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About the cover: F-16s of the 35th Fighter Wing. See "New Life for Old Fighters," p. 28. Photo by Katsuhiko Tokunaga/DACT, Inc.

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Editorial

By Adam J. Hebert, Editor in Chief

Replanting ROTC

THE editorial in *The Harvard Crimson* made no bones about it: "ROTC should not return" to campus "ever, under any circumstances."

The editors of the school's newspaper asserted that "establishing a chapter on campus would compromise Harvard's academic integrity" and "even if ROTC accepted gays, it should be kept off campus for academic reasons."

This was in April 1989—seven months before the Berlin Wall fell and four years before "Don't Ask, Don't Tell" became law. If the editorial tells us anything, it is that re-establishing ROTC on many college campuses will be difficult even though the legislation barring homosexuals from military service is now a thing of the past.

Harvard and Columbia, to cite two Ivy League examples, welcomed ROTC to campus in 1915 and 1916. Cadets, military instructors, and other students coexisted until the two universities gave the detachments the boot in 1969, a time when many universities kicked ROTC off their campuses to appease anti-Vietnam protesters. The Vietnam War ended a few years later, but ROTC never returned to the schools—although, tellingly, the stated reasons for this have changed over time.

Expect opposition to ROTC to resurface because of alleged military discrimination against women, or the old, or the handicapped or disabled. Cries about ROTC corrupting academic standards will likely return, along with nonsensical assertions that the military is opposed to "openness and critical inquiry."

This has been a recurring theme over the years. Those opposed to the military, to recruiters' access to schools, and to ROTC programs cite their opposition to what they describe as the Pentagon's discriminatory policies. Right or wrong, however, these policies were completely legal.

In the case of Don't Ask, Don't Tell, it was the explicit law of the land. DADT was passed by Congress and signed by President Clinton. Neither the military nor the ROTC cadets had the power to change this, but some universities still chose to punish DOD and their own military-minded students for the actions of the US Congress.

At the end of 2010, Ivy League institutions Brown, Columbia, Harvard, and Yale all prohibited ROTC detachments on their campuses, as did the University of Chicago, Stanford, and other prestigious schools.

This has never been a majority position. ROTC did not leave most schools, and others that kicked it out during Vietnam peacefully allowed detachments to return in later years. ROTC is available at the Ivy League's Cornell, Dartmouth,

The true reasons for opposition to ROTC will soon become clear.

Penn, and Princeton, plus other top universities such as Cal-Berkeley and MIT. What makes the detachments acceptable at some of these schools and not at others is largely a matter of internal politics.

In fact, the schools that bar ROTC routinely see students participate in programs at neighboring institutions. Despite the difficulties inherent in this, Harvard has students who trek across town to participate in the ROTC program at MIT, while some Stanford students head over to Cal.

The reasons why ROTC should be on these prestigious campuses are numerous and straightforward. A professional military benefits from the most capable officers possible, and students at the top schools will, by and large, be intelligent and motivated. These are exactly the sorts of officer candidates DOD should encourage. The students at these institutions who choose military service should not be made to jump through hoops.

ROTC is good for the schools as well. The military represents all of America, and should not give up on recruiting talent from entire regions of the nation such as the Northeast. Exclusive universities, largely populated by privileged students and insular faculty, will benefit from more exposure to the military.

More officers from schools like Harvard and Yale might also put an end to an enduring canard of the anti-military establishment: the argument that, all evidence to the contrary, the military draws disproportionally from the ranks of the poor and underprivileged.

Don't Ask, Don't Tell was overturned Dec. 22. After a transition period, open homosexuals will for the first time be allowed to serve in uniform, but this will not end the controversy. Some academics embraced DADT as a convenient club with which to attack Pentagon policies, and new excuses will emerge because many campus elites simply don't like the military or what it represents.

The true reasons for opposition will soon become clear. If new excuses for blocking ROTC are contrived, then the opposition is to the military itself and is not a principled stand against discrimination.

The schools have already shown they have fungible principles. When Elena Kagan was dean of the Harvard Law School in 2004, she sought to ban military recruiters from the school's Office of Career Services to protest discrimination against gays. When it became clear the school would lose $400 million in federal funding for doing so, Kagan recanted and allowed the military the same access as all other recruiters.

But exactly how ROTC will return to these campuses is still to be determined. Various school faculties and administrations must approve the return, and this might be a sticking point.

After approval, DOD then has to invest personnel, officers, time, and money to set up detachments. There are even economic arguments against a return to schools with small undergraduate enrollments. But beyond the dollars and cents, there are also symbolic reasons to return ROTC to some of these universities.

Many of the leaders of these schools, including the presidents of Harvard, Yale, and Columbia, recently expressed interest in bringing back ROTC once the "Don't Ask" policy officially ends. President Obama, a Columbia grad, has said it is a "mistake" that "young people here at Columbia … aren't offered the choice, the option of participating in military service."

The battle at the ROTC-less universities will not end quietly, but 40 years have passed. It is long past time to bring cadets back to the schools that kicked them out during the Vietnam War. Just don't expect it to be quick or easy. ■

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Letters

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Hoggy Heaven

I enjoyed reading Walter J. Boyne's December 2010 article, "Hog Heaven" *[p. 34].* As then-Capt. Paul Johnson's and Capt. Randy Goff's squadron commander, I remember their incredibly successful combat search and rescue mission like it happened last week, instead of almost 20 years ago. I'm also pleased to see PJ's enviable skill and talent as an officer and aviator have taken him far.

I do have a few issues with the article, though. The 353rd "Panthers" squadron was situated at the midpoint of the deployment, Moron AB, Spain, briefing for the second leg before our wing commander, then-Col. Sandy Sharpe, informed us we were to land at King Fahd Airport in Saudi Arabia. Secondly, my recollection of the private conversation I had with PJ over going to Fighter Weapons School or deploying with the squadron to an unknown location was as follows: You only get one shot at FWS; they don't give out invitations a second time. We don't know if or where the squadron is deploying, how long we might be deployed, and when, if ever, we'll be engaged in combat. I recommend going to FWS. He made the decision to take the sure thing, going to Nellis Air Force Base. I also remember Capt. Steve Phillis maintaining his position as squadron weapons officer until he was declared missing in action on Feb. 15, 1991. Here's to the lasting memory of "Syph." Finally, as a long-term subscriber to your wonderful magazine, I would have appreciated the correct spelling of my name for this article.

Col. Richard D. Shatzel, USAF (Ret.)
Falmouth, Mass.

The Element of Surprise

While John T. Correll's "Entebbe" article in your December 2010 issue *[p. 62]* gave proper credit to the role of airpower of the Israeli Air Force in the Entebbe hostage rescue, he did not give an accurate accounting of why and how the Israeli ground forces compromised the element of surprise vital to the mission *[p. 62].*

On p. 66, he wrote that a Ugandan sentry pointed his rifle at the Israeli commandos in the "dummy" Idi Amin Mercedes approaching the airport's old terminal. He speculated that the guard knew that the car was not Amin's. He continued, "They [the commandos] had to shoot their way through and immediately came under from the old control tower."

I consulted several sources, including *Secret Soldier,* the memoirs of Moshe Betser, who was a commando on the raid. The book bills him as Israel's most famous commando, a statement that may or may not be true.

Yoni Netanyahu, the commander of the assault troops, was in the Mercedes with his deputy, Betser. Three of the commandos, including Netanyahu and Betser, had silenced .22-caliber Beretta semi-automatic pistols. When Netanyahu saw the Ugandan sentry raising his rifle, Netanyahu indicated he wanted to shoot the sentry. Betser tried to dissuade him from doing so, telling him the sentry's actions were merely routine and simply consistent with a sentry on the alert and not a threat. In fact, according to Betser, the sentry had said, "Advance."

Netanyahu disregarded the advice, and he and another commando shot at the sentry with their silenced pistols. The sentry fell but stood up and aimed his rifle at the car, only to be cut down by a burst of fire from a Kalashnikov rifle carried by one of the commandos in the vehicle following the Mercedes; the commando thought that the sentry was a threat to the passing Mercedes. The element of surprise was compromised.

In his book, Betser observed that "the plan went wrong because of the silenced .22s and the long blast of Kalashnikov fire that followed."

Do you have a comment about a current article in the magazine? Write to "Letters," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. (E-mail: letters@afa.org.) Letters should be concise and timely. We cannot acknowledge receipt of letters. We reserve the right to condense letters. Letters without name and city/base and state are not acceptable. Photographs cannot be used or returned.—THE EDITORS

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AFA's Mission

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.

Letters

The "battle" over Entebbe remained controversial for years and perhaps remains so. In November 2006, *Haaretz,* an Israeli daily newspaper, revisited the arguments surrounding the raid and mentioned the silenced pistol incident in a story titled, "Still Fighting Over Entebbe." Betser's account of events infuriated the Netanyahus and was one of many controversies over who did what on the raid and who should receive the credit for its success.

In summary, the competence of the air and ground commanders must be mutual. The entire operation, ground and air, is endangered or degraded if either component exhibits poor judgment or commits an avoidable mistake. In this case, the ground operations were jeopardized by something as simple and unnecessary as ground troops, including—of all people—the assault unit commander, taking unnecessary shots with silenced pistols at an enemy guard who in reality posed no threat.

Fortunately for Israel, the operation was a success, notwithstanding the silenced pistols compromising one of the greatest weapons in warfare: surprise.

Col. Charles A. Jones,
USMC Reserve (Ret.)
Norfolk, Va.

Kudos to John T. Correll for his outstanding report of the Entebbe raid. Few realize the importance of this mission in shaping the buildup of US special operations over the last 30 years.

Right after the successful Entebbe mission, questions were asked in the Pentagon: "Can we do this kind of mission to rescue Americans halfway around the world?" The answer was, "Perhaps, but the presence of intermediate friendly countries willing to let our special ops C-130s refuel is critical."

[To avoid] having to depend on refueling bases on foreign soil, actions were started to modify special ops Combat Talons MC-130A and AC-130 Spectre Gunships for airborne refueling, which materialized in the mid- to late '70s. But probably the biggest influence of the Entebbe raid on US special operations was the realization and embodiment of the concept, "In special operations, you can get away with almost anything—once."

Col. Roland D. Guidry,
USAF (Ret.)
Destin, Fla.

The Bomber Question

The dilemma faced by defense officials concerning "The Bomber Question," eloquently stated by Executive Editor John A. Tirpak may reflect two disparaging views of Defense Secretary Gates and some uniformed service Chiefs about the military threats facing the nation in the next 50 years (December, p. 22). Philosophically, a false premise may produce a false conclusion, and it is suggested that a premise that a long-range manned bomber is essential to protect from potential enemies, with China the major probable antagonist (p. 24), and possibly Russia lurking in the back of the minds of the military planners, no doubt, may be fundamentally flawed. First, there is no credible rationale for either nation to war with the West, particularly the United States, and more pointedly, none was presented; and secondly, real current and future enemies may not best be constrained or defeated by manned, long-range bombers. Thus, in the absence of agreement of a realistic military threat to the nation, any conclusion as to what weapons are needed must by definition be flawed.

