a guy, ‘Yeah, you’re doing great!’”

Luke is not a “cutthroat” environment, but it demands more of an instructor than a typical unit. Since instructors and students usually fly in separate aircraft, an instructor at Luke must be able to simultaneously handle his aircraft and manage a wingman.

“I’m still pilot in command, ... [but] it’s now looking over my shoulder to see what the student is doing,” explained Capt. Cesar Orozco, evaluations instructor with the 309th Fighter Squadron.

Students fly six to nine sorties in a dual-seat F-16D as well, usually as an introduction to dogfighting or ground attack. As a result, Luke IPs are some of the few in the Air Force who qualify to land F-16s from the back seat. “You don’t get to see as much out the front,” chuckled DeLapp. In the F-16D, you have to “touch and feel to find your way to the runway,” he noted.

Nurturing students requires a new level of restraint in the instructors as well. Unlike in a combat environment, mistakes—when not life-threatening—are educational.

“If I think it can wait, I don’t get in the student’s chili,” emphasized Orozco. “If I don’t need to tell them right now, ‘This is what you need to do,’ then that can wait [until the] debrief.”

For instructors, the reward comes from the success of their students. “When they’re doing well and it’s because of you, ... that feels good,” Orozco said. “There’s some sense of pride when you go, ‘Hey, he’s using my technique and he’s doing well at it.’”

Luke is hard on its aircraft. Stripped of panels during 400-hour phase inspection, a 309th F-16’s threadbare tires are normal. Students at the base fly some of the oldest F-16s in the Air Force; some are still Block 25 A models.

Nevertheless, Harris boasted that Luke maintains “mission capable rates [on F-16s] as if they were new airplanes.”

Luke’s oldest F-16s will “start to fade away” beginning in 2013, said Harris. Before then, a plan is in the works to replace the base’s most weary airframes with F-16s of the same block, albeit with fewer hours.

“They’ll look the same, but they’ll have about 2,000 hours less flight time,” stretching Luke’s F-16 pool another six to 10 years, by Harris’ estimation.

“They’re flying as hard as they’ve ever flown,” he said of the airplanes, but “our students are the same. Sometimes they have hard landings, sometimes they touch down in the overrun or do other things, so we’re not easy on the airplane in a training environment.”

Harris’ conversation was interrupted by an urgent radio call: An F-16 had just ingested a bird near taxiway Alpha, but remained intact.

“Speaking of!” said Harris, acknowledging the call. “Old airplanes—they’re still doing very well surviving bird strikes and things like that.” ■

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Near Failure at Nagasaki

The first atomic mission was executed perfectly. On the second one, almost everything went wrong.

By John T. Correll

Hiroshima lay in ruins. Eighty thousand people had been killed instantly and two-thirds of the city destroyed by the atomic bomb dropped by the B-29 *Enola Gay* on Aug. 6, 1945. For Japan, the war had been lost for some time. Since the beginning of the year, American B-29s had been systematically demolishing Japan's urban areas and industrial centers with incendiary bombs.

The military regime refused to accept defeat. Japan still had five million troops, 10,000 airplanes—more than half of them configured for suicide missions—and a seven-month supply of aviation fuel. The United States resumed the firebombing missions and continued planning for an invasion of Japanese home islands.

Sooner or later, the bombing and naval interdiction would make it impossible

for Japan to continue, but no one knew how long that would take. The invasion plan called for the commitment of a US force of 1,865,000. Another year of war plus an invasion of Japan probably meant US casualties in the range of a quarter million and similar losses for the Japanese.

The alternative was to drop another atomic bomb. A second bomb was in place at North Field on Tinian in the Mariana Islands, home base of the 509th Composite Group, which had flown the Hiroshima mission. No other atomic bombs were yet available, but the United States wanted the Japanese to believe there was an unlimited supply.

The mission was planned for Aug. 11 but a forecast for bad weather moved it up to Aug. 9. The bomb, called "Fat Man," was stored under tight security and controlled conditions in an air-conditioned hut with a rubberized floor to prevent accidental sparks. On

the evening of Aug. 8, it was loaded aboard the B-29 that would deliver it. Thus began the chain of events that would culminate in the detonation of the atomic bomb at Nagasaki the next day.

Whereas Hiroshima was a perfectly executed operation, almost nothing went right on the second atomic mission, and it came close to failure. This mission drew less attention, both in news at the time and by historians later, than did the bombing of Hiroshima. The main problems with the Nagasaki operation have been known since 1945, but the extent of difficulties and the discord among participants were not fully disclosed until the 1990s.

The pilot in command for Nagasaki was Maj. Charles W. Sweeney, 25, chosen for the assignment by the 509th commander, Col. Paul W. Tibbets Jr., who had flown the Hiroshima mission himself. Sweeney was commander of

Bockscar en route to Japan, carrying Fat Man, the nuclear bomb that would be dropped on Nagasaki.



USAF photo

the 393rd Bomb Squadron. He had been on the Hiroshima mission, flying the instrument plane, *The Great Artiste*, which measured the effects of the detonation. Over Hiroshima, he was 30 feet off the right wing of Tibbets' plane, the *Enola Gay*. Sweeney had drawn that assignment because Tibbets intended him to fly the next mission, if there was one, and wanted him to have the step-by-step experience.

The primary target for the next mission was not Nagasaki. It was Kokura, about 95 miles southwest of Hiroshima, where one of the largest arsenals in Japan was located, surrounded by urban industrial structures. Nagasaki was the secondary target, to be struck only if circumstances ruled out the attack on Kokura.

The Aircraft

Six B-29s were allocated to the mission. Sweeney would fly the lead aircraft

and drop the bomb. *The Great Artiste* was still rigged with the instrument package it carried at Hiroshima, so Sweeney and Capt. Frederick C. Bock switched airplanes. Sweeney and his crew took *Bockscar* and Bock and his crew flew *The Great Artiste*, which would again serve as the instrument plane.

To avoid identification as atomic bomb aircraft, the six B-29s bore the triangle N tail marking of the 44th Bomb Group instead of the forward arrow of the 509th. None of the mission aircraft had their names painted on the nose. This led to confusion for William L. Laurence of the *New York Times*, who was authorized to go along and write a first-person account. He thought Sweeney was still flying *The Great Artiste* and so reported in his article. In fact, Laurence himself was aboard *The Great Artiste*, which was flown by Bock.

Lt. Col. James I. Hopkins Jr., the group operations officer, flew the ob-

servant/photo airplane, inelegantly named *Big Stink*. According to Sweeney, Hopkins had a noncooperative attitude, possibly because the mission commander was his junior. He walked away from Sweeney's reminder about the rendezvous plan, saying, "I know how to make a rendezvous."

There were two weather airplanes. *Enola Gay*, flown by Capt. George Marquardt, would go ahead to report conditions from the primary target, Kokura, and *Laggin' Dragon*, flown by Capt. Charles F. McKnight, would scout the weather at Nagasaki. Capt. Ralph Taylor would position the sixth B-29, *Full House*, at Iwo Jima as a backup aircraft.

Three mission specialists augmented Sweeney's regular crew on *Bockscar*: a radar countermeasures officer and two weaponeers with special knowledge and understanding of the atomic bomb. The senior weaponeer was Navy Cmdr.



Bockscar and crew (note the missing nose art). Capt. Kermit Beahan (wearing glasses), whom many believe saved the mission from failure, stands next to Maj. Charles Sweeney (dark shirt), the pilot and mission commander.

Frederick L. Ashworth, who had managed the field testing of the atomic bomb at Los Alamos, N.M.

Sweeney had no previous combat experience, but Ashworth had commanded a squadron of Grumman TBF Avengers at Guadalcanal. In the aftermath of the mission it would be said, notably by Tibbets, that Sweeney had deferred too much to Ashworth.

“The job of Ashworth was to arm the bomb, assure its readiness to be dropped, and, ultimately, make the ‘no drop’ call if something went wrong with the detonating system,” Tibbets said. “Those tasks defined the realm of his authority aboard *Bockscar*.”

It is sometimes argued that Sweeney and Ashworth were in “joint command.” That is wrong. Sweeney was clearly the mission commander. Ashworth’s authority covered decisions about the bomb because of his specialized knowledge. Influence was another matter, and Ashworth exerted a powerful influence on Sweeney.

Fat Man was loaded into *Bockscar*’s bomb bay at 10 p.m. on Aug. 8. It was a plutonium bomb, more complex and more efficient than the “Little Boy” uranium device dropped at Hiroshima. Fat Man worked on an “implosion” principle. At its core was a subcritical mass of plutonium, surrounded by 64 high-explosive charges. Upon detonation, the inward pressure of the charges compressed the plutonium core from the size of a grapefruit to the size of a tennis ball, achieving the supercritical mass to trigger the bomb.

Complications

The crews briefed shortly before midnight, had their pre-mission breakfast at the mess hall and were driven out to their airplanes at 1 a.m. The first big problem came when flight engineer MSgt. John D. Kuharek notified Sweeney that the fuel in the reserve tank in *Bockscar*’s rear bomb bay bladder was not pumping. Of 7,250 gallons of fuel aboard, 600 gallons were in the reserve tank. Sweeney climbed out of the aircraft and went to talk with Tibbets, who was watching from the ramp.

Tibbets told Sweeney he did not need the fuel in the bladder, it was only there to balance the weight of the bomb in the forward bomb bay, but if Sweeney disagreed, he had the authority as commander to cancel the mission. Sweeney decided to go. Tibbets pointed out that he was off to a late start and that he should not linger at the rendezvous point if the escort aircraft did not show up.

Bockscar roared down the runway and into the night sky at 3:49 a.m. On the Hiroshima mission, the Little Boy bomb had not been armed until *Enola Gay* was airborne. Fat Man was too complicated for that. However, some of the arming and firing circuits in the nose of the bomb were disabled by two green-handled “safing” plugs. After *Bockscar* was off the ground and before it reached pressurization altitude, Ashworth opened a hatch between the cockpit and the bomb bay, removed the two green plugs, and

replaced them with red arming plugs. The bomb was ready to go.