Lt. Col. Bill Getz,
USAF (Ret.)
Fairfield, Calif.

Seeking Photos From Cold War Veterans

First came *Air Force* Magazine's "World War II Scrapbook" in 1995. The "Korean War Scrapbook" and the "Vietnam War Scrapbook" followed in 1996. Now comes the "Cold War Scrapbook."

As with those earlier collections, the magazine seeks personal, candid, unofficial photos from current AFA members who served during the Cold War.

DOD defines the Cold War as the period between Sept. 2, 1945, and Dec. 26, 1991. We're looking for photos of Cold War service both in the US and overseas, but away from the active war zones of the time.

Please mail photos and detailed descriptions to: Cold War Victory Scrapbook, *Air Force* Magazine, 1501 Lee Hwy., Arlington, VA 22209-1198. Photos will be returned.

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Deadline is May 1.

Photos selected for *Air Force* Magazine's "Cold War Victory Scrapbook" will be published in August.

Washington Watch

By John A. Tirpak, Executive Editor

Budget downslope; Funded priorities; China surprise ....

FLAT BUDGETS AHEAD

The Pentagon's budget request for Fiscal 2012 will be $553 billion—less than the amount projected for 2012 in last year's budget, but still representing about three percent real growth over the 2011 continuing resolution. However, in real terms, the Pentagon budget is expected to flatten gradually over the next five years until it rises only at the rate of inflation in Fiscal 2015 and 2016.

The projection was announced by Defense Secretary Robert M. Gates Jan. 6. Although the detailed budget rollout is not expected until the middle of this month or early next, Gates called the event to explain how the Pentagon had answered his charge to find $100 billion worth of savings from service overhead functions.

Last summer, Gates promised the services they could translate the savings into spending on needed modernization projects, and in January explained what they would be spending the money on.

He also meant to pre-empt congressional enthusiasm for using defense as a bill payer in the deep federal budget cuts expected this year.

The Pentagon budget will be some $78 billion smaller over the next five years than it would have been under last year's plan, but Gates warned Congress not to cut more deeply.

"In recent weeks, there have been calls from various quarters for major reductions in defense spending, to include substantial cuts in modernization, force structure, troop levels, and overseas bases. I consider such proposals risky at best and potentially calamitous," Gates asserted. The US, he said, continues to play a vital role in providing stability and fostering political freedom around the world, and needs a healthy military to back that up.

"We shrink from our global security responsibilities at our peril, as retrenchment brought about by shortsighted cuts could well lead to costlier and more tragic consequences later—indeed, as they always have in the past." Drastic cuts in US military strength, such as after World War I, "make armed conflict all the more likely … with an unacceptably high cost in American blood and treasure," Gates said.

The budget proposal for 2012, Gates insisted, "represents, in my view, the minimum level of defense spending that is necessary, given the complex and unpredictable array of security challenges the United States faces around the globe."

Counting federal pay freezes, DOD-wide overhead reductions, and other changes, including shifts in economic assumptions and troop reductions, the Pentagon actually came up with about $180 billion worth of savings. Gates said some of that—about $28 billion—will have to be spent on "must pay" bills arising from the growing costs of doing business.

"These costs include health care, pay and housing allowances, sustainment of weapon systems, depot maintenance, base support, and flight hours and other training," Gates explained.

"Frankly, using these savings in this way was not my original intent or preference, but we have little choice … and better to confront [these costs] now than through raiding investment accounts later."

DOD photo by USAF MSgt. Jerry Morrison

Drastic cuts make conflict more likely.

Describing actual cuts that will appear in the budget, Gates said he's canceling a Marine Corps amphibious vehicle, downsizing the Army and Marine Corps starting in 2015, and planning to overhaul Tricare to make it more affordable.

He also put the short takeoff and vertical landing F-35B—the variant to be used by the Marine Corps—on a two-year "probation." If its schedule and design problems can't be fixed by then, he'll recommend terminating that variant of the Joint Strike Fighter. To offset the shortfall in fighters, he's added about 40 more F/A-18 Super Hornets to the Navy's budget.

THE AIR FORCE'S SHARE

The Air Force came up with about $34 billion worth of overhead savings as its share of Gates' charge to find funds that could be better applied to modernization accounts.

Without supplying details, Gates said USAF will consolidate two air operations centers in the US and two in Europe; consolidate three numbered air forces into their respective commands; reduce fuel costs in Air Mobility Command by $500 million; improve depot maintenance and sustainment processes; and reduce the cost of communications infrastructure by 25 percent. Other measures will be taken, but Gates did not elaborate.

He also said that 80 of 900 general officer billets across the services will be eliminated, and more still will be downgraded. One such change will be the conversion of the job of commander, US Air Forces in Europe, from a four-star to a three-star job.

SPENDING THE SAVINGS

In exchange for its streamlining efforts, the Air Force will get to proceed with some critical modernization programs.

First up, Gates ended suspense about USAF's long-range strike situation and said the service will be allowed to start a new bomber program.

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This "major area of new investment" will yield a "new long-range, nuclear-capable penetrating bomber … which will have the option of being remotely piloted." Gates said the aircraft will be designed and developed "using proven technologies, an approach that should make it possible to deliver this capability on schedule and in quantity."

Though he was imprecise about the timing of the project—saying it is "important that we begin ... now" and yield an operational capability "before the current aging fleet goes out of service"—Gates said the portfolio of deep-strike capability will be a "high priority" investment area, "given the anti-access challenges our military faces."

Other things the Air Force will spend its savings on are:

- Additional copies of the "most advanced" MQ-9 Reaper remotely piloted aircraft
- Moving "essential" intelligence, surveillance, and reconnaissance programs from the war budget to the permanent base budget
- Increasing procurement of Evolved Expendable Launch Vehicles to ensure access to space and sustain the industrial base in this area
- Active electronically scanned array (AESA) radars for the F-15 fleet
- More F-35 flight simulators

The choice to buy more Reapers is surprising, given Air Force statements that it will have more than enough for all conceivable missions once it achieves 65 "orbits" and fields the Gorgon Stare system, which will vastly expand the capability of the aircraft. The requirement for Reapers is expected to diminish as the wars in Iraq and Afghanistan wind down. The Air Force has said it planned to redeploy to other commands Reapers freed up by the eventual withdrawal from Afghanistan.

Gates said that the Air Force conventional takeoff version of the JSF—the F-35A—and the carrier version, the F-35C, are "proceeding satisfactorily," and will continue to have "a central place in the future of US military aviation."

Nevertheless, Gates is slowing the program somewhat to reduce concurrency between the flight-test program and production, against the possibility that major rework would be needed on produced aircraft if problems are found in development. To make up the lost time, the Pentagon plans to increase the F-35 production rate by 50 percent beginning in Fiscal 2013, which will also improve production efficiency.

MADE—STEALTHILY—IN CHINA

China revealed a flight test of a stealth-type aircraft on Jan. 11, marking the third nation—after the US and Russia—to develop such technology. The development, drawing excited speculation in aerospace circles, was greeted by the Pentagon largely with a public shrug.

The aircraft, believed to be called the Chengdu J-20, was exposed in a series of amateur images that began circulating on the Internet in late December.

The Pentagon's first comment, through a spokesman, was to point out that China's efforts to develop "advanced aircraft" had already been mentioned in last summer's multiagency report about China's military power. However, that report had not said anything about stealth. The spokesman declined to go further, saying the Pentagon doesn't discuss intelligence.

Defense Secretary Robert M. Gates, in mid-2009, predicted that in 2020, the US would field some 1,200 "fifth generation" combat aircraft, but China would have fielded "zero." Gates made the remarks in justification of his decision to terminate the F-22 at just 187 aircraft, roughly half the long-standing Air Force requirement.

Shortly after the photos became public, Gates, enroute to China for an official visit in January, told reporters, "We knew they were working on a stealth aircraft," but admitted "they may be somewhat further ahead in the development of that aircraft than our intelligence had earlier predicted."

The J-20: Stealthy or not?

He continued, "I never said … that their stealth aircraft didn't matter. What I said was that in 2020 or 2025, that there would still be a vast disparity in the number of deployed fifth generation aircraft" between the US and any other country. "I continue to stand by that statement," despite further stretch-outs of the F-35 program.

He acknowledged that the development of capabilities such as the Chinese stealth fighter are "matters of concern," but said they have been addressed with countermeasures to "anti-access programs" in the upcoming 2012 budget.

However, Gates hopes "the need for some of these capabilities is reduced" through a "strategic dialogue" with China.

Intelligence analysts for the Navy, asked to assess the images, noted that China has said it is developing "a next generation fighter that will have signature reduction and supercruise performance." While the photos seemed "to be this aircraft," they don't expect it "to be operationally fielded for some time."

The J-20 "was likely designed to counter US F-22 and F-35 capabilities, and the employment of this fighter in numbers will be both a qualitative and quantitative improvement" in the capabilities of the People's Liberation Army Air Force, the Navy analysts said.

The front of the aircraft bears strong resemblance to US designs, with a nose and canopy suggestive of the F-22 and air intakes reminiscent of those on the F-35. The rear of the aircraft, however, has standard round exhaust nozzles, which are not stealthy, suggesting design priority was given to low observability in the forward quarter.

At an apparent length of more than 70 feet, the J-20 appears to be designed for speed, stealth, and range. It may not be a true air superiority fighter at all, but more of an intermediate-size attack aircraft akin to USAF's own retired F-111. A pure air superiority stealth design, said to be called the J-12, has long been rumored under development by Shenyang, China's other fighter maker.

Vice Adm. David J. Dorsett, deputy chief of naval operations for information dominance and head of Navy intelligence, told defense reporters in early January that while the J-20 is "not a surprise," US intelligence has a track record of misjudging the speed with which China can develop new technologies.

"The last several years, … we have been pretty consistent in underestimating the delivery and IOC [initial operational capability] of Chinese technology weapon systems," Dorsett said.

He also said it's unclear how much development time is ahead before China has a functional stealth aircraft.

"Integrating that into a combat environment is going to take some time," he noted. ■

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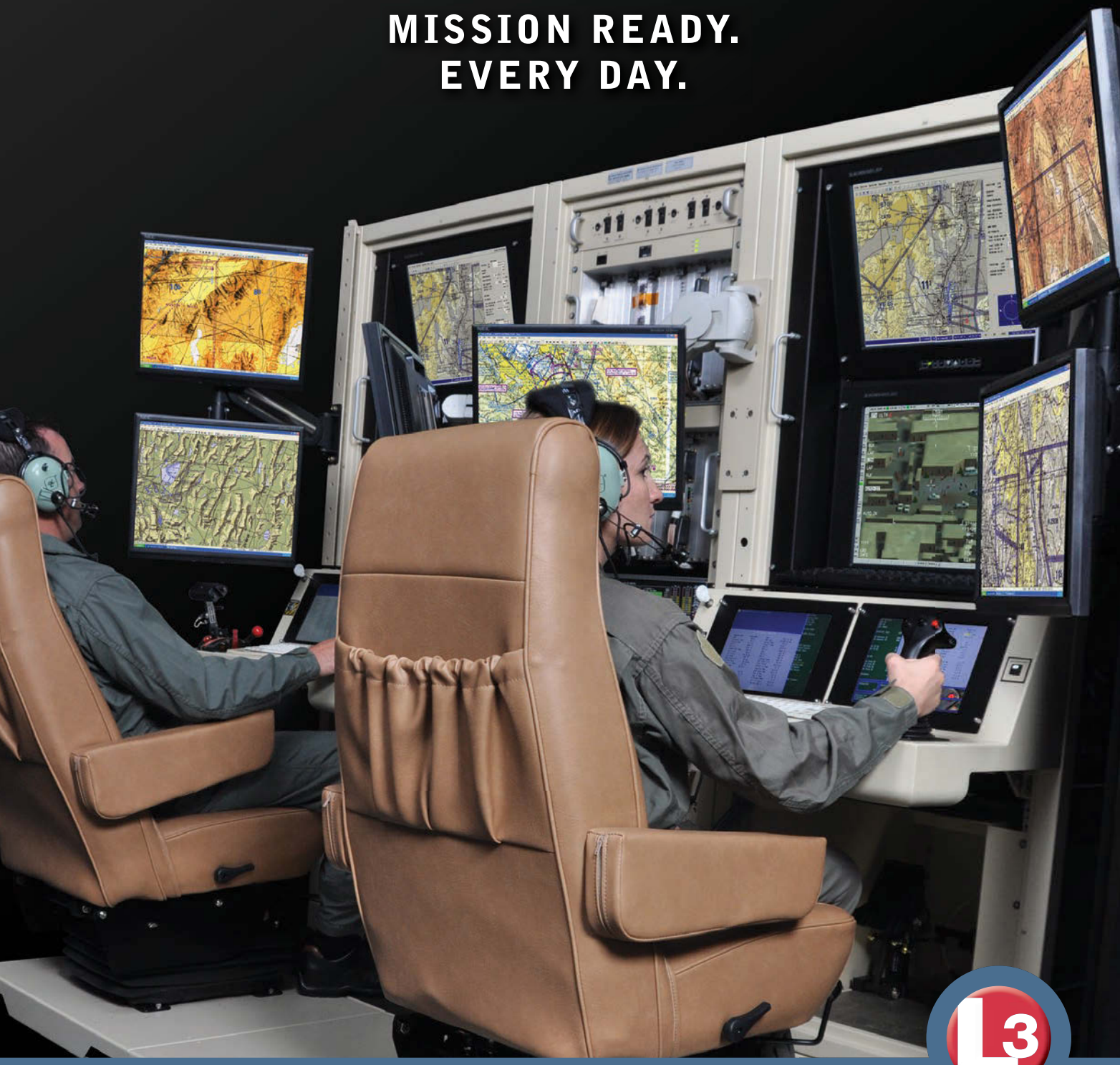

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Air Force World

By Aaron Church, Associate Editor

New START Ratified

The Senate ratified the New Strategic Arms Reduction Treaty with Russia on Dec. 22, by a margin of 71 to 26.

"This is the most significant arms control agreement in nearly two decades, and it will make us safer and reduce our nuclear arsenals along with Russia," President Obama said during a White House press briefing following the vote.

New START limits both the United States and Russia to a strategic arsenal of 1,550 deployed warheads, 700 deployed launchers, and 800 launchers overall. President Obama and Russian President Dmitry Medvedev signed the treaty on April 8, 2010.

Despite objections by many Republican senators, 13 of them ultimately voted in favor of the deal, which then passed to Russia's Parliament for an expected approval.

The Duma, Russia's lower legislative body, approved the treaty in a first reading by a vote of 350 to 58 on Dec. 24, with final approval expected early this year. The upper house, Russia's Federation Council, also had to certify the agreement.

Nuclear inspections can recommence within 60 days of Russia's Parliament ratifying the New START. Data sharing on the status and deployment of each country's strategic nuclear forces would begin 15 days before that.

President Obama said the next step with Russia after New START will be to work toward reducing tactical nuclear weapons. Russia has far more such weapons than the US, a repeated point of contention during the Senate debate on New START.

Welsh Takes Command at USAFE

Gen. Mark A. Welsh III assumed command of US Air Forces in Europe during a December ceremony at Ramstein AB, Germany. He succeeds Gen. Roger A. Brady, who had commanded USAFE since January 2008, and retired effective Feb. 1, after 41 years of service.

"This command is in great shape," said Welsh at the change-of-command ceremony. "My goal is just to make things even better," he added. Welsh took over USAFE after more than two years as associate director for military affairs with the CIA.

This is Welsh's third tour in Europe during his 34-year career. The first was a flying assignment, and the second, from 2001 to 2003, was as USAFE's director of plans and programs.

Global Strike Leadership Changes

Lt. Gen. James M. Kowalski took command of Air Force Global Strike Command at Barksdale AFB, La., succeeding Lt. Gen. Frank G. Klotz, who is retiring. Kowalski accepted the command flag from Chief of Staff Gen.

USAF photo by SSgt. Mike Meares

Implementing DADT Repeal

Following the Senate's repeal of the Don't Ask, Don't Tell policy, Defense Secretary Robert M. Gates said the Pentagon would move out "immediately" on planning to implement the new policy.

Gates said the Defense Department would carry out the change "carefully and methodically, but purposefully" in consultation with the military service Chiefs and combatant commanders, to avoid disruption to unit cohesion.

Speaking after the Senate's repeal, Dec. 18, Gates reminded service members that DADT remains in effect for the time being, noting that it "will take an additional period of time" before President Obama, the Chairman of the Joint Chiefs of Staff, and he could certify implementation.

Like the House, which overturned the policy Dec. 15, the Senate voted 65 to 31 to overturn the ban, acting on a stand-alone measure, separated from the defense authorization bill.

"No longer will able men and women who want to serve and sacrifice for their country have to sacrifice their integrity to do so. We will be a better military as a result," said Adm. Michael G. Mullen, Chairman of the Joint Chiefs of Staff.

Norton A. Schwartz during a change-of-command ceremony Jan. 6.

Kowalski is now responsible for organizing, training, and equipping the Air Force's Minuteman III ICBM and nuclear-capable bomber forces. Prior to the change of command, Kowalski received his third star.

AFGSC is the Air Force's newest major command, standing up in August 2009, reaching full operational status in September 2010. Klotz had led Global Strike Command since its activation. His retirement, effective March 1, ends more than 37 years of uniformed service.

Everyone Is Accountable

The Air Force took administrative action against five generals in December, following a lengthy Pentagon investigation that concluded they had a role in going $87 million over budget for permanent-change-of-station moves in 2005.

Based on the Defense Department comptroller's investigation, letters of admonishment were issued to Gen. Roger A. Brady, Gen. Stephen R. Lorenz, Lt. Gen. Glenn F. Spears, Maj. Gen. Anthony F. Przybyslawski, and retired Brig. Gen. Sandra A. Gregory.

In 2005, Brady oversaw personnel issues on the Air Staff, and Lorenz managed the Air Force's budget. The others held senior budget and personnel positions within the Air Force.

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MSgt. Justin Papalia, a jumpmaster with the 36th Contingency Response Group, checks out the drop zone during proficiency training at Andersen AFB, Guam. A C-17 aircrew from the 535th Airlift Squadron, on temporary assignment from JB Pearl Harbor-Hickham, Hawaii, to Guam, provided four separate jump opportunities for the 36th CRG. The 535th ALS also provided pallet-dropping training .

"Everyone is accountable for their actions, and we expect the highest standards of conduct from everyone in the Air Force—regardless of rank—and senior leaders have a special responsibility to those who follow them," said Air Force Secretary Michael B. Donley in a statement.

KC-135 Bows Out of Grand Forks

Fifty years of tanker operations at Grand Forks AFB, N.D., ended Dec. 31, with the departure of the 319th Air Refueling Wing's last KC-135 Stratotanker.

The base's 905th Air Refueling Squadron, 319th Maintenance Group, and 319th Aircraft Maintenance Squadron all inactivated at the end of 2010. Air Mobility Command Vice Commander Lt. Gen. Vern M. Findley II flew the wing's final KC-135 to McConnell AFB, Kan., Dec. 4, completing the tanker drawdown as part of BRAC 2005.

Findley said Grand Forks will "continue to play a critical role" in national defense as the base takes on the new role of operating RQ-4 Global Hawk remotely piloted aircraft, the first of which is due to arrive this summer.

Key Field Picked for C-27J Training

Key Field's Air National Guard base in Meridian, Miss., is the Air Force's preferred location to bed down two C-27J transports that will serve as training assets in the 38-aircraft C-27 Spartan fleet, service officials announced Dec 8. Key Field beat out Mansfield Lahm Airport in Ohio to host conversion training.

"This base is the right location for these two C-27J training aircraft," said Kathleen I. Ferguson, USAF's deputy assistant secretary for installations. Pending environmental impact analysis, the two aircraft would arrive in the second half of Fiscal 2014.

Key Field was already selected to host four operational C-27s. Operational C-27s also are slated thus far for Mansfield; Baltimore; Battle Creek, Mich.; East Granby, Conn.; Fargo, N.D.; and Great Falls, Mont.

Photo by Jim Haseltine

Old Frame, Meet High Tech: *Two Hawker Beechcraft AT-6 Light Attack aircraft return from a sortie. The AT-6 is part of the Air National Guard's ongoing light attack assessment and has been the focus of USAF's efforts to find modern solutions to capability gaps in counterinsurgency and close air support operations.*

X-37B Is Under the Microscope

Engineers have been scrutinizing the Air Force's X-37B orbital test vehicle (OTV-1) since its return to Earth in December, looking for lessons learned as the second ship is prepared for launch this spring. The spacecraft spent more than 220 days in orbit.

The checks are meant to discover anything that would affect the launch or operation of OTV-2, which is almost identical in configuration to the first vehicle.

The inspection of OTV-1 has revealed several areas of damage by space debris. One of the vehicle's tires also ruptured during its landing at Vandenberg AFB, Calif.

Boeing builds the X-37, and in late December was readying OTV-2 for shipment to Cape Canaveral, Fla., for launch. Like OTV-1's time on orbit, OTV-2's flight will focus on evaluating the vehicle itself rather than any payload it may carry.