The original plan had been for the three aircraft to reassemble over Iwo Jima, which had been the rendezvous for the Hiroshima mission. On Aug. 9, a typhoon was gathering momentum around Iwo Jima so the rendezvous point was Yakushima, a small island off the coast of Kyushu. “Because of bad weather at lower altitudes and our proximity to the Japanese mainland, the rendezvous would be at 30,000 feet instead of 8,000 as on the Hiroshima mission,” Sweeney said, which consumed additional fuel.

Missed Rendezvous

The Great Artiste was at the rendezvous point but *Big Stink* was not. The orders from Tibbets were explicit. Make a single 360-degree circle of the rendezvous area, then proceed. “My orders were to wait 15 minutes and then leave for the target, but the mission brief also called for three airplanes to proceed to the target,” Sweeney said. A message from Marquardt in the *Enola Gay* said the weather at Kokura was clear for bombing, but Sweeney circled the rendezvous for 45 minutes. Unknown to Sweeney, who was maintaining radio silence, Hopkins in *Big Stink* was circling at 39,000 feet, 9,000 feet higher than he was supposed to be.

“When only one plane showed up, I told Sweeney that I wanted to be sure that we had the instrument-carrying aircraft with us,” Ashworth said. “Why Sweeney didn’t tell me that the instrument aircraft was already with us, I don’t know.” In later years, Tibbets said Sweeney’s delay may have been due to pressure from Ashworth, a point that Ashworth vigorously denied.

Sweeney said, “When Hopkins failed to make the rendezvous and couldn’t find us, for some inexplicable reason he broke radio silence and radioed back to Tinian, ‘Has Sweeney aborted?’ The message got garbled in transmission and was received on Tinian as ‘Sweeney aborted.’” Emergency air-sea rescue preparations were terminated as a result. “If we had to ditch in the ocean, no one would be there to pick us up,” Sweeney said.

The extra time spent at the rendezvous was costly. When *Bockscar* got to Kokura, the target was no longer clear, partially obscured by drifting smoke from a B-29 firebomb strike, two nights before, on a steel mill at Yawata, just to the north.

As Sweeney approached the initial point to begin his bomb run, some of the landmarks, including the river and some streets and buildings, were visible, and he thought there was a good chance of sighting the target, the Kokura arsenal. This was important because the target had to be bombed visually, not by radar. “Kermit Beahan, our bombardier, had to see the target to insure accuracy during the bomb run,” said Lt. Fred J. Olivi, the third pilot on *Bockscar*. “The orders were very specific.”

But Beahan couldn’t see the target on the bomb run, nor could he see it on two additional bomb runs that Sweeney made. Again, Tibbets blamed the influence of Ashworth, who denied responsibility for the decision but acknowledged years later in an interview, “After the first run and no drop, I did go up to the flight deck and suggested to Sweeney that it might be possible to see the target if we approached it from a different direction.”

“By this time, *Bockscar* had consumed so much fuel that there was serious question of whether she could make it to Nagasaki, drop the bomb, and return to Okinawa,” which was the closest American airfield, Tibbets said. “At this point, the mission should have been scrubbed.” Instead, Sweeney headed for the secondary target, Nagasaki, 97 miles to the southwest and in the same general direction as Okinawa.

Nagasaki was a major military port, one of Japan’s largest shipbuilding centers and the location of several large plants of the Mitsubishi Corp., which turned out torpedoes and other weapons and war materiel. The city lay at the head of a long bay, with a long ridge of hills screening the main residential section from the Urakami river valley where the Mitsubishi factories were, a mile and a half to the north.

As *Bockscar* and *The Great Artiste* began their approach, it was 11:50 a.m. Tinian time and 10:50 a.m. in the city below. Nagasaki was under heavy cloud cover, making a visual drop impossible.

Sweeney had enough fuel for only one bomb run and he was not going to pass it up. He conferred with Ashworth in the “interest of interservice harmony” and proposed a drop by radar, contrary to the explicit orders. Ashworth concurred.

Twenty-five seconds out, with the bomb bay doors open, a break sud-



Bockscar is now on display at the National Museum of the United States Air Force in Dayton, Ohio.

denly developed in the clouds and Beahan yelled, “I’ve got it! I’ve got it!” Sweeney immediately gave control of the airplane to Beahan, whose Norden bombsight was linked to the autopilot. It was too late to drop on the original aiming point, the docks on the east side of the harbor, so Beahan quickly picked a new aiming point in the industrial valley.

As the bomb fell free, Sweeney swung the airplane into a steep, diving 155-degree turn to the left to put some distance between *Bockscar* and the shock wave. Bock made a corresponding high-G turn in the other direction. The bomb detonated at 1,890 feet over the Urakami Valley at 11:02 a.m. local time in Nagasaki. When the shock wave reached *Bockscar*, it was 12 miles away.

The mushroom cloud rose toward 45,000 feet. The explosion was almost midway between the Mitsubishi Steel and Arms Works and the Mitsubishi-Urakami Ordnance Works, which were destroyed. The damage was less severe in the main part of the city, on the other side of the hills. About 40,000 persons were killed instantly, a staggering death toll, but much lower than it would have been if the bomb had fallen on the original aiming point around the docks.

Landing on Fumes

Between circling at the rendezvous and the three bomb runs at Kokura, Sweeney had lost more than an hour and a half of time, and it was catching up with him. Fuel had become critical. He set course for Yontan Field

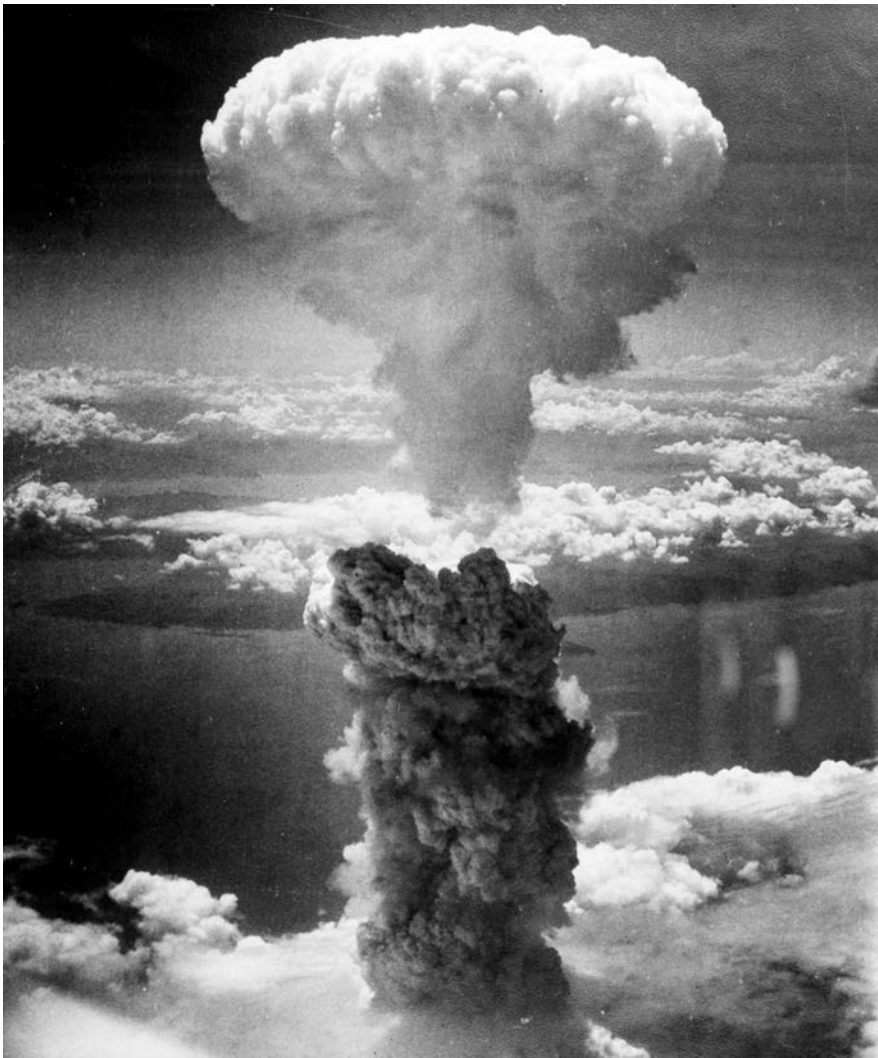
on Okinawa, which was the nearest airfield, some 350 miles farther on. He descended by stages to save fuel, and throttled the propellers back from 2,000 rpm to 1,600.

Fifteen minutes out, *Bockscar* called the Yontan tower with a Mayday but got no response. Another call and an emergency flare made no change in airfield traffic. *Bockscar* then fired every flare it had, including those signaling “aircraft out of fuel,” “prepare for crash,” and “dead and wounded aboard.” Traffic cleared and Sweeney took it in for a rough landing. The fuel remaining, as measured later by the flight engineer, was seven gallons.

“The instrument-carrying airplane landed on Okinawa shortly after we did, and strangely who should arrive shortly thereafter but the third plane that had never joined us,” Ashworth said. “It had gone to Nagasaki and done some observing after the bomb was dropped.”

Sweeney was taken to see Lt. Gen. Jimmy Doolittle, commander of Eighth Air Force, who had moved his headquarters to Okinawa a few weeks earlier. Doolittle heard Sweeney’s story and did not delay his return to Tinian. After a quick meal and refueling, the crew flew the last leg of their mission, landing on Tinian at 11:30 p.m.

Sweeney got a cool reception from Tibbets and an even cooler one the next morning from Maj. Gen. Curtis E. LeMay, chief of staff of Strategic Air Forces of the Pacific. In the end, LeMay decided that an investigation into the conduct of the Nagasaki mission would serve no good purpose, and little was said about the problems.



Above: The mushroom cloud that rose over Nagasaki on Aug. 9, 1945. Right and below: Pictures of Nagasaki both before and after Bockscar's atomic bombing mission.

The Nagasaki mission had tipped the balance toward the faction in Japan that wanted to end the war. The military hardliners continued to resist surrender, but even Gen. Korechika Anami, the war minister, acknowledged that the Americans might have 100 bombs and “the next target might be Tokyo.” The emperor announced the surrender Aug. 15.