Barksdale Realigns Reserve

As of Jan. 1, Air Force Reserve Command's B-52 bomber operations at Barksdale AFB, La., are now managed by the newly activated 307th Bomb Wing.

The unit replaces the just-inactivated 917th Wing as the overseer of the Reservists' activities, which include running USAF's sole B-52 schoolhouse and operational and maintenance cooperation with Barksdale's combat-ready, nuclear-capable B-52s, assigned to the active duty 2nd Bomb Wing.

Along with the change, the 307th BW cedes control of the AFRC A-10s based at Barksdale, passing oversight to the 442nd Fighter Wing at Whiteman AFB, Mo.

Reserve officials at Barksdale stated that reorganization permits full attention to be focused on the primary bomber mission.

Air Force Reserve chief Lt. Gen. Charles E. Stenner Jr. marked the official change in a ceremony Jan. 8.

Pilot Error Felled C-17

Pacific Air Forces' investigation into the crash last July of a C-17 near JB Elmendorf, Alaska, found clear and

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compelling evidence that pilot error caused the mishap, which killed the four airmen aboard, according to an accident report.

"The pilot violated regulatory provisions and multiple flight manual procedures, placing the aircraft outside established flight parameters at an attitude and altitude where recovery was not possible," concluded PACAF's investigation, the report of which was released Dec. 10.

The Sitka 43 crew, assigned to Elmendorf's 3rd Wing, was practicing for an upcoming air show when the aircraft stalled at low altitude and crashed. Killed were Maj. Michael H. Freyholtz, Maj. Aaron W. Malone, Capt. Jeffrey A. Hill, and MSgt. Thomas E. Cicardo.

The destroyed C-17 was valued at an estimated $184 million and also caused damage to a segment of the Alaska Railroad. Video of the mishap flight, with the impact deleted out of respect for the families, was released by PACAF along with its report.

Last A-10A Leaves Osan

The 25th Fighter Squadron at Osan AB, South Korea, completed transition to the A-10C ground-attack aircraft with the official departure of the unit's last A-10As on Dec. 4. Osan's A-10Cs began arriving last March.

The C model Warthog's improved features include digital cockpit upgrades and the ability to deliver satellite guided munitions.

These changes "provide attack pilots with a truly integrated suite of sensors, aircraft, and weapons that build situational awareness and facilitate the rapid destruction of targets," said Maj. Andrew Taylor of Osan's 51st Operations Group. "In short," he added, "the A-10C perfects what was already the world's most respected CAS [close air support] platform."

The A-10C reached initial operational capability in September 2007. Osan began A-10 operations in 1982, and its A models have joined the Air National Guard.

CV-22 Crash a Mystery

After an "exhaustive investigation," Air Force officials still don't have "clear and convincing evidence" as to what exactly caused a CV-22B to crash April 9, 2010, near Qalat, Afghanistan, killing four and injuring the remaining 16 on board.

The investigation ruled out enemy action, brownout, and vortex ring state for the loss of the aircraft. However, to protect classified gear aboard the aircraft, much of the wreckage was destroyed in the field before investigators could examine it.

Because the aircraft's flight data and system diagnostic "black boxes" were destroyed for security purposes, officials were unable to pinpoint the cause of the accident, according to the investigation report released Dec. 16.

A contingency plan covering what to do if a CV-22 should crash had not been published beforehand, leaving responders to conduct the recovery by memory. Though some equipment was on a list of items to collect in such circumstances, in the ensuing chaos, recovery personnel were not asked to recover the equipment before destroying the wreckage, despite their willingness to do so.

The accident board did, however, determine several factors in the mishap, including inadequate weather planning, poorly executed approach, low visibility, adverse tailwind, task saturation, "negative transfer" of learned behavior for a different system, and an unanticipated sink rate due to loss of engine power.

Though the president of the accident investigation board, Brig. Gen. Donald D. Harvel, stated in the report that based on the "preponderance of the evidence" 10 factors substantially contributed to this mishap, the Air Force Special Operations Command's vice commander, Lt. Gen. Kurt A. Cichowski, argued in an addendum that there wasn't enough credible evidence to support Harvel's finding that engine trouble played a role.

After reviewing the report and Cichowski's addendum, Chief of Staff Gen. Norton A. Schwartz reopened the investigation, ordering Harvel to analyze additional information. Upon doing so, Harvel increased the estimated ground speed upon impact from 86 to 92 mph, and determined that "only an aircraft performance issue could completely account for the [mishap pilot's] decision to execute a roll-on landing."

Harvel wrote in conclusion that it was highly unlikely that a "very experienced and competent [pilot] would have chosen to execute a roll-on landing on rough terrain if he had power available to go around."

Goodbye Girl: ***Geraldine Hoff Doyle, the face of "Rosie the Riveter"—an iconic symbol of American "can-do-spirit" during World War II—died Dec. 26 in Lansing, Mich. The Westinghouse War Production Coordinating Committee commissioned artist J. Howard Miller to paint a poster of a war worker, which he modeled on Doyle without her knowledge.***

Talons Headed for Langley

Seven T-38 Talons will be stationed at JB Langley, Va., for use as companion trainers for the 1st Fighter Wing, which operates the F-22. The Talons will provide F-22 pilots with additional flight hours, simultaneously serving as dissimilar adversaries for air-to-air combat training.

Capt. Shannon Collins, Air Combat Command spokeswoman, said the T-38s are scheduled to arrive between March and September.

Dual-qualified F-22/T-38 pilots, as well as those awaiting F-22 training, will fly the T-38s, meaning no additional pilots will be assigned to Langley.

The Langley-bound aircraft are reconditioned ex-South Korean T-38Bs, and not Air Education and Training Command T-38Cs, industry officials reported.

M1 Support Services of Denton, Tex., will maintain the type. USAF may add a T-38 contingent at Tyndall AFB, Fla., which also operates the Raptor, for similar purposes.

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F-16's Future Intertwined With F-35

The Air Force and Air National Guard will almost certainly seek a service life extension program for Block 30 F-16s in the Fiscal 2012 budget, but the extent of improvements is tied to the health of the F-35 program.

The ultimate number of F-16s USAF will include in a SLEP depends on the conclusions drawn from the Defense Department review of the F-35 program, ANG Director Lt. Gen. Harry M. Wyatt III said in December.

The bulk of the Guard's F-16 Block 30 fleet is scheduled to exit the inventory by 2018, Wyatt said, and based on current estimates, this comes at least four years sooner than the Guard anticipates delivery of its first F-35.

While the need to address the F-16 fleet isn't a new development, it is a pressing one. The F-35 program schedule again slipped an estimated 13 to 15 months in 2010, further widening the gap between F-16 end-of-life and F-35 delivery.

Defense Secretary Robert M. Gates announced further F-35 delays in early January, although he also said the Pentagon plans to boost production of the fighter by 50 percent in the out-years.

Wyatt said the Air Force has recognized the situation and is working with the Air Guard to bridge the gap until sufficient numbers of F-35s arrive. "There are several ways we can do that," said Wyatt. Some F-16s, such as Block 30 Vipers receiving structural reinforcements, will "buy us a year or two of extra life in those aircraft." Meanwhile, radar and avionics upgrades are coming to Block 40 and 50 F-16s, most of which reside in the active duty inventory.

The Guard's F-16 Block 30 units are primarily responsible for the US air sovereignty alert mission and are also included in air expeditionary rotations and contingency scenarios.

C-130s Respond to Israeli Fires

C-130Js of the 37th Airlift Squadron at Ramstein AB, Germany, delivered tons of airborne fire retardant to Israel in December, helping to battle deadly wildfires. The fires broke out in northern Israel's Carmel Mountains, ravaging the region surrounding Haifa.

Additionally, Air Force Reserve Command's 302nd Airlift Wing at Peterson AFB, Colo., deployed two of its C-130s equipped with the Modular Airborne Firefighting System (MAFFS), directly aiding the firefighting effort. The aircraft and some 50 Reservists responded within 24 hours of the call, marking the fastest international response time in the 38-year history of MAFFS operations.

Thanks to multinational assistance, Israeli officials declared the fires under control on Dec. 5. They were the worst wildfires in Israel's history, displacing more than 17,000 people and killing more than 40.

USAF photo by TSgt. Tony R. Tolley

That Doesn't Belong There: *TSgt. Shawn Merchant, a crew chief with the 4th Aircraft Maintenance Squadron at Seymour Johnson AFB, N.C., removes the foreign object inspection mats from an F-15E assigned to the 4th Fighter Wing. Foreign object inspections are part of the postflight routines for crew chiefs and are vital to keeping the jet aircraft's engines running smoothly.*

912th Is Back in Action

The Air Force activated—again—the 912th Air Refueling Squadron in December, after inactivating the unit in March 2009 as part of the BRAC action to end the KC-135 air refueling mission at Grand Forks AFB, N.D. The newly revived 912th ARS now will operate at March ARB, Calif., under the Air Force Reserve Command's 452nd Air Mobility Wing as an active associate unit, one of several Air Mobility Command recently has formed with AFRC.

Some 200 active duty airmen, including more than 30 aircrew and 130 aircraft maintainers, are set to begin work with March Reservists. Lt. Col. Brice Middleton, 912th ARS commander, explained, "Reserve airmen aren't always necessarily available, but the jets are." Now, active duty personnel will fill the gaps, flying missions Guardsmen and Reservists can't.

The active duty squadron will remain under administrative control of the 92nd Air Refueling Wing at Fairchild AFB, Wash.

AESA Radar Flies on an F-16

Raytheon announced completion of a series of flight trials of its Advanced Combat Radar—which Raytheon calls RACR—on an Air Force F-16 at Edwards AFB, Calif., in December.

The active electronically scanned array radar system executed a variety of air-to-air and air-to-ground modes, according to the company.

"Successfully flying RACR on an F-16 is another critical step in demonstrating how we've optimized our AESA technology for F-16 customers," said Jim Hvizd, Raytheon Space and Airborne Systems' vice president for international business development.

RACR is a company-funded project that Raytheon said it developed in 24 months.

"Raytheon's AESA technology brings unparalleled capability and reliability to the F-16 at an acquisition cost comparable to the old mechanically scanned radars," said Brian MacDonald, RACR program manager.

Northrop Grumman is also offering an AESA system for the F-16 called the Scalable Agile Beam Radar.

C-17 Reaches Two Million Hours

The Air Force's C-17 transport fleet has passed two million total flying hours less than 18 years after the Globemaster III entered operational service.

A C-17 operating from Bagram Airfield, Afghanistan, reached the flight-hour

Photo: United States Air Force

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Casualties

By Jan. 19, a total of 1,453 Americans had died in Operation Enduring Freedom. The total includes 1,451 troops and two Department of Defense civilians. Of these deaths, 1,131 were killed in action with the enemy while 322 died in noncombat incidents.