Sweeney left active duty in 1946 as a lieutenant colonel, went to the Massachusetts Air National Guard, and retired in 1976 as a major general. He died in 2004. Ashworth rose to the grade of vice admiral, commanded the Sixth Fleet, and retired from the Navy in 1968. He died in 2005.

Shortly after the mission, *Bockscar's* name and familiar nose art were painted on the fuselage. The airplane can be seen at the National Museum of the United States Air Force at Wright-



John T. Correll was editor in chief of Air Force Magazine for 18 years and is now a contributing editor. His most recent article, “USAF and the UFOs,” appeared in the June issue. For additional perspective, see “Atomic Mission” (October 2010) and “The Invasion That Didn’t Happen” (June 2009), both available at airforce-magazine.com.

Patterson AFB, Ohio, where it has been on display since 1961.

Leading figures in the operation differed in the way they remembered and told the story, but their disagreement was not widely known until the 1990s. An unsuccessful attempt by the Smithsonian’s National Air and Space Museum in 1994 to exhibit the *Enola Gay* in a politically charged exhibit inspired Sweeney to write his memoirs, published in 1997.

Ashworth wrote a letter to Sweeney’s publisher itemizing numerous mistakes. In 1998, Tibbets revised his memoirs, adding a chapter on Nagasaki, sharply critical of Sweeney.

“Sweeney blames Hopkins for the delay at the rendezvous point, but Tibbets blames both Ashworth and Sweeney,” said historian Donald L. Miller. “Tibbets is convinced that Ashworth told Sweeney to wait for the observation plane.”

Ashworth said that “we had the wrong guy flying the plane,” Miller added. “Yet he blames Tibbets for picking Sweeney.”

Everyone credited bombardier Beahan for saving the mission. “Major General Sweeney wouldn’t be a general and Admiral Ashworth wouldn’t be an admiral if Beahan hadn’t done the job that he did,” said Ashworth.

A particularly valuable account came in *Decision at Nagasaki: The Mission That Almost Failed*, privately published in 1999 by the third pilot, Fred Olivi, who avoided accusations and acrimony and who had no need to defend his own actions. Olivi reconstructed the flight in detail from his diary, written in 1945 with the aid of an official logbook borrowed from navigator James F. Van Pelt.

The amazing thing is that, despite all, the mission succeeded. The military results were more effective and the death toll was lower than if the operation had been flown as planned. Nagasaki was the final blow that induced the Japanese to surrender, bringing World War II to an end. ■

In 2011, AFA's premier high school cybersecurity competition for the first time included civilian teams.

CyberPatriot Nation

By Peter Grier



CyberPatriot, the Air Force Association-led cybersecurity education initiative, is all grown up.

In April, CP completed its third annual championship—a competition which for the first time included civilian teams from public, private, and home schools across the US—as well as JROTC and Civil Air Patrol units.

The CyberPatriot III final round wrapped up April 1 during AFA's CyberFutures Conference at the Washington, D.C.-area Gaylord National Resort and Convention Center. Team Mantrap, of Red Bank Regional High School in Little Silver, N.J., took home the President's Trophy by winning CyberPatriot III's Open Division. Team Wilson, from CAP's Orlando, Fla., cadet squadron, won the Commander-in-Chief's Trophy by beating all other military-related teams.

In a larger sense, the nation won, too. CyberPatriot is helping increase the number of data defenders that private industry and the US government will depend upon to keep crucial computer systems up and running in coming decades.

"I am so proud of this team," said CAP National Commander Maj. Gen. Amelia S. Courter about the winning Orlando cadet squad. "To hear from the members about their future career ideas and how the Air Force Association has

inspired them and opened doors of opportunity, it is priceless, just priceless."

CyberPatriot may not be as exciting a spectator sport as, say, high school football. It involves groups of students sitting around a computer, planning and coordinating, for hours at a time. But in its own way, it is just as intense as a physical competition. When winning teams are announced the cheers can be heard through walls, two meeting rooms away.

The point of CyberPatriot is to develop a fun and engaging way to stimulate

kids who are interested in technical fields. "CyberPatriot is playing a role in developing more cyber-savvy citizens in this country, truly engaging students with hands-on learning toward real-world challenges," said Bernard K. Skoch, CyberPatriot commissioner, at the April championship round. "All of the finalists ... have proven to be exceptionally talented students, building a keen understanding of the challenging tasks we have given them."

It has long been obvious the US needs to take an innovative approach



Microchips and CyberPatriot challenge coins fill the winner's cup at the CyberPatriot III competition.

to bolstering national science, technology, engineering, and math (STEM) proficiency. American students for years have lagged counterparts in other nations when it comes to math and science test scores. Last December, results from the triennial Program for International Student Assessment (PISA) showed the US in the middle in science, and near the bottom in math.

Chinese students scored an average of 600 on the PISA math test. US students scored an average of 487, placing them 25th among 34 participating nations. (PISA scores are on a scale with 500 as the average.) The state of American STEM education is such that earlier this year President Obama mentioned it in his State of the Union address. "We need to teach our kids that it's not just the winner of the Super Bowl who deserves to be celebrated, but the winner of the science fair," Obama said.

This is precisely the kind of national attitude CyberPatriot intends to foster.

CP began as a small-scale educational outreach effort at AFA's Orlando symposium in 2009, limited to eight JROTC and CAP teams from the surrounding area. Team Spaatz from Osceola High in nearby Kissimmee was the winner that year.

CyberPatriot II in the 2009-2010 school year expanded to include JROTC and CAP teams from across the country. It attracted more than 200 teams from 44 states. Team Doolittle, from Clearfield High School, Utah, was the second national CyberPatriot champion.

The just-completed CyberPatriot III marked the competition's maturity as it expanded further to include entrants not affiliated with military organizations. One hundred eighty-six such teams representing schools from coast to coast and border to border registered to participate. The unforeseen benefits of this program "are profound," said Skoch at a panel discussion during the CyberFutures conference. "We are reaching to inner-city schools. We are reaching to schools that never had any aspiration to excel in a field like cybersecurity."

Four hundred fifty service-related teams signed up for CP III as well. Together, the two divisions fielded students from 48 states, the District of Columbia, US Virgin Islands, Guam, and Department of Defense dependent schools from around the world. Qualifying competitions began last October. Teams assembled in their own schools



Team Wilson (left and below), consisting of cadets from the Orlando, Fla., Civil Air Patrol, earned the Commander-in-Chief's Trophy by finishing first among 450 military-related teams.

and engaged in a day-long cyber defense sessions. All were provided software that mimicked various attacks on operating systems and tied into central servers for real-time scoring. The point was to get the kids to play the role of information technology (IT) personnel defending an internal network against malware, viruses, and hacker attacks.

Showcasing Skills

Five service division teams and 12 open division teams earned trips to Washington, D.C., for the final round. The trip was a significant incentive, since a number of final round participants said they had never been to the nation's capital. More than a few noted they had never even been out of their own states. "The trip to Washington, D.C., is huge for us," said Sandra Marshall, coach of the team from tiny Lakewood Christian School in McAlester, Okla., before the championship event.

The final round took place in a large exhibition hall at the Gaylord, where each team had its own sectioned-off area. Over five hours of competition, as the students swatted at electronic adversaries, a scoreboard that listed positions without team names showed things were pretty close—except for a single team that kept maintaining a lead. At the close, that winning team was revealed as Team Mantrap, the only East Coast representative left in the competition. Each member of the winning team took home a \$2,000 scholarship from CyberPatriot presenting sponsor Northrop Grumman, as well as memories for a lifetime.

At an evening banquet following the competition, the members of the top three teams from each division were



also awarded scholarship money good for college or vocational education. The Army JROTC team from Buena High School in Sierra Vista, Ariz., placed second in the All-Service Division, while last year's CyberPatriot II champion, the Air Force JROTC contingent from Clearfield High in Utah, placed third.

In the Open Division, Westview High School of San Diego won second, while Alamo Area Academies of San Antonio took third.

Among those congratulating the Open Division winning team was New Jersey Gov. Chris Christie, who patted members on the back (metaphorically speaking) in his Twitter feed. "Congrats to Team Mantrap at Red Bank Regional High for becoming CyberPatriot III national champions. Keep up the good work," Christie wrote.

The team members in the final round got more than just a shot at scholarship money and a trophy, of course. They also had a chance to showcase their skills for possible future employers. The US is dreadfully short of cyber defenders, and helping to close that gap is one of CyberPatriot's main reasons for existence. In fact, CyberPatriot has already had a direct—albeit small—positive effect on the US cyber corps. Presenting sponsor Northrop Grumman has hired the captain of last year's winning team, said Diane G.



Team Mantrap, from Red Bank Regional High School in Little Silver, N.J., took home the President's Trophy for winning CyberPatriot III's Open Division.

Miller, the firm's director of operations for the cybersecurity group. Northrop Grumman is also offering internship opportunities for CyberPatriot participants. "We're excited about hiring more CyberPatriots," said Miller.

The industry-CyberPatriot interaction can be two-way, with the students inspiring existing industry workers. Miller said she was "shocked" to find out that more than 50 Northrop Grumman employees volunteered to be technical advisors and mentors to entrants. "They've done things from spending their evenings and Saturdays at the schools with the students or even providing support over the Internet as virtual advisors for teams that aren't near one of our offices," she said.

To help create a new pipeline for cyber professionals, CyberPatriot now should perhaps link up with college-level programs and cyber defense competitions, said Natalie J. Granado of the Center for Infrastructure Assurance and Security at the University of Texas at San Antonio. That could provide for more seamless professional development. "We really need to start building programs that can allow those students to have a pathway to get into this field," said Granado.

That would be one part of what panelists at the CyberFutures Conference agreed should be the competition's next step: expansion. "This is a really needed opportunity for these kids, and they really get excited about it. ... The footprint needs to get much larger," said Granado. One option in this regard would be to open the CyberPatriot experience to middle school

students—or perhaps even elementary school students—in some manner. "We've got to get them young," said Miller.

No Limit

There are aspects of cyber defense that children at all levels can absorb, panelists at the conference agreed. Even second-graders might benefit from awareness training that would stress the need of online self-protection. CyberPatriot's strategy of building interest via competition could be expanded to include simpler computer games. "We've had middle schoolers participate and actually place for an award in a competition that we had back in San Diego," said Duke Ayers, program manager for the CyberNEXS platform at SAIC.

"We know the kids are capable if they're given positive instruction and then immediately allowed, in some sort of live environment, to reinforce that training."

Could international expansion be a viable opportunity? At least one panelist was dubious, not because other nations might benefit, but because the US has limited resources and a long way to go in educating its own math and science students. "There's a lot of opportunity left in the United States to work with our students at all levels," said Miller.

But others felt that reaching out to allies and friends on cyber defense

education was imperative. "If we put our heads in the sand and try to focus simply on the United States, we lose the opportunity to find what's the best of breed for training and exercising," said Ayers.

In a sense, cyber defense itself is already a global exercise, in that the US is attacked from everywhere in the world. It must defend its computer systems in far-flung outposts. Defense contractors are hiring internationally and partnering with foreign firms. "We need to do this at an international level with all of the friendly folks out there that are working with us and participating with us. I agree, it's imperative," said Granado.

CyberPatriot might consider expanding within its core audience of high school age students by offering education in more technical subjects and a wider array of competitions that stretch out over an entire year, panelists suggested. Once students get experienced in cyber defense, they could continue on and conduct forensic analysis of their systems. Some might go further, into penetration testing. "That is where they will determine what the vulnerabilities are of their own systems, not hack against others. They need to know these things, if they're going to understand what it is that they want to ... learn in their formal education process, in college," said Ayers.

There are 26,000 high schools in the US, Ayers pointed out. Hook just 40 kids at each school on CyberPatriot, and the nation would have a new corps of a million cyber defenders.

This would take quite a bit of money, of course, in an era where defense spending cutbacks are limiting the resources of the Pentagon and military contractors alike. But US schools as a whole are often more strapped than defense, and welcome even limited amounts of outside aid. The current structure of CyberPatriot does not cost a lot of money at the school level, panelists pointed out. It depends instead on lots of dedicated volunteers putting in time and effort to help out.

"I don't think there's really a limit. It's just really getting the word out. It's getting people to understand and getting people to become involved," said Granado. ■

Peter Grier, a Washington, D.C., editor for the Christian Science Monitor, is a long-time defense correspondent and a contributing editor to Air Force Magazine. His most recent article, "April 15, 1953," appeared in the June issue.

The German Army was on the march through France until aerial reconnaissance led the Allies to a critical victory.



The Influence of Airpower on the Marne

By Walter J. Boyne

The mere mention of World War I aviation elicits images of dogfights between Spads and Fokkers, or of Gotha bombers over London. The fact that the advanced airplanes of 1918 stemmed from a handful of harmless-looking aircraft first taking flight at the beginning of the war in 1914 rarely comes to mind.

Most of these early warplanes were conversions of civil aircraft. They were slow, with perhaps a 20 to 40 mph margin between stalling and top speed. They lacked power to carry any but the lightest armaments.

Yet it can be argued the outcome of World War I was influenced less by the thousands of efficient new aircraft fight-

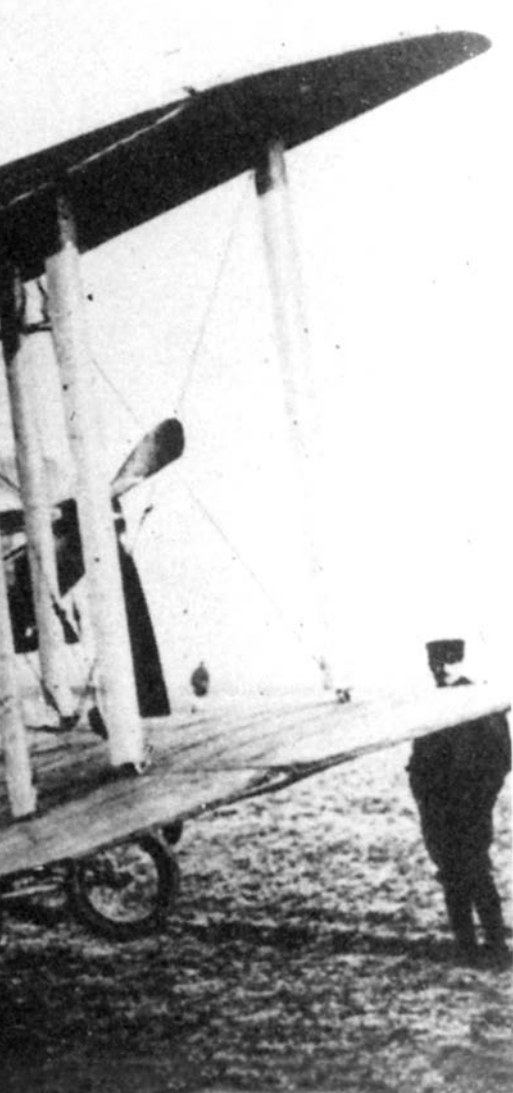
ing in 1918 than by a handful of fragile aircraft gathering the vital data early in the war. Airpower, in its earliest form, led to the decisive Battle of the Marne in September 1914.

From the start, the Wright brothers presumed their invention would be adapted by the military services. This was not realized until 1909, when the US Army purchased the Wright Military Flyer. In the Army, aviation came to be regarded as a dangerous hobby, pursued only by men indifferent to both longevity and successful military careers.

In Europe, things were different. There, military men were convinced of the airplane's potential by Wilbur Wright's dazzling display at Le Mans,

France, in 1908. As a result, the major European powers adopted a more systematic approach to acquiring and experimenting with this new phenomenon.

Aviation was also fashionable, and was adopted as a sport by wealthy men in many nations. Thus, it had sponsors at high levels in government who were able to funnel resources into aviation. Besides its glamour, the aircraft offered what every military man always sought, a means of viewing "the other side of the hill." Balloons were used before and would be again, but they were static, difficult to install in position, and could survey only a limited area. The airplane was seen as a means of rapidly getting to the other side of any hill.



In 1910, France established the Service Aeronautique. The results were promising, and on Oct. 22, 1910, Gen. Pierre A. Roques created the world's first air force, the Aeronautique Militaire. French aerial maneuvers in 1910 led him to say, "Airplanes are ... as indispensable to armies as the cannons and rifles, and those to whom this is not to their liking risk one day having to admit it by force."

Germany had already made great progress with Ferdinand von Zeppelin's huge airships, believing they had immense potential value for reconnaissance and bombardment. But Germany was also interested in heavier-than-air craft, and the Imperial German Army Air Service was founded in 1910.

The British waited until 1912 to establish the Royal Flying Corps. The RFC would use heavier-than-air craft, while the Royal Naval Air Service (RNAS) operated lighter-than-air craft. The First Lord of the Admiralty, Winston Churchill, was very unhappy

Left: Flying an AG-4 similar to this one, Louis Breguet spotted a gap in the German line. Below: German soldiers keep watch from a trench during the Battle of the Marne. Until they were forced to dig in to the trenches that came to define World War I, the Germans had been maneuvering toward Paris.

with this, and by 1914, the RNAS operated a variety of aircraft. Great Britain went a step further, founding the Royal Aircraft Factory in 1911, to spur aircraft development. It did so, but with mixed results.

In the East, Imperial Russia also established its air force in 1910, initially depending on aircraft purchased from the French. In time, under the leadership of Igor Sikorsky and backed by the surprising depth of Russian research, it established its own aviation industry. Although Austria-Hungary established a balloon corps in 1893, and reorganized it in 1912 as an air service, it did not provide the funds for training pilots or buying equipment on the scale of the other major powers.

Plan XVII

On June 28, 1914, a Serb assassinated the Austro-Hungarian Archduke Franz Ferdinand and his wife, Sophie, beginning the slide into what became the "Great War." When war began, Great Britain had about 150 aircraft in military service, France had 160, Germany had 246, and Russia had about 150. Austria-Hungary had 10 balloons and perhaps 50 aircraft.

The new enthusiasm for military aviation has to be viewed in context.



Photos via National Archives



Breguet joined the French Army as an enlisted pilot, and flew an aircraft of his own design and manufacture on reconnaissance missions.

Expenditures by all these governments on standard arms vastly exceeded the amounts spent on aviation. Secondly, national armies operated on a great scale, with hundreds of thousands of men fighting over many miles of territory. Not much was expected of a handful of experimental machines, flown by inexperienced pilots on ill-defined missions. Nonetheless, the intelligent operation of these fragile aircraft helped change the course of the war, preventing a swift German victory—and affecting how conflicts would be waged in the future.

In 1914, Germany possessed what was acknowledged at the time to be the finest army in the world, but it feared a war on two fronts. A magnificent rail system led Germany to plan a French defeat in five weeks, then shuttle its troops on trains to the east, to Russia. The German High Command estimated it would take the Russians at least six weeks to mobilize—giving Germany a week to play with in a high stakes game.

With the war under way, German armies were sent to sweep through Belgium and Luxembourg into France. They planned to destroy the French armies, rather than capture Paris. The French had their own “Plan XVII,” calling for troops to advance into the provinces of Alsace-Lorraine, ceded to Germany after their 1870 conflict. This fit into German plans unwittingly, for it thrust French forces forward so they could be cut off by a scything movement from the west.

Germany was surprised to find its invasion of Belgium brought Great Britain into the war on Aug. 4.

The British forces, while small, were professional. In a similar way, the tiny Royal Flying Corps responded to the emergency with surprising skill.

By Aug. 13, more than 40 aircraft flew from Dover across the English Channel to land at fields near Amiens, France. A further 24 aircraft followed them, accompanied by the men and equipment necessary to support the force in the field. After landing at Amiens, the aircraft deployed to makeshift fields near the Belgian border, from which the first reconnaissance flights took off on Aug. 19.

Flying the Colors

The German plan of attack called for a quick sweep through Belgium deep into France, and then a turn to envelop the French armies and destroy them. The strong Belgian defense of fortresses at Liege and Namur slowed the Germans down somewhat, to the extent that the British and the French lost contact with them.