There have been 10,140 troops wounded in action during OEF.

Afghans Complete Training

Afghan Air Force 1st Lt. Abdul Saboor Amin and 1st Lt. Ahmad Fawad Haidari have returned to Kabul, Afghanistan, to begin Mi-17 helicopter pilot training after successfully completing 16 months of language and pilot training in the United States.

Amin and Haidari are the first two AAF helicopter pilots to finish the entire US pilot training course.

The two pilots began helicopter training with six months of language instruction in San Antonio, followed by flight training at Fort Rucker, Ala.

In Kabul, they will undergo six to eight months of Mi-17 conversion training jointly developed by US and Croatian advisors at the 438th Air Expeditionary Wing. They will eventually become instructor pilots.

Afghans Retire An-26s

The Afghan Air Force has retired the last of its Antonov An-26 transport aircraft, taking another important step forward in its transition to a more modern and capable force, with the help of US Air Force and NATO air advisors. Eventually, 20 refurbished C-27s will be the nation's primary airlift aircraft.

At peak strength in 1986, the Afghans operated 36 An-26s in roles such as light transport, medical and personnel evacuation, airdrop, and VIP shuttle. "Every aircraft is important, but the An-26 has executed more missions than any other aircraft in the history of this air force," said Brig. Gen. Assadullah Hashmi, AAF group operations commander.

Afghan airmen, past and present, gathered Dec. 24, at the AAF base in Kabul for the retirement ceremony. With the An-26s gone, the AAF will turn to phasing out the An-32 transport fleet by this summer.

Questions Surround NATO AWACS for Afghanistan

Army Gen. David H. Petraeus, commander of allied forces in Afghanistan, has requested NATO E-3 AWACS aircraft to relieve US air traffic controllers on AWACS now flying over Afghanistan.

Since the country lacks an integrated air traffic control system, USAF AWACS teams currently manage Afghan airspace, in addition to providing airborne early warning. The double duty is putting a strain on Air Force assets and crews.

NATO headquarters is evaluating the request, which will then go to the member states for approval. The proposed deployment will likely meet German opposition, according to the German magazine *Der Spiegel.*

German personnel make up a third of the multinational AWACS force, but as the Afghan war is unpopular in Germany, Berlin will be hard pressed to get support for the participation of up to 100 additional German airmen for Afghan operations.

Germany's Bundestag capped contribution at 5,350 personnel, requiring a further reshuffling of Germany's contribution to allow AWACS to deploy.

Germany permitted the NATO AWACS operational mandate in Afghanistan to lapse in December 2009, after E-3s were denied overflight of Turkmenistan and Azerbaijan. If deployed, aircraft would likely fly from Konya, Turkey, diverting over Iraq, Oman, and Pakistan to avoid denied airspace on the way to Afghanistan.

milestone for the fleet on Dec. 10, during an airdrop mission over Afghanistan, according to US Air Forces Central.

USAF has been operating the Boeing-built C-17 since June 1993.

According to AFCENT, C-17s surpassed one million flying hours in 2006, after 14 years of service. It took just four more years to double that figure.

Misaligned Missile Killed Airman

Misaligned equipment caused the death of SrA. Richard A. Gallelli Jr. during a cruise missile loading drill in April of last year, at Minot AFB, N.D., Air Force investigators determined. Gallelli, 22, was a member of Minot's 17th Munitions Squadron.

According to an Air Force Materiel Command report released in December, Gallelli was part of a team training to fit Air Launched Cruise Missiles to the B-52's wing pylon weapons station. Although the airmen were following the proper procedures and the equipment in question was functioning properly, they were not aware that the equipment was misaligned, allowing the missile to roll off, killing Gallelli.

AFMC has since implemented "a short-term engineering solution" to the problem and is developing a permanent fix so this mishap cannot be repeated, according to an AFMC news release.

Midcourse Misses Again

The Ground-based Midcourse Defense system failed for the second time to shoot down a ballistic missile target over the Pacific Ocean, according to the Missile Defense Agency.

On Dec. 15, a target missile launched from the Kwajalein Atoll in the western Pacific and the ground-based interceptor missile fired successfully from Vandenberg AFB, Calif., deploying its kill vehicle for the hoped-for collision with the target missile in space.

Though last January's GMD test failed due to a glitch with a sea-based radar, MDA said that all sensors, including the sea-based X-band radar system, performed as planned on the second test.

MDA is investigating the cause of the failure; a date for the GMD's next test will be determined after the problem is identified.

VIP Upgrade Arrives

The 76th Airlift Squadron at Ramstein AB, Germany, received its first C-37A, boosting US Air Forces in Europe's distinguished visitor support fleet. A military version of the Gulfstream V ultra-long-range business aircraft, the C-37A arrived from Gulfstream's facility in Savannah, Ga., Dec. 7.

With a service ceiling of 51,000 feet, maximum speed of Mach 0.885, and range of 6,000 miles, the Gulfstream offers an improved communications system, keeping dignitaries connected throughout the flight.

"We currently cannot meet the demand with our aircraft inventory, and this new addition will be a great help," said Lt. Col. Tom Dowdle, 76th AS standards and evaluations chief. With the new aircraft, he added, "our government and military's senior leaders can fly nonstop from Ramstein to San

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Senior Staff Changes

RETIREMENTS: Gen. Roger A. **Brady,** Maj. Gen. Anthony F. **Przybyslawski.**

CHANGES: Brig. Gen. Jack L. **Briggs II,** from Cmdr., 455th AEW, AFCENT, ACC, Bagram Airfield, Afghanistan, to Dep. Cmdr., Canadian North American Aerospace Defense Region, NORAD, Winnipeg, Manitoba, Canada ... Brig. Gen. (sel.) John L. **Dolan,** from Cmdr., 8th FW, PACAF, Kunsan AB, South Korea, to Dep. Dir., LL, OSAF, Pentagon ... Gen. Claude R. **Kehler,** from Cmdr., AFSPC, Peterson AFB, Colo., to Cmdr., STRATCOM, Offutt AFB, Neb. ... Lt. Gen. Darrell D. **Jones,** from Cmdr., AF District of Washington, JB Andrews, Md., to DCS, Manpower, Personnel, & Svcs., USAF, Pentagon ... Brig. Gen. John R. **Ranck Jr.,** from Dep. Dir., Strat. Effects, US Forces-Iraq, CENTCOM, Baghdad, Iraq, to Dir., Warfighter Systems Integration, Office of Info. Dominance and Chief Info. Officer, OSAF, Pentagon ... Brig. Gen. Darryl L. **Roberson,** from Dep. Dir., LL, OSAF, Pentagon, to Cmdr., 455th AEW, AFCENT, ACC, Bagram Airfield, Afghanistan ... Gen. Mark A. **Welsh III,** from Assoc. Dir., Mil. Spt., CIA, Washington, D.C., to Cmdr., USAFE, Ramstein AB, Germany.

SENIOR EXECUTIVE SERVICE RETIREMENTS: David M. **Jerome,** Sue A. **Lumpkins,** Martin M. **Mazick,** Charles D. **Metcalf,** Cathlynn B. **Novel,** Gregory H. **Petkoff,** Eugene G. **Pino,** Mary C. **Puckett,** David R. **Russell.**

SES CHANGES: Thomas F. **Christian Jr.,** to Dir., AF Ctr. for Systems Engineering, AFIT, AETC, Wright-Patterson AFB, Ohio ... Gregory L. **Garcia,** to Dep. Dir., Strat. Comm., US Forces-Iraq, CENTCOM, Baghdad, Iraq ... Evan J. **Hoapili,** to Assoc. Dir., Capability & Resource Integration, STRATCOM, Offutt AFB, Neb. ... Robert S. **Jack II,** to Dir., Comm., AFGSC, Barksdale AFB, La. ... Noel C. **Nolta,** to Dep. Dir., Public Affairs, Office of the SECAF, Pentagon ... Joseph D. **Rouge,** to Spec. Asst. to the Dep. Undersecretary of the AF, Space Prgms., Office of the Undersecretary of the AF, Pentagon ... John W. **Snodgrass,** to Dep. Dir., Manpower, Orgn., & Resources, DCS, Manpower, Personnel, & Svcs., USAF, Pentagon ... Barbara J. **Sotirin,** to Dep. Dir., Strategy, Policy, Prgms., & Log., TRANSCOM, Scott AFB, Ill. ... Gregory G. **Stanley,** to Assoc. Dir., Log., DCS, Log., Instl., & Mission Spt., USAF, Pentagon. ▪

Francisco, Stuttgart to Johannesburg, or Frankfurt to Beijing."

The C-37A joins the squadron's varied fleet, serving alongside C-21A, C-20H, and C-40B aircraft.

SCA Carts Phantom Ray

On Dec. 13, Boeing flew the company's Phantom Ray unmanned aircraft test bed atop a Boeing 747 modified for NASA as a space shuttle carrier. The piggyback test flight around Lambert-St. Louis Airport was the first time the 747 carried an aircraft other than the space shuttles.

Having verified that both aircraft were aerodynamically and structurally safe, on Dec. 14, the SCA ferried the Phantom Ray 1,800 miles to Edwards AFB, Calif., for flight testing.

USAF photo by SSgt. Brian Ferguson

On the Road Again: *SrA. Aaron Royston (right) and Army Sgt. Johnny Hoyos, both assigned to Provincial Reconstruction Team Zabul, patrol a road in that province's Mizan district in Afghanistan during a shura Jan. 4. The shura—meaning "council"—drew local leaders to talk about security and education and to open the road from Qalat, the provincial capital, to the district. Previous visits to the region could only be made by air due to the danger from IEDs and insurgents.*

The Phantom Ray was completed from parts generated during USAF's aborted X-45 program.

Successfully rigging Phantom Ray for tandem flight was "a real feat of engineering," according to Phantom Ray Program Manager Craig Brown, requiring fabrication of a custom attachment rig.

The experimental air vehicle completed ground taxi tests at Lambert in November.

Corrosion Never Sleeps

The Air Force expects to pay $228 million to address corrosion issues with the F-22 fighter by 2016, according to a recent Government Accountability Office report. Areas such as the F-22's paint, gap-filling material, and small drainage holes have contributed to corrosion problems.

The Defense Department is doing a good job of ensuring that the same problems don't plague the F-35 strike fighter, GAO said.

The F-35 features different gap-filling materials, a design with fewer seams, and more, adequately sized drain holes. However, the F-35 uses a nonchromate primer, although this treatment ultimately proved ineffective in preventing corrosion on the F-22.

GAO auditors called for DOD's acquisition office to establish a process for monitoring and assessing corrective actions taken by the F-22 and F-35 program offices. Pentagon officials concurred with most of the recommendations.

Classic Associate at Kirtland OK'd

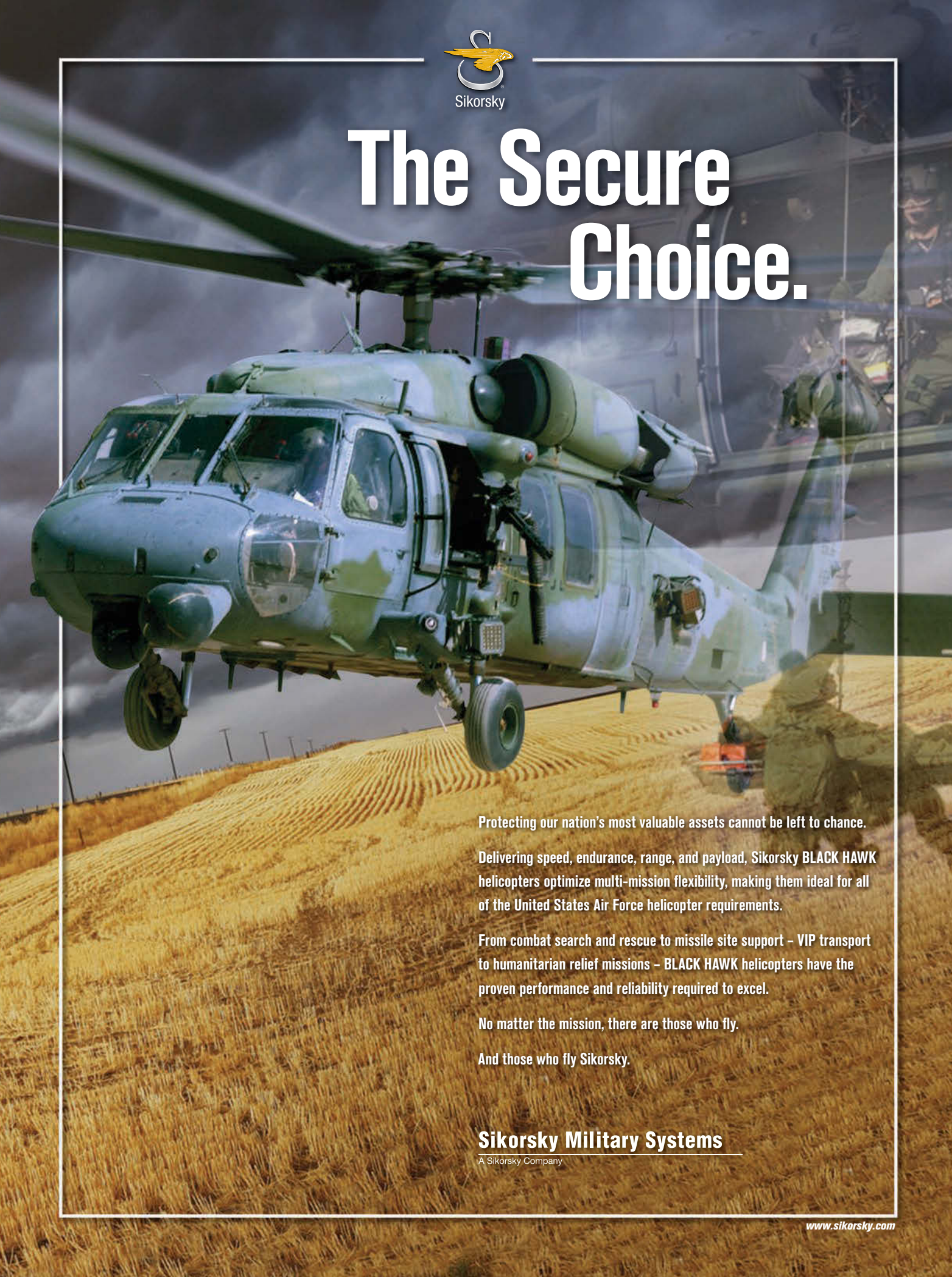
Gen. Norton A. Schwartz, Air Force Chief of Staff, approved a new classic associate unit at Kirtland AFB, N.M., for the HC/MC-130P, HH-60, and UH-1 flight training mission.

The change aligns elements of the New Mexico Air National Guard's 150th Wing with the active duty 58th Special Operations Wing.

Under the partnership, the 58th SOW will serve as the host and have primary aircraft responsibility, with the Air Guard sharing in operations and maintenance of assets.

Guardsmen with the 150th Wing have already begun training for this mission and are preparing for secondary roles in rapid, deployable engineering, power production, and intelligence targeting.

"This new association maintains a cadre of qualified flight instructors with long-term continuity and preserves New Mexico Air National Guard manpower to support state emergencies," according to a DOD press release.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Lockheed Martin photo by Liz Kaszynski

Fill 'er up: *A conventional takeoff and landing F-35A—the third to join the test fleet at Edwards AFB, Calif.—gets topped off by an NKC-135 while cruising west toward the base from Fort Worth, Tex. The F-35 program reached the 400-flight mark for 2010 on Dec. 13.*

C-130 Shuttles Manatee

Members of the active duty 6th Air Mobility Wing and Puerto Rico Air National Guard's 156th Airlift Wing came together Dec. 9 to airlift an injured West Indian manatee from MacDill AFB, Fla., to its new home in Puerto Rico.

The Fish and Wildlife Service asked for assistance in moving the 840-pound male sea mammal, which was nicknamed "UPC" because injuries it sustained from a boat propeller resembled a bar code.

Airmen with MacDill's 6th Logistics Readiness Squadron helped load UPC onto a C-130H at MacDill for the ride to San Juan.

Biologists and veterinarians accompanied UPC. In Puerto Rico, UPC will serve as a surrogate parent to orphaned manatees in rehabilitation, eventually taking up a new life at the Puerto Rico Zoo.

Boeing photo

Hitching a Ride: *Boeing's new Phantom Ray multimission unmanned aircraft hitched a ride atop NASA's shuttle carrier Aircraft Dec. 13. The flight marked the first time the modified Boeing 747 had carried any aircraft other than the space shuttle. The day after this 50-minute flight around St. Louis, the 747 ferried the Phantom Ray to Edwards AFB, Calif., for flight tests.*

Mountain Home for Saudi Eagles

Mountain Home AFB, Idaho, is the Air Force's preferred location to host Royal Saudi Air Force F-15SA training.

Saudi Arabia is building a large force of F-15SAs under a newly approved US foreign military sale. As part of the deal, the Saudis have requested potential standup of a 12-aircraft training contingent in the US.

Air Force officials identified Mountain Home as the preferred site, primarily due to the presence of USAF F-15E units there, as well as suitable weather conditions, nearby desert environment, and the availability of airspace and infrastructure for training.

Notional plans call for a five-year Saudi presence to start in 2014. The contingent of 12 F-15SA aircraft would arrive sometime that year.

Mountain Home hosts Singapore's F-15SG fighter training, but beddown of the Saudi detachment is contingent upon the results of an environmental impact analysis.

AWACS Upgrade Tested

The Air Force has tested a new identification, friend or foe, or IFF, system for E-3 AWACS aircraft. The system could dramatically improve the Sentry's ability to identify targets, decreasing the risk of friendly fire in the air, according to Electronic Systems Center officials at Hanscom AFB, Mass.

"The next generation IFF Mode 5 will allow for earlier detection of friendly targets" and maneuvering targets, according to Tricia Hill, who heads this initiative.

Testing recently took place at Joint Base Lewis-McChord, Wash., with an E-3 Block 30-35 aircraft, supported by F-15s.

Initial test results were positive, paving the way for a production decision this spring, pending full review of the test data. The system is also under evaluation by French and NATO allies to equip their respective AWACS fleets.

MC-12 Unit Completes 5,000 Sorties

The 362nd Expeditionary Reconnaissance Squadron at JB Balad, Iraq, flew its 5,000th sortie in Iraq Dec. 30.

The MC-12W unit conducted its first mission in June 2009, taking just 18 months to reach the 5,000 mission mark.

MC-12s carry a crew of four, along with imagery sensors and electronic eavesdropping equipment, to provide ground commanders at the tactical level with near-real-time intelligence, surveillance, and reconnaissance information.

The 362nd ERS was the first MC-12 operational unit. Two additional squadrons, the 4th ERS at Bagram Airfield and the 361st ERS at Kandahar Airfield, are now deployed in Afghanistan.

USAF photo by SSgt. Eric Harris

No Rest For the Weary: *Capt. Nick Morgans communicates with the crew of an HH-60 Pave Hawk as it lands during a mass casualty scenario training exercise near Kandahar, Afghanistan on Christmas Eve 2010. Morgans is with the 46th Expeditionary Rescue Squadron. Rescue squadrons at Kandahar stay on alert 24/7, including on holidays such as Christmas.*

Obituary

Retired Maj. Gen. J. Stanley Holtoner, a key figure in establishing Edwards AFB, Calif., as a leading test center for military aircraft, died Dec. 17 in Goldsboro, N.C., at age 99.

Holtoner was the ninth pilot to fly at 1,000 mph. Commissioned in the Army in 1932, he entered pilot training the following year. During World War II, he flew fighter aircraft, including a stint as commander of the 82nd Fighter Group in Italy.

In January 1952, Holtoner, then a colonel, took command of the Air Force Flight Test Center at Edwards, expanding it and flying in every test aircraft assigned there over the next five years, including the Bell X-1.

Holtoner won the Thompson Trophy Race in September 1953, setting a world speed record flying the F-86D Sabre. He retired from the Air Force in February 1967.

A native of New York City, Holtoner is to be buried with full military honors at Arlington National Cemetery in Virginia. ■

News Notes

■ Air Force Special Operations Command's enlisted force bestowed its highest honor, the Order of the Sword, on AFSOC chief Lt. Gen. Donald C. Wurster Nov. 19. Wurster led the command through one of its most demanding operational periods.

■ Retired Lt. Gen. John L. Hudson became the new director of the National Museum of the US Air Force at Wright-Patterson AFB, Ohio, taking the reins from retired Maj. Gen. Charles D. Metcalf Dec. 16. Before retiring, Metcalf led the museum since 1996.

■ The undergraduate cyberspace training course graduated its first class of 15 officers Dec. 8, after six months of rigorous training in cyber operations. The 333rd Training Squadron began the training mission in June at Keesler AFB, Miss.

■ The Royal Australian Air Force retired the last F-111 fighter-bombers in service anywhere in the world Dec. 3. Retirement of USAF's last EF-111s in 1998 left Australia as the type's sole operator, flying a total 43 Aardvarks since entry into RAAF service in 1973.

■ Reserve SSgt. Andrew Dunn and ANG A1C Brian Alfano became the first graduates of the Air Force's newly abbreviated survival, evasion, resistance, and escape course (SERE) in December. The course aims to qualify Reserve and Guard airmen as instructors while minimizing disruption to their civilian commitments.