On Aug. 19, British Capt. Philip Joubert de la Ferte took off in his Bleriot, accompanied by Lt. Gilbert W. Mapplebeck in a B.E.2 on the first RFC reconnaissance mission of the war. Both men saw large numbers of the enemy, and both made landings to ask local people for information before returning to base. These early reconnaissance flights were subject to fire from all ground troops, friendly or hostile. This led first to the painting of the British flag on wings, and then the adoption of the now familiar

Royal Air Force blue, white, and red roundels.

Three days later, a dozen reconnaissance flights took off. One was flown by Capt. L. E. O. Charlton and Lt. V. H. N. Wadham of No. 3 Squadron. They scouted Brussels, but found no German troops. They then landed 50 miles away at Moerbeke, Belgium. There the mayor told them large German forces were passing through the neighboring town of Grammont, only two miles away. The two men took off and soon found what they estimated as an entire Army corps marching along the Brussels-Ninove road toward the British forces. This turned out to be the II Corps of the 1st German Army, commanded by Gen. Alexander von Kluck, just beginning the turn by which he intended to cut off and annihilate the British Army.

The observations delivered by Charlton and Wadham were taken directly to the British commander, Field Marshal John French, who believed the information and would have acted on the intelligence at once, had he not been bound by orders to support his counterpart, Gen. Charles Lanrezac.

On the previous day, at Charleroi, the 15 divisions of the French 5th Army under Lanrezac were virtually destroyed by the attack of 38 divisions of the German 2nd Army, led by Gen. Karl von Buelow. The two commanders, Lanrezac and French, were so furious with each other it took a personal intervention by their respective commanders, the French commander in chief, Gen. Joseph Joffre, and the British Secretary of State for War, Horatio Herbert Kitchener, to bring them back into a working relationship. Reluctantly, French agreed to hold the British Expeditionary Force’s position for 24 hours, to allow the French Army to retreat.

Fortunately the advance warning provided by Charlton and Wadham’s report allowed French to deploy two infantry corps around Mons, across a 25-mile front. Although outnumbered two-to-one in both men and artillery, the expert British riflemen held off the German advance for a crucial day. They then began an eight-day fighting retreat, with the RFC relocating to new fields each day.

Von Buelow’s success against Lanrezac’s forces caused him to urge von Kluck to turn his forces to the southeast and envelope the French Army. Von Kluck complied on Aug. 31, but his

movement opened a gap in the German lines immediately spotted by no less than six members of the RFC.

Once again, Field Marshal French believed the aerial reports and acted on them.

The French Army was equally well-served by aerial reconnaissance. Louis C. Breguet, of the famous watch-making family, had himself assigned as an enlisted pilot.

Flying a Breguet AG-4 of his own design and manufacture, Breguet also spotted the gap as the German forces changed direction, moving from west to east. He informed his headquarters of it.

A Course Irrevocably Changed

Getting the Allies to act on the information was a tougher task, as the French High Command, from Gen. Ferdinand Foch down, held a dismissive view of aviation and aviators. Flights with an R.E.P. monoplane and a Maurice Farman pusher biplane confirmed Breguet's report. Coupled with information from the British, this induced the French to deploy to trap the Germans. The net result of this collaborative effort was that over a period of three days, the Germans marched into a salient with the French 5th Army on their left flank, the French 6th Army on their right flank, and the British Expeditionary Force standing firm at the bottom of the pocket. Suddenly, the German flanking movement

An Eclectic Collection of Early Airpower

In early August 1914, a rather eclectic collection of British aircraft left Dover, England, in four squadrons to aid the defense of France and Belgium along the front lines near Amiens, France. No. 2 and No. 4 Squadrons flew Bleriot Experimental 2s (B.E.2s).

No. 3 Squadron flew a mixture of Bleriot and Henri Farmans, while No. 5 Squadron had Henri Farmans, Avro, and B.E.8s, the latter nicknamed "Bloater" for its resemblance to the fish.

Two of the types, the B.E.2 and B.E.8 were products of the Royal Aircraft Factory at Farnborough, present-day site of the biennial international air show. Originally established as His Majesty's Balloon Factory, it became the Royal Aircraft Factory in 1911 and attracted some of the best aviation pioneers in England, including Geoffrey de Havilland and Henry Folland. The Royal Aircraft Factory created some useful aircraft early in the war and was responsible for what many consider to be the best RFC/RAF fighter of the period, the S.E.5a.

Most of the aircraft sent to France in August 1914 were B.E.2s, a fragile looking biplane powered by a 70-hp Renault engine. Its sole original design requirement was to create "a stable aircraft," and no one envisioned that it would enter combat. With a maximum speed of 70 mph, it could carry a load of 224 pounds of bombs. Its stall speed was just over 40 mph, providing a 30 mph envelope in which to maneuver. Despite this limited performance, the aircraft was continually improved and served until 1918. The B.E.8 was essentially a B.E.2 powered by an 80-hp Gnome rotary engine. It was built in much smaller numbers than the B.E.2, and as a result, killed fewer British pilots than the B.E.2.

The Bleriot of the Royal Flying Corps were essentially similar to the channel-crossing type, and had a top speed of 59 to 61 mph.

Only a few Avro 504s were available for the initial operation, despite their superior 82 mph top speed. An Avro 504 of No. 5 Squadron was shot down on Aug. 22, 1914, the first British aircraft lost to enemy fire.

The Henri Farmans were a hopeless-appearing collection of wings and struts, powered by an 80-hp Gnome pusher engine providing a blistering 65 mph top speed.

This collection of RFC aircraft was impressive to the French, and the aircraft were soon dispersed to fields around Maubeuge, the French garrison town designated as the forward operating base of the British Expeditionary Force.



French infantrymen charge the line in 1914. Alerted by reconnaissance aircraft, the French redeployed to draw the German advance into a trap at the Marne.

was outflanked—and trapped. The Allied forces attacked at dawn on Sept. 6, beginning the Battle of the Marne. After four days of hard fighting, the Germans retreated 40 miles to the River Aisne. They began digging the trenches that would extend from Switzerland to the sea and forever characterize the war.

In an exultant dispatch written to Kitchener on Sept. 7, French wrote, "I wish particularly to bring to your lordship's notice the admirable work done

by the Royal Flying Corps under Sir David Henderson. Their skill, energy, and perseverance have been beyond all praise. They have furnished me with the most complete and accurate information which has been of incalculable value in the conduct of operations."

Aerial reconnaissance disrupted the German plan and turned a swift five-week conquest of France into a four-year bloodbath that proved impossible for Germany to win. Had the primitive

aircraft not been available, the course of World War I might have been irrevocably changed. The warplanes were available only because the French and British governments had drawn the correct conclusions from the convincing demonstrations of the early Wright aircraft.

Had the Wright brothers not been successful in 1903, there would have been no 1908 demonstrations in Europe, and it is probable there would have been no primitive air forces available in 1914. Germany might well have won World War I that year because, before the Battle of the Marne, the Germans were on the move. ■

Walter J. Boyne, former director of the National Air and Space Museum in Washington, D.C., is a retired Air Force colonel. He has written more than 600 articles about aviation topics and 40 books, the most recent of which is How the Helicopter Changed Modern Warfare. His most recent article for Air Force Magazine, "The High Intensity Life of Patrick Fleming," appeared in the March issue.



In nine days during July 1941, air war planners on Hap Arnold's staff put together a bold plan for the defeat of Germany.

The Prescient Planners of AWPD-1

By Phillip S. Meilinger

IN JULY 1941, President Franklin Roosevelt believed it prudent to begin planning for conflict. On July 9, he directed the War Department's General Staff to begin drawing up production requirements for a war that assumed Germany would be the main enemy and Britain the main ally.

The plan he requested was to follow guidelines already established in the Rainbow 5 and ABC plans. The Rainbow plans were so named because they were color-coded—orange for Japan and black for Germany, for example—whereas secretive plans drawn up with the British and Canadians were termed the ABC plans. The outlines of both sets called for a Europe-first strategic framework in the event America joined the war.

Upon receiving this tasking, Col. Clayton L. Bissell, an airman in the War Department General Staff's War Plans Division, immediately went to Gen. Henry H. "Hap" Arnold, the commander of the Army Air Forces.

Bissell was one of the old guard airmen and a strong airpower advocate. He had

been an aide to Billy Mitchell shortly after World War I. Seeing the importance and potential implications of Roosevelt's directive, Bissell suggested to Arnold that he ask to have his own staff draw up the air annex to the war plan. Ordinarily, the Army's Plans Division had this responsibility, but Arnold agreed with Bissell's suggestion and approached Gen. George C. Marshall, Army Chief of Staff, on the matter. The request was granted.

To author it, Arnold turned to Lt. Col. Harold L. George, Lt. Col. Kenneth N. Walker, Maj. Haywood S. Hansell Jr., and Maj. Laurence S. Kuter. All had been instructors in either the Air Force or Bombardment Sections at the Air Corps Tactical School before the war, and all had played key roles in formulating the doctrine of high-altitude, daylight, formation precision bombing of an enemy's industrial centers. Now they were tasked to put their ideas into practice.

More than a dozen other staff officers from various divisions on the Air Staff (Maj. Hoyt S. Vandenberg and Col. Arthur W. Vanaman, among others) and procurement specialists from Wright Field in Ohio assisted on various parts of the plan. These officers drew up what was termed an aircraft production plan, but was actually far more detailed. It would be the air war plan for the defeat of Germany: AWPD-1, for the Air War Plans Division-Plan 1.

The task was enormous, but the strategists approached it by relying on their own

Left: B-24s bomb heavily loaded railroad sidings at Karlsruhe, Germany. Below: A four-ship of P-51 Mustangs. Jimmy Doolittle declared that the first duty of Eighth Air Force fighters was to destroy German fighters.

experiences, academic studies done at Maxwell Field in Alabama, and their belief in the efficacy of strategic bombing—which had yet been put to a serious test.

What Made Germany Tick

The first task for the team was to articulate strategic objectives (derived from the existing ABC and Rainbow 5 plans), defend the Western Hemisphere, defeat Germany and her allies while maintaining a strategic defense in the Pacific, and provide close air support to the ground forces in preparation for an eventual invasion. For airpower, the goal was to destroy the industrial war-making capacity of Germany and restrict Axis air operations.

Following their doctrinal beliefs from the tactical school, the planners studied information on the German economy to determine what made it tick. Once they understood how that economy worked, it would be easier to figure out how to break it. Hansell was recently assigned to the intelligence section of the Air Staff and had been in Britain observing the Royal Air Force bombing campaign against Germany. The British were helpful and shared sensitive information, and the knowledge Hansell gained in those duties proved extremely useful.

In addition, the planners turned to American industrialists and bankers for assistance in understanding the US economy, assuming the operation of modern industrialized societies were similar. The airmen knew that many of Germany's factories were financed or built by American banks and companies. As a result, they were able to obtain detailed blueprints of many German industrial facilities from sources on Wall Street.

The planners then sorted and prioritized this data to project an image of Germany as an industrial web. This notion was to visualize the enemy's economic infrastructure as a huge web, and like a spider's, a disturbance in one sector would reverberate throughout the entire system, as per the theories of strategic bombing. The airmen believed that a modern society was interdependent, which meant that it was not necessary to attack and destroy everything of economic value. Rather, planners should strive to discover which targets were most important to the whole and whose destruction would cause a cascading effect and produce the most damage to the entire system.

Using this construct, an examination revealed the 154 most important targets in Germany. These were grouped into six major target sets: 50 electrical power plants, 47 transportation networks, 27 synthetic oil refineries, 18 aircraft assembly plants, six aluminum plants, and six "sources of magnesium." Using data from bombing tests and the RAF, the planners determined the weight of ordnance needed to destroy a variety of structures. They projected loss rates in aircraft and crews and estimated how many aircraft would be needed, as well as the number of personnel to fly, maintain, and support the force.

Later critics claimed planners were overly mechanistic, treating the campaign as a science problem rather than a Clausewitzian exercise in friction. However, the planners did take unknowns into account. Based on prewar experiments, they determined accuracy estimates and loss rates and then multiplied these peacetime accuracy numbers by 2.25 so as to produce a figure they presumed would account for wartime: poor weather, enemy fire, fear in combat, enemy attempts to camouflage or otherwise hide the targets, and other factors. They also employed an attrition figure of 20 percent per month for all units, derived from a study of RAF operations.

Putting this together, planners came up with a needed force of 6,834 operational bombers organized into 98 groups. The officers assumed an additional 1,708 aircraft would be located in depot reserve, and they projected a monthly replacement rate of 1,245 aircraft.

For defense of air bases in England, they would need 3,400 fighter aircraft. Planners thought there would be a shortage of bases in Britain, and therefore called either for more of them elsewhere, or a bomber with twice the range of the B-17 or B-24. This would, of course, become the B-29, although the Superfortress would never be used in the European theater.





Henry "Hap" Arnold

Given the planned force, they estimated it would take six months to destroy the 154 targets once a campaign was fully operational. They predicted a token force of three bomb groups would be able to begin operations in April 1942, but a full offensive could not begin until April 1944; hence, the 154 targets would be eliminated by September 1944.

The numbers they arrived at were enormous: more than 63,000 aircraft and some 135,000 pilots as part of a force totaling 2.1 million personnel. Considering that the AAF had ordered only some 300 heavy bombers for 1941, the vision and audacity of these planners were remarkable.

Even so, AWPD-1 underestimated the number of aircraft needed. By the end of the war, the AAF purchased more than 231,000 aircraft, of which nearly 35,000 were strategic bombers. The accuracy and attrition multipliers they used, though sizable, were not large enough. Not factoring in major war with Japan also affected projections.

Planners assumed an invasion of the continent would take place, but if an air offensive were successful, a land invasion might not prove necessary. Planners recognized the AAF's first priority was to gain air superiority over Germany. Without it, a bomber offensive would be long and bloody. As a consequence, they listed the German Luftwaffe and the factories supplying it as a crucial intermediate objective. "The degree of success attained by our sea and ground forces will be determined by the effective and timely employment of air superiority units and the successful conduct of strategical missions, the plan said. "No major military operation in any theater will succeed without air superiority or at least air superiority disputed."

While the air superiority campaign was ongoing, however, the bombers would also be attacking German economic nodes. Escort fighters for the bombers, though such aircraft would be desirable, did not yet exist, so planners recommended urgent development of such an aircraft. In the meantime, they offered the combination of speed and altitude; defensive guns and a tight formation would be adequate to get bombers to their targets and back.

Some views of airpower prior to World War II did not emphasize fighter escort for bombers. The doctrine formulated at the Air Corps Tactical School between the world wars focused on strategic bombardment of industrial objectives. In the early 1930s, the instructors there had already begun to argue that the speed of attacking bombers (such as the B-10) was nearly as fast as the P-26, and the B-17 was even speedier—meaning that interception of a bomber formation was unlikely. They assumed "the bomber will always get through."

The Escort Mission

In the days before radar, this was not an unwarranted assumption. Planners did not update their assumptions once radar did become operational, however.

Not everyone subscribed to supremacy of bombardment. Capt. Claire Lee Chennault, a pursuit instructor at Maxwell from 1931 to 1936, argued just as vehemently that the bomber would not always get through, and that a well organized and capable defense, armed with first-rate interceptor airplanes and backed by a ground-observer corps, would be able to defeat an air attack. In one lecture, he dismissed the overly optimistic thinking of bombardment by saying a "lack of regard for hostile opposition is a theory which has no foundation in experience." Chennault, who would later organize and command the



Laurence Kuter



Harold George

Flying Tigers in China during World War II, was ignored, with devastating results.

Chennault and his successor in the Pursuit Section at the tactical school, Hoyt Vandenberg, did not advocate escorts for the bombers they suggested were at high risk. To them, such a mission was too passive and would inhibit the inherently offensive nature and aggressiveness of fighter pilots.

As a result, the lack of an adequate escort fighter at the beginning of the bomber offensive in Germany was based on both technical and doctrinal shortcomings. Even if such a fighter were available at the time, to many pursuit/fighter pilots of that era, such a defensive mission was out of character and "incompatible with the mission of pursuit," a phrase used by Vandenberg while on the Air Staff in 1941.

Entering the war, official Army doctrine acknowledged the escort mission, but saw it in purely defensive terms. Field Manual 1-15, *Tactics and Techniques of Air Fighting*, stated the role of escort was to ensure the success of the forces they support. "Their firepower may be considered as replacing or augmenting the defensive firepower of the supported force. Their mission precludes their seeking to impose combat on other forces except as necessary to carry out their defensive role," it stated.

The doctrinal issue was settled once and for all in early 1944 when Maj. Gen. Jimmy Doolittle took over command of Eighth Air Force. When walking into the headquarters of his fighter command, he noticed a sign that read: "The First Duty of the Eighth Air Force Fighters Is to Bring the Bombers Back Alive."

He ordered it removed and replaced with one stating: "The First Duty of the Eighth Air Force Fighters Is to Destroy German Fighters."



B-17s from Eighth Air Force fly through flak to drop their bombs on Leipzig, Germany, during a bombing raid on aircraft factories.



Kenneth Walker

The semantic distinction went to the heart of the debate regarding the proper role of fighters in an escort role. To Doolittle, the issue was one of capitalizing on the innate aggressiveness of fighter pilots. By unleashing them to seek out and destroy enemy aircraft whenever and wherever they were located, he ensured that the bombers would indeed be protected. Doolittle later wrote that he thought this decision was his most important and far-reaching of the war.

As the war planners noted, however, the problem was also technological. Few airmen believed it was possible to build a suitable escort fighter incorporating both the range and agility to engage enemy interceptors on equal terms. An aircraft with the range to escort bombers had to be large enough to carry a great deal of fuel and would thus need two engines. To compensate for the lack of maneuverability of such a design, it would need flexible gun positions and extra crew members to man them. Soon, the escort fighter looked

much like the bombers it was designed to protect. Such a multiengine fighter would be at a severe disadvantage when confronting the agile interceptors of the Luftwaffe.

Drop Tanks to the Rescue

There were some aircraft builders who disputed these notions. The P-35, built by Alexander P. de Seversky, was a remarkable airplane when the Air Corps began purchasing it in 1936. Incorporating a revolutionary “wet wing” design, the P-35 was extremely fast and had unusually long range: It could fly from coast to coast with only two refuelings. De Seversky’s ideas, like those of Chennault, were also largely ignored.

Even so, it became apparent during the war that even the P-47 Thunderbolt—the successor to the P-35—did not have the legs to escort bombers all the way to the target. The solution was the drop tank. Cheap, disposable tanks were slung under the wings of fighters such as the P-47, P-38, and P-51, and pilots would drain gas from these tanks first. When empty, they were jettisoned and the airplanes would still be equipped with a full internal fuel load.

The results were dramatic. By the end of the war, P-51s were able to escort the bombers all the way to Frankfurt and back.

The AWPDP-1 planners understood the problem of fighter escort. They saw such an aircraft was necessary to protect bombers, but fell into the mindset of most other airmen at the time that such an airplane was not technically feasible (and were proved wrong).

AWPDP-1 was completed in nine days. It was a Herculean task in miserable heat; the munitions building where they worked was not air-conditioned. Tempers frayed and discussions included numerous heated

exchanges between the planners. The plan was briefed up the chain of command and approved by Secretary of War Henry L. Stimson on Sept. 12, 1941.

The blueprint laid out in AWPDP-1 was a good starting point, though the priority assigned to specific target systems would vary during the war. Though daring in its materiel and personnel projections, planners still underestimated the resources needed. The warning that long-range escort fighters might prove necessary proved all too true.

There were, however, other errors in the planners’ thinking: German industry and morale were tougher and more resilient than expected and bombing accuracy was worse than projected.

Nonetheless, AWPDP-1 remained a reasonably accurate forecast of the US strategic bombing effort against Germany. The planners predicted a token force of three bomb groups could be ready to begin operations in April 1942, while the first B-17 strike actually occurred in August. The planners had also not anticipated the North African invasion that siphoned off bomber assets intended for Eighth Air Force.

However, the planners’ predicted full bomber offensive began in spring 1944, and by the end of that year, the German economy was indeed in shambles. ■

Phillip S. Meilinger is a retired Air Force pilot with 30 years of service and a Ph.D. in military history from the University of Michigan. He is the author of seven books and more than 80 articles on military affairs. His latest book is Hubert R. Harmon: Airman, Officer, and Father of the Air Force Academy. His most recent article for Air Force Magazine, “A Short History of Decisiveness,” appeared in September 2010.