■ AF-3, the third Air Force F-35A test aircraft, arrived at Edwards AFB, Calif., for flight testing Dec. 14. "AF-3 will focus on testing advanced technologies and mission systems," while at Edwards, according to a Lockheed Martin release.

■ Royal Netherlands Air Force F-16 training became fully operational with the ANG's 162nd Fighter Wing at Tucson, Ariz., in January. For three years, the training had been done with the Ohio ANG. RNLAF pilots previously trained in Tucson for 18 years.

■ Twenty-fourth Air Force, USAF's cyber operations arm at Lackland AFB, Tex., added "Air Forces Cyber" to its title Dec. 7. The organization is now 24th Air Force (Air Forces Cyber), with the addition better reflecting the numbered air force's USAF role and significance.

■ Pratt & Whitney announced Jan. 3 that it delivered the first F135 short takeoff and vertical landing production engine, receiving initial service release certification. The clearance certifies the engine's production configuration, clearing the way for operational installation on the F-35B variant to be used by the Marine Corps. Lockheed Martin's fifth STOVL demonstrator, BF-5, undertook the certification.

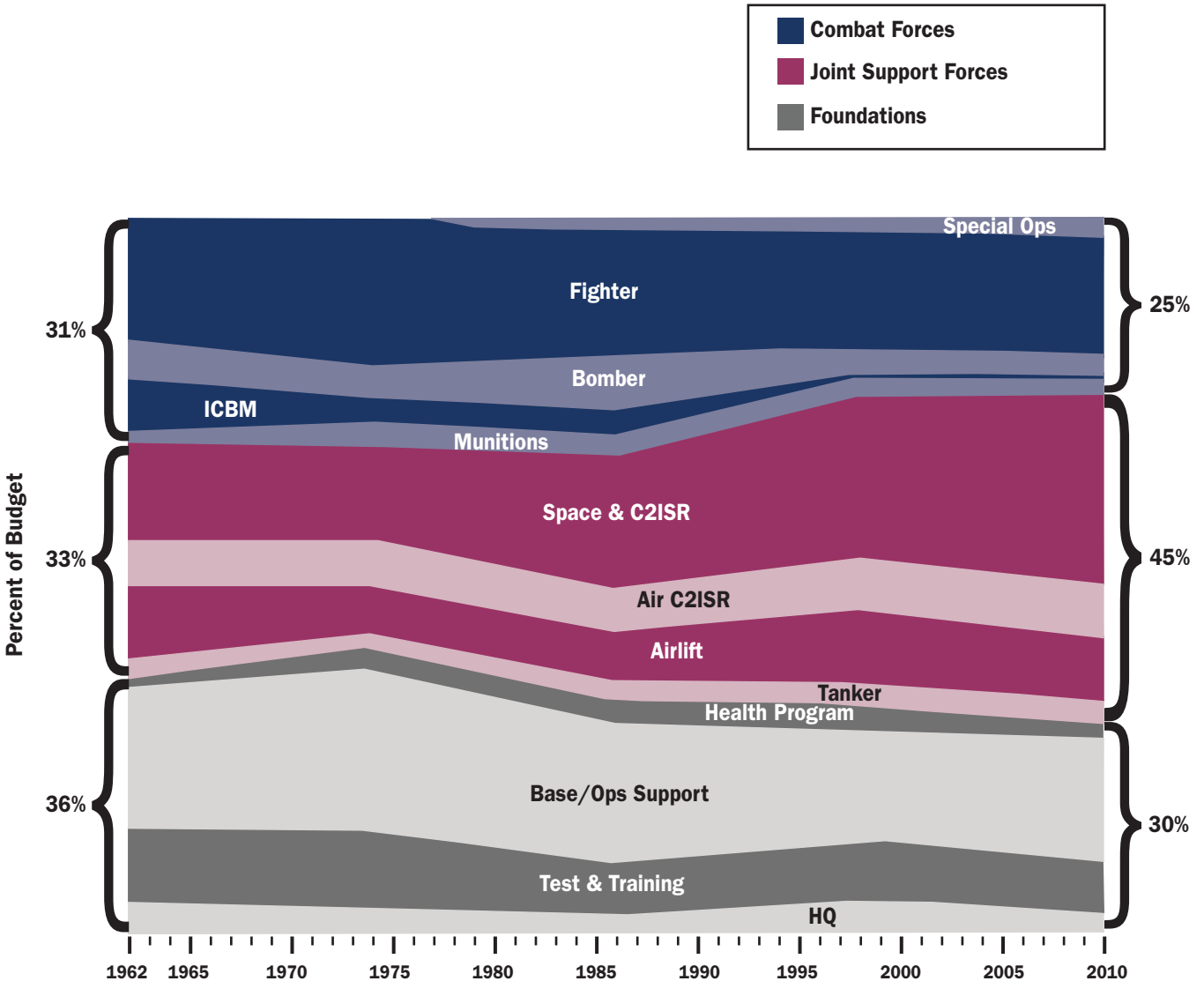
■ AFRC Lt. Col. Richard L. Lowe, a flight instructor at Randolph AFB, Tex., was awarded the Airman's Medal Dec. 10 for rescuing passengers and crew from a burning commercial airliner at Denver Airport in 2008. He was a passenger on the airplane. The medal recognizes noncombat heroism. ■

chartpage@afa.org

Rise of an "Existential" Dilemma

The Air Force has undergone a long-term shift in spending. The figure on this page illustrates where the service has invested funds since 1962. Spending on "foundations"—bases, test, training, and so forth—changed little. However, spending on joint force "enablers"—space, mobility, intelligence-surveillance-reconnaissance capabilities—has zoomed from 33 percent to 45 percent of USAF's budget. As a result, the combat air force has been squeezed; CAF's share of the budget has dropped from 31 to 25 percent. James C. Ruehrmund Jr. and Christopher J. Bowie, authors of a recent analysis of USAF spending, believe this trend constitutes "a serious existential dilemma" for the service.

USAF's Inventory—Less Bang, More Support



Source: "Arsenal of Airpower—USAF Aircraft Inventory 1950-2009," James C. Ruehrmund Jr. and Christoper J. Bowie, Mitchell Institute Press, Arlington, Va., November 2010.

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New Life for Old Fighters

The A-10, F-15, and F-16 will be in the inventory for years, and the Air Force will make the most of them.

By John A. Tirpak, Executive Editor

Photo by Jim Haseltine

Two F-16s pass near the Grand Canyon on a training mission from Luke AFB, Ariz. How long the F-16—already five years beyond its original planned retirement date—will last is an important question USAF is attempting to answer.

Soon, in a factory at Fort Worth, Tex., an F-16—a veteran of years of service—will be slowly tortured to death. Suspended in a test rig known to engineers as "the rack," the Block 50 Fighting Falcon will be punished with metal bars incessantly pushing up and down on its wings, while its fuselage and control surfaces are twisted, bent, pulled, and struck. After many months of such abuse, something important will break, and engineers should have the answer to a question that the whole USAF fighter force hinges on: How long will the F-16 last?

The torture process, known officially as the full-scale durability test, will discover if the F-16 fleet, already five years beyond its originally planned retirement date, can serve well into the 2020s. The Air Force is betting it can, and is preparing a series of upgrades intended to keep the Falcon credible and capable right up until it is withdrawn from service.

A similar fate awaits an F-15C and, later, an F-15E, which will both undergo full-scale fatigue testing (different name, same process) at Wright-Patterson AFB, Ohio. A comparable A-10 stress test is already under way. The predicted longevity of these fighters will significantly shape USAF's choices in the next couple of years.

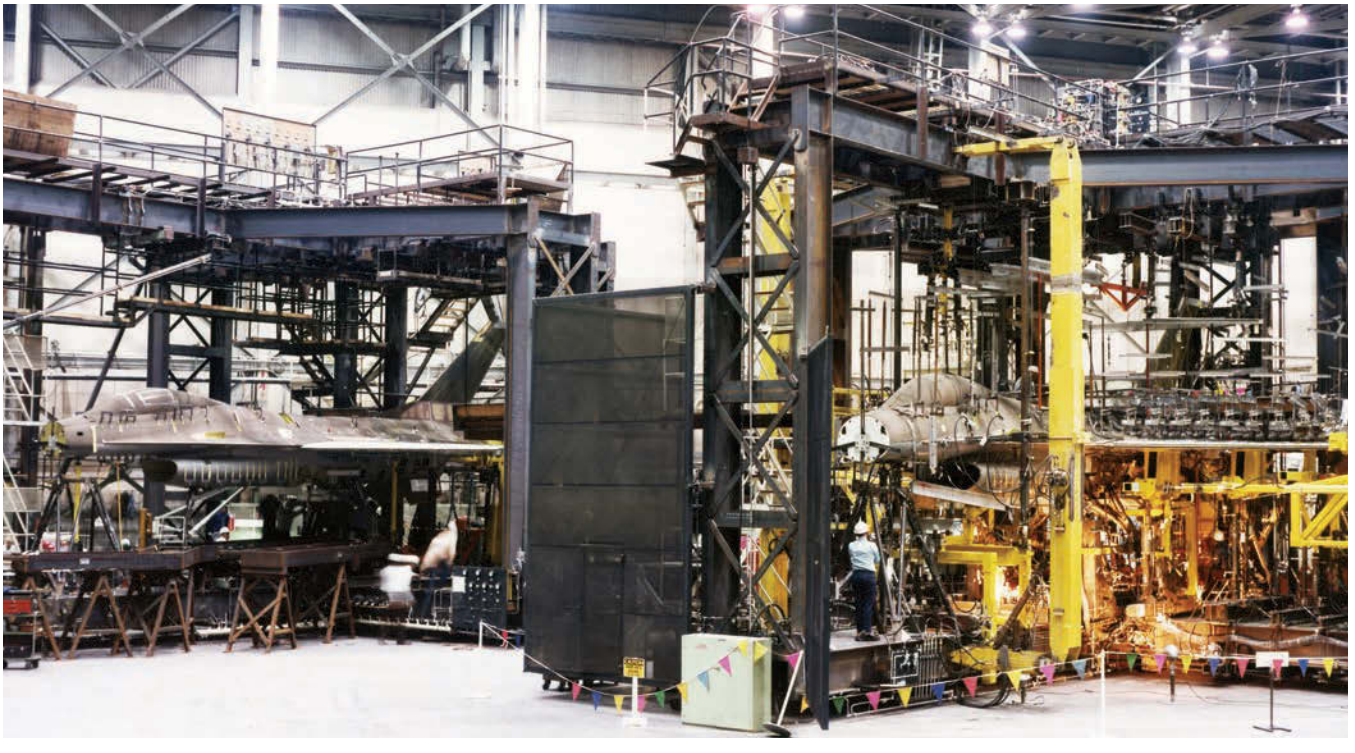
Planning the golden years of the Air Force's legacy fighter fleet has taken on great urgency, given the new realities of fighter modernization. Production of the F-22, which was to have completely replaced the F-15, was capped at 187 aircraft. The F-16's replacement, the F-35, has seen schedule delays and cost jumps that have made it a target of various panels and think tanks offering deficit-cutting advice. Although the Air Force and Pentagon strongly back the fighter, budget pressures or test delays could further stretch out deliveries.