Haywood Hansell Jr.

By Frances McKenney, Assistant Managing Editor

The Astrochimp

In Alabama, a presentation organized by the **Montgomery Chapter's** aerospace education VP has captured the interest of adults and kids alike.

Susan Mallett came up with the idea of spotlighting Ham, a chimpanzee that rode a Mercury Redstone rocket into a suborbital flight 50 years ago, on Jan. 31, 1961.

Ham's spacecraft reached an altitude of 157 miles, a speed of 5,857 mph, and landed 422 miles downrange. This was higher, faster, and farther than originally planned, due to technical problems, but he survived his 16.5-minute flight in good condition. The first chimp in space paved the way for America's first human astronaut, Alan B. Shepard Jr., who went into space four months later.

Mallett was inspired to highlight Ham's anniversary flight because a friend, retired USAF Col. Marvin E. Grunzke, had trained Ham and other animals sent into space. She wanted the Montgomery community to know about Grunzke, whom she called one of the "hidden gems" in their midst.

The initial presentation in January on "Ham the Astrochimp"—by Grunzke, Mallett, and fellow chapter member Debbie Dahl—drew a standing-room-only crowd of 300 people. They had expected 50.

A local newspaper gave this event Page 1 full-color coverage, and it generated TV and Internet video segments.

Mallett says the trio then began receiving invitations to give the presentation to schools and churches. Once, they were filmed live for an hour-long local TV program.

Most recently, Mallett partnered with the Civil Air Patrol to present the program as part of National Astronomy Day in May at the W. A. Gayle Planetarium.

Mallett used a video to explain the astrochimp program, then spent four hours with some 100 children at the planetarium, building and flying "fun shuttles" made from paper and balsa wood, with propellers driven by rubber bands. As at previous events, she distributed brochures on AFA, the CyberPatriot program, Civil Air Patrol, and photos of Grunzke training Ham to push buttons on a space capsule simulator.



Photo by Gay Acceto

AFA Board Chairman Sandy Schlitt (far left) watches the CyberPatriot's Open Division champ, Team Mantrap from Red Bank Regional High School in New Jersey, celebrate its win. Next to Schlitt is Melissa Hathaway, a panelist in AFA's CyberFutures Conference. At far right is Amanda Galante, Team Mantrap's advisor. See "CyberPatriot Nation," p. 65.

More photos at <http://www.airforce-magazine.com>, in "AFA National Report"

"Like a Rock Concert"

At a state drill meet in Virginia, carried out by the **Tidewater Chapter** and **Richmond Chapter**, the AFJROTC cadets performed before highly experienced—some might think intimidating—judges: the Air Force Honor Guard Drill Team.

If that wasn't enough, more role models—the Air Force Color Guard from JB Langley-Eustis, Va.—performed during the competition's opening ceremony.

The honor guard drill team is the traveling component of the USAF Honor Guard, based at JB Anacostia-Bolling, D.C. They "added credibility to the judging," remarked Gordon Strong, Tidewater Chapter secretary and head of the AFJROTC unit at Grassfield High School in Chesapeake. "And then when they performed" for the young cadets, Strong continued, "it was like a rock concert."

One observer said the place was "rolling." The kids even asked drill team members for autographs.

This annual Virginia State Air Force JROTC Drill Meet involved two dozen

units competing at Atlee High School in Mechanicsville.

Besides the Air Force drill team, other judges came from the ranks of senior ROTC cadets from the University of Virginia in Charlottesville and the Virginia Military Institute in Lexington.

In front of this knowledgeable panel, E. C. Glass High School cadets from Lynchburg won the overall event trophy for the second consecutive year.

Stonewall Jackson High School in Quicksburg came in second, and Western Branch High School in Chesapeake, third.

Virginia State President J. Randy Hobbs presented the trophies. The drill meet had financial backing from the **Donald W. Steele Sr. Memorial Chapter, Gen. Charles A. Gabriel Chapter, Langley Chapter**, and the state AFA organization.

Thomas O. Moran, leadership development VP from the Richmond Chapter, gets the credit for inviting the Air Force Honor Guard Drill Team to the event, said Strong. "He started working them a year out."

First Scholarship for First Unit

The **Lincoln Chapter** in Nebraska presented its first annual aerospace education scholarship in April.

AFJROTC cadet Rebekah E. King, a senior at Lincoln Northeast High School, received the award, presented by Chapter Aerospace Education VP Diane R. Bartels and Brandon R. Tovado, then a University of Nebraska-Lincoln AFROTC cadet and now a newly commissioned second lieutenant.

Behind the presentation of this \$500 award to King lay a lot of effort by the chapter over a lengthy period.

Bartels reports that the chapter had urged Lincoln Public Schools to establish an AFJROTC unit for 17 years. The big push came in 2008 when the chapter hosted a reception for an AFJROTC site survey team.

The AFJROTC program at Lincoln Northeast received the go-ahead shortly thereafter and got under way the following school year.

Then-Lincoln Chapter President Robert R. Tovado—who was largely responsible for establishing the high school’s AFJROTC program at Lincoln—and his family fund the new aerospace education scholarship. Tovado, his son Brandon, and daughter Meagan all participated in AFJROTC programs during their high school years.

Back Again

The **General Doolittle Los Angeles Area Chapter**, one of AFA’s original charter chapters, faltered last year, but AFA California leaders worked together to help it rally this year. In the process, they discovered a source of new members, willing volunteers, and youthful enthusiasm: the Arnold Air Society.

The chapter marked its restart with an April meeting, highlighted by an unusually stellar VIP list: George K. Muellner, AFA vice chairman of the board for aerospace education, and retired Col. Jimmy Doolittle III and Jonna Doolittle Hoppes, grandson and granddaughter of the USAF—and AFA—legend for whom the chapter is named.

“Chapter reconstitution,” as the Golden State AFA officials called this new beginning, came about under the direction of California State President Rex Moen. He appointed Donald E. Zweifel, membership VP of the **Orange County/Gen. Curtis E. LeMay Chapter**, as interim president for the Doolittle Chapter.

Zweifel, in turn, tapped Arnold Air Society cadets from Loyola Marymount University, UCLA, and University of Southern California. A professional, honorary organization focused on service, AAS aims to develop cadets into strong Air Force officers, and Zweifel found its members eager to help the AFA chapter: In fact, AAS cadets Jonathan C. Blaisdell and

Jonathan S. Coe now serve as chapter VP and secretary, respectively.

They were elected at that April meeting, along with Harry Talbot as president and Capt. Ryan C. Marcotte, treasurer.

On Base in Minnesota

Some 30 chapter members and guests attended the May dinner meeting of the **Richard I. Bong Chapter (Minn.)**, hosted by the 148th Fighter Wing at Duluth Airport.

The wing vice commander, Lt. Col. Jon S. Safstrom, served as guest speaker. The chapter’s Teacher of the Year and the local Civil Air Patrol unit also took a turn in the limelight that evening.

Safstrom delivered an update on wing activities, including the arrival of F-16s from Spangdahlem AB, Germany. The Block 50 fighter aircraft began joining the wing in April 2010, as part of USAF’s legacy fighter drawdown, to replace the unit’s Block 25 F-16s.

Chapter Teacher of the Year Rebecca Lindgren is from the South Shore School District, Port Wing, Wis. At the meeting, she received \$250, a plaque, and a book bag as part of her awards.

Chapter President Carol J. Wolosz pointed out that Lindgren is a Visions of Exploration teacher.

Now in its 20th year, Visions of Exploration is a joint program of AFA and *USA Today* newspaper. It encourages the study of science, technology, en-

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gineering, and math by providing print or digital copies of the newspaper to classrooms. Lesson plans, multidisciplinary activities tied to news events, and other resources help teachers carry out the Visions program.

To cap the chapter's quarterly gathering, the Duluth Civil Air Patrol squadron received a donation presented by Wołosz, to support cadet summer training and education programs. This summer, for example, the CAP cadets plan a field trip to the Air Force Museum and Wright-Patterson AFB, Ohio.

Beastly Attraction

Need to attract attention? Try a beast. **Scott Berkeley Chapter** President Mike Hartsfield did.

Joined by State President Louis A. Emond and Southeast Region David A. Klinkicht, Hartsfield manned an AFA booth at Wings Over Wayne, a two-day air show at Seymour Johnson AFB, N.C., in April.

Emond bought plastic bags decorated with the AFA logo, and the trio stuffed them with copies of *Air Force Magazine*, an AFA membership application, and a flyer about CyberPatriot.

Helping out was the eBEAST. At Seymour Johnson, Airman eBEAST is a florescent-green costumed mascot whose name-acronym reminds people to take care of the environment: Buy

AFA Conventions

July 8-9	Florida State Convention , Ocala, Fla.
July 22-24	Texas State Convention , Fredericksburg, Tex.
Sept. 17-18	AFA National Convention , Washington, D.C.
Sept. 19-21	AFA Air & Space Conference , Washington, D.C.

and use recycled and bio-based items; Encourage family and friends to "Think Green"; Act to protect land, air, water, and animals; Sort recyclables; and Turn off faucets and lights when not needed.

MSgt. Mike Wolfe, the 4th Civil Engineer Squadron's first sergeant, donned the eBEAST costume for the air show.

Chapter members distributed 300 AFA goodie bags that weekend.

4th Fighter Wing public affairs office reported that a record-breaking 160,000 attended the air show.

Think Safety, and Pass it On

Troubled by several airplane crashes in the Long Island, N.Y., area, some safety-minded pilots in the **Iron Gate Chapter (N.Y.)** decided to set up bi-annual Pilot Safety Seminars. The purpose: Exchange information on how to avert accidents.

The latest Iron Gate-sponsored seminar took place at the Cradle of Aviation

Museum in Garden City, N.Y., in May. Chapter President Frank T. Hayes introduced Andrew Miller, from the Air Safety Institute, as guest speaker for a capacity crowd of 300 pilots. Miller's presentation covered subtle errors and missed clues that have led to crashes, and several pilots related personal experiences.

Afterward, reports Hayes, Miller was surrounded by guests asking questions and expressing thanks for sharing the information.

The Iron Gate Chapter sponsored a reception beforehand, using the opportunity to distribute AFA membership applications and copies of *Air Force Magazine*.

More Chapter News

■ The AFROTC detachment at the Florida State University in Tallahassee invited Clifford Palmer, president of the **Col H. M. "Bud" West Chapter**, to present several honors at its annual awards

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ceremony in April. Among the recipients were: Christian J. Shipp, receiving an AFA Silver Medal; William R. Sinkey, named Outstanding AS 400 Cadet; and Anthony D. Monaro, who earned the Chief John Schmidt Community Service Award, established by the detachment to recognize a longtime supporter. Schmidt—a seven-term chapter president and now its VP—attended the presentation.

■ Scott Chesnut, the **Frank Luke Chapter (Ariz.)** aerospace education VP, presented AFJROTC cadet Joey Kendrick with an AFA Medal at an awards ceremony at Gilbert (Ariz.) High School on April 15. This was the first of 18 cadet ceremonies supported by the chapter in the Greater Phoenix

Metropolitan Area, pointed out Luisa C. Bailey, chapter communications VP.

■ Howard Leach Jr., acting New Jersey state president as well as president of the **Shooting Star Chapter**, attended the May 11 New Jersey Aviation Hall of Fame induction ceremony for Air Force Chief of Staff Gen. Norton A. Schwartz.

Team of the Year

In April, AFA honored five Air Force first sergeants as its 2011 Team of the Year: CMSgt. David R. Henry, from headquarters Air Force Reserve Command, Robins AFB, Ga.; SMSgt. Melanie K. Noel, instructor at the USAF First Sergeant Academy, Gunter Annex, Ala.; SMSgt. Manny Pineiro, from head-

quarters 3rd Air Force, Ramstein AB, Germany; SMSgt. Ernest T. Williams, 147th Combat Communications Squadron, San Diego ANG Station; and MSgt. Todd K. Meaney, 790th Missile Security Forces Squadron, F.E. Warren AFB, Wyo.

CMSAF James A. Roy and major-command-level command chief master sergeants selected the first-sergeant career field for this recognition. ■

reunions@afa.org

Reunions

1st Fighter Assn. Sept. 14-18 at the Mission Inn in Riverside, CA. **Contact:** Pete Marty (1stfighter@comcast.net).

5th Aerial Port, Evreux-Mildenhall. Aug. 18-21 in Fairborn, OH. **Contacts:** Bill Bishop (w_j_bishop@yahoo.com) or Lee Jarrett (turfteach@cox.net).

18th Fighter-Interceptor Sq. Sept. 26-29 in Colorado Springs, CO. **Contact:** Jim Sidebottom (303-913-9104) (sidebot-tomj@hotmail.com).

40th Fighter/Test Sq Assn. Oct. 6-9 at the Hilton House NASA Clear Lake, Houston. **Contact:** Keith Kosan (850-687-0009) (kosanfamily@knology.net).

384th Air Refueling Sq. Sept. 9-11 at the Wichita Marriott Hotel in Wichita, KS. **Contact:** Kenneth Godstrey, 12018 Maycheck Ln., Bowie, MD 20715 (301-464-1150) (kengodstrey@comcast.net).

405th Bomb Sq, Laon AB, France (1953-59). Sept. 20-24 in Las Vegas. **Contact:** Willie Wise (717-838-1561) (twocrickets70@aol.com).

Johnson AB, Japan (1946-62). Sept. 29-Oct. 1 in Nashville, TN. **Contact:** Keith Swinehart (303-814-0800) (keith.swinehart@gmail.com).

National Red Horse Assn, including Prime Beef. Oct. 16-20 at the Holiday Inn San Antonio Downtown, San Antonio. **Contacts:** Paul Sattler (303-650-1215) (paul.sattler@rhamail.org) or Greg MacDougal (912-396-1359) (greg.macdougal@rhamail.org).

Randolph UPT Class 70-05. Oct. 27-30 in Savannah, GA. **Contact:** Howard Hackney, 605 S. Lapeer Rd., Oxford, MI 48371 (248-505-1964 or 248-236-9050). ■



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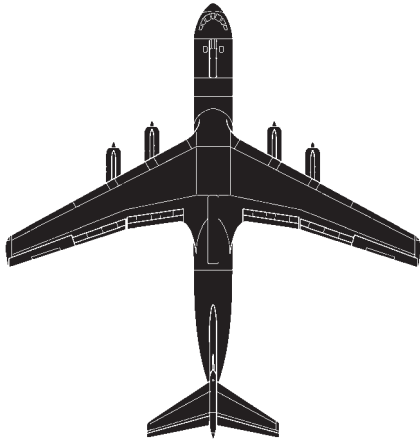
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C-141 Starlifter



The C-141 Starlifter was the first pure-jet airlifter specifically designed for USAF's strategic transport force. The beautiful Lockheed aircraft became, after 1965, the US airlift workhorse, carrying troops, vehicles, cargo, refugees, and even a giant Minuteman ICBM, while also turning in outstanding operational service from the Vietnam War in the 1960s to Persian Gulf conflicts in the 1990s. It was equally adept as a medical evacuation aircraft or transport for special operations forces.

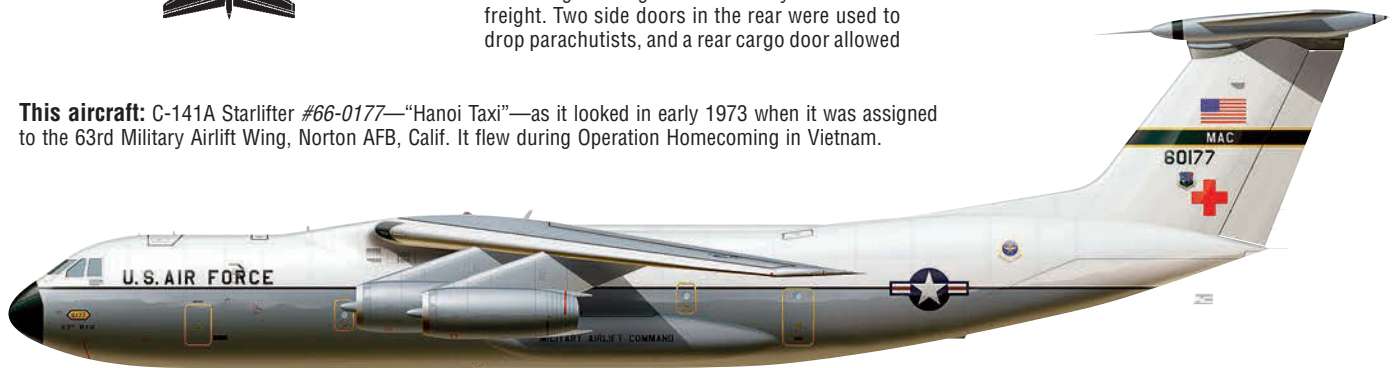
In response to Specific Operational Requirement 182, issued in 1960, Lockheed produced its Model 300 design, beating out General Dynamics and Boeing. The design featured a high swept wing with four jet engines mounted in under-slung nacelles, and a tall T tail. Designed to perform both strategic and tactical missions, the C-141's low-slung fuselage allowed easy transfer of freight. Two side doors in the rear were used to drop parachutists, and a rear cargo door allowed

delivery of heavy cargo by parachute. The prototype C-141A was rolled out on Aug. 22, 1963. Testing proceeded swiftly.

Operational C-141A aircraft began service in 1965 and quickly became the preferred aircraft for flights to and from South Vietnam and Southeast Asia. Reliable and easy to fly, the Starlifter was beloved of crews accustomed to the slow, noisy Douglas C-124s it replaced. In 1973, the aircraft brought home POWs released by North Vietnam. "Stretched" into the C-141B by the insertion of fuselage plugs to increase its volume capability, the Starlifter continued in service until 2006. Its retirement was accelerated by its extremely heavy usage during the Gulf War.

—Walter J. Boyne

This aircraft: C-141A Starlifter #66-0177—"Hanoi Taxi"—as it looked in early 1973 when it was assigned to the 63rd Military Airlift Wing, Norton AFB, Calif. It flew during Operation Homecoming in Vietnam.



A C-141 over its assembly plant in Marietta, Ga.

In Brief

Designed, built by Lockheed ★ first flight Dec. 17, 1963 ★ number built 285 ★ crew of six (pilot, co-pilot, two flight engineers, one loadmaster, one navigator) ★ armament none ★ max load 94,508 lb of cargo, or 205 troops, or 168 equipped paratroops. **Specific to C-141B:** four Pratt & Whitney TF-33P-7 turbofan engines ★ max speed 567 mph ★ cruise speed 490 mph ★ max range 2,935 mi ★ weight (loaded) 342,100 lb ★ span 160 ft ★ length 168 ft 4 in ★ height 39 ft 3 in.

Famous Fliers

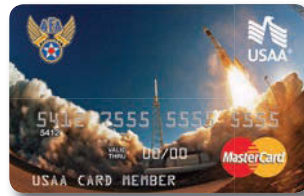
Notables: James Blackman, Alanson Bynum, Alfred Funck, Harold Hale, Benjamin Johnson, Leroy Leonard, James Sherrard III, Rondal Smith, Max Starkel. **Test Pilots:** Hank Dees, Frank Hadden, Herb Klein, Leo Sullivan.

Interesting Facts

Was first US aircraft into Saudi Arabia during Operation Desert Shield in August 1990 ★ ordered into development by President Kennedy in first official act ★ carried NASA's Kuiper Airborne Observatory Telescope at high altitude ★ suffered deep stall problems due to T tail ★ performed first paratroop drop from jet aircraft (August 1965) ★ off-loaded 68,000 lb of cargo and reloaded same amount in less than one hour ★ grew 23 ft in length when A models were "stretched" to B version ★ took on 24,000 gallons of fuel in 26 minutes ★ flew in Operation Deep Freeze through 2005 ★ made final flight on May 6, 2006, when the "Hanoi Taxi" flew to the National Museum of the United States Air Force in Dayton, Ohio.



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