The Government Accountability Office, in a summer 2010 audit, said that even if the Air Force is able to buy F-35s at the rate of 80 per year—which the GAO found dubious at best—the service will fall further and further short of the 2,000 fighters necessary to fulfill the national military strategy. That means some of the old fighters will have to be kept in service simply to keep the Air Force in business.

Besides the F-15C, F-15E, and F-16s of various block numbers, the Air Force will also hold onto hundreds of A-10 attack aircraft, made in the 1970s and 1980s, for at least another 20 years.

USAF photo by A1C Benjamin Wiseman

Two A-10s fly a two-ship formation during training at Moody AFB, Ga. The Air Force plans on holding on to hundreds of A-10s produced in the 1970s and 1980s for at least another 20 years.



Lockheed Martin photo

Two early F-16s undergo full-scale durability tests at a Lockheed Martin facility in Fort Worth, Tex. When something important finally breaks, USAF will have vital information about upgrades necesssary to keep the F-16 flying.

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"Should the F-35 not deliver on the anticipated schedule, … there are potential work-arounds," said Gen. Norton A. Schwartz, Chief of Staff of the Air Force.

Speaking with defense reporters in November, Schwartz said, "Certainly we will look at sustaining F-16 aircraft—principally Block 40 and Block 50 aircraft—perhaps a bit longer than we had originally planned." There would be structural modifications as well as avionics improvements, to include new, advanced radars, he said.

He emphasized that the Air Force is "fully committed" to buying the F-35A, the progress of which has been "the best of the lot" compared with the Marine Corps F-35B and Navy F-35C versions in flight test.

However, "you have to hit the ball where it lays, and if the airplanes aren't ready to put on the ramp, we'll work alternatives. … We'll do what's required."

Schwartz said that in the Fiscal 2012 budget, a "fighter force structure strategy" document would accompany information about the F-35's progress.

The Air Force is trying to find the right balance in deciding how to fill out its fighter inventory, said Maj. Gen. Thomas K. Andersen, Air Combat Command's director of requirements.

"We do have that struggle: Do you trade off capacity for capability?" he said. On the one hand, the Air Force must have enough aircraft to go around to meet field commander needs, which is capacity. On the other, the fighters must have technology relevant against adversaries with increasingly advanced aircraft—capability.

"Those are things that we try to inform every day," Andersen said.

The Air Force's "wish list" for improving its legacy fighters is specific to every aircraft, but some items are deemed essential to all.

To remain credible against modern, generation 4.5+ fighters, both the F-15 and the F-16 will need active electronically scanned array radars, better known as AESAs. The benefits of such radars are many. They can perform several different functions simultaneously, from searching the air for enemies to doing ground-mapping and detection of moving surface vehicles. Because the radar can rapidly hop frequencies, its emissions are less detectable and this improves aircraft survivability.

Solid-state digital systems, AESAs have very high reliability. In fact, once installed, AESAs have a mean time between failure rate rivaling the life expectancy of the aircraft itself. So reliable are they—and so able to degrade gracefully even if some parts go bad—that the aircraft radome could potentially be sealed shut. The virtual elimination of service requirements on radars would dramatically reduce the man-hours needed for maintenance of fighters while dramatically enhancing their capability.

USAF photo by SrA. Ricky Best

Capt. Jim Parslow inspects a weapons carriage on an F-15E loaded with a GBU-39B Small Diameter Bomb. F-15Cs and, later, Es also will undergo full-scale durability tests at Wright-Patterson AFB, Ohio.

Big Incentives

"There's a lot of great [radar] technology we've been working on with the F-22 and F-35," Andersen noted. "We'd love to pull some of that capability into an AESA radar for the F-16." He said, "We've paid for that nonrecurring engineering" on AESA radars for the fifth generation fighters, and there are "a couple of offerings out there that are relatively inexpensive."

Another improvement becoming more common in the fleet is helmet mounted cuing systems. These devices enable fighter pilots to simply look in the direction of a target and in so doing, tell a missile where to go once it leaves the launch rail. The system relieves the pilot of having to point his aircraft directly at an enemy fighter before firing, a valuable asset in a dogfight.

To deal with stealthy targets, the Air Force will likely put infrared search-and-track (IRST) devices on its fighters, so the aircraft can see the faint heat plumes of engines even when a target has reduced radar reflectivity.

Beyond sensors and targeting systems, the legacy fleet will need upgrades to its suite of electronic warfare equipment, as well as new air-to-air weapons that can target enemies at greater distances, are less prone to spoofing, and are more agile. The Air Force is counting on the latest version of the Advanced Medium-Range Air-to-Air Missile, or AMRAAM, called the AIM-120D, for its future air superiority missile. For ground attack, fighters will need smaller munitions that can inflict extremely precise damage and destroy only what they're supposed to. The Small Diameter Bomb Increments 1 and 2 are the principal munitions in this latter category.

There's a big incentive to fix up the older airplanes until new generation aircraft can be fielded. Schwartz has consistently and categorically said the Air Force will not spend scarce fighter dollars to buy new versions of older aircraft—i.e., to buy new-build F-15s and F-16s. The Air Force would rather stretch its existing equipment and wait for cutting-edge airplanes than buy new airplanes with 40 years of service life but only 10 years of survivability.

The GAO, in its summer 2010 report on fighter forces in all the services, said, "Recently, the Air Force provided Congress with a report titled 'Procurement of 4.5 Generation Fighter Aircraft,' which concluded that modernizing and extending the service life of current fighters would provide essentially the same capability of new 4.5 generation fighters at 10 to 15 percent of the cost." The estimate was based on buying 300 new aircraft of the F-16 Block 50+, F-15E+, or F/A-18E/F vintage or performing a service life extension on

DOD photo by SrA. Julianne Showalter

SrA. Rebeca Hill (top) and SrA. Christopher Jaeger work on an F-16 at JB Balad, Iraq. The F-16's planned replacement, the F-35, has fallen prey to schedule delays.

a similar number of existing airplanes. The Air Force looked at doing structural improvements only, or structural and capability enhancements combined.

The estimates, however, don't have the benefit of the fatigue testing to be done on the F-16, F-15C, and F-15E. While the Air Force thinks it has a pretty good idea how long the airframes can last, there could be considerable surprises in the destructive testing that radically alter estimates.

However, Andersen doesn't think that will be the case. For the past few years, USAF has been monitoring fighters by tail number, keeping track not only of how many hours they have flown, but what kind of hours: An hour spent ferrying across the ocean is very different from an hour of hard-turning air combat maneuvering. This effort is known as the Aircraft Structural Integrity Program, or ASIP. Besides the severity of missions flown, basing has a lot to do with aircraft longevity. Andersen noted that aircraft operated for years in the dry Southwest have more potential life than those flown in humid, salty conditions.

"If you take the ASIP … and you put it together with the full-scale durability testing, we're going to have a pretty good idea of what the life of the F-16 is going to be," he said.

The "pre-blocks" of F-16s, he said—those early vintage Block 25s and 30s—will be allowed to age out of the inventory when they reach about "10,800 equivalent flying hours." They were originally specified for 8,000 hours.

For the long term, he said, the Air Force is concentrating on the Block 40s, 42s, 50s, and 52s. All these aircraft have completed the Common Configuration Implementation Program, or CCIP, which largely standardized F-16s with a similar cockpit configuration, software, modular mission computer, helmet mounted cuing systems, and the Link 16 data link.

In addition to the AESA radar upgrade, F-16s would get new weapons: the AIM-120D, Small Diameter Bomb Increments 1 and 2, and potential future weapons such as the Joint Dual-Role Air Dominance Missile, or JDRADM.

Learning From Failure

The durability test will be done on a Block 50 considered to be representative of what the fleet has typically endured. It will be stressed to an equivalent of 24,000 hours of flying, assuming it doesn't suffer a fundamental failure before that point. The Air Force traditionally tests to double the anticipated usage of the airplane, so if the test article achieves 24,000 hours without a major structural failure, USAF believes it can get 12,000 flying hours out of line aircraft, Andersen explained.

"We're fairly confident" of the 12,000-hour number, Andersen said. "So if you look at those numbers conservatively, that's about another perhaps seven to eight years of service life" on the Block 40s to 52s. That would be on top of the additional years of life "bought" by monitoring the aircraft individually.

The Air Force has already performed a structural improvement on some F-16s called Falcon STAR, but this was intended to get them to their originally planned service lives. The F-16s, which saw extensive combat from Desert Storm in 1991 to today, were used harder and carried heavier loads than first expected; this caused stress fatigue in some components and cracks in some bulkheads. Falcon STAR—for Structure Augmentation Roadmap—was not meant to be a service life extension program, or SLEP.

Without a SLEP, ACC thinks that "a small number" of F-16s could make it to 2030, but most will be "gone by 2025." With a SLEP—which would reinforce or replace bulkheads, some spars, and add maintainability improvements overall—an F-16 fleet of about 300 airplanes could make it "to about 2030 to 2035," Andersen said.

One thing that likely wouldn't feature in an F-16 upgrade is the set of overwing, conformal fuel tanks that distinguish late-model F-16 Block 52s and 60s being sold overseas today.

"As of right now, we don't have a requirement for it," Andersen said.

Lt. Gen. Philip M. Breedlove told reporters in November the Air Force is going to look at the F-16 fleet "almost on a tail-by-tail basis to determine how

USAF photo

A GBU-39B Small Diameter Bomb strikes a rocket launcher during tests at White Sands Missile Range, N.M. SDB Increments 1 and 2 are being integrated into the F-16 fleet.

Photo by Clive Bennett

An F-15E takes to the air. No F-15Es have been retired, and the aircraft will be fitted with the AIM-120D air-to-air missile.

many and what type" it needs to SLEP. But "we have to address a threat that continues to become more and more capable," said Breedlove, deputy chief of staff for operations, plans, and requirements.

A fatigue test was ordered for the F-15C after an Air National Guard Eagle broke in half during a practice dogfight in 2007, leading to a months-long grounding of the F-15C/D fleet. The problem was a failure of longerons expected to last the life of the airplane, but the F-15 has served well beyond its planned lifetime. A series of inspections and some repairs cleared the fleet to return to duty, but the test is considered essential in getting the full story of what F-15 maintainers can expect as the aircraft continues to age.

The Air Force plans to retain 176 F-15Cs. Only two units—one at Kadena AB, Japan, and one at RAF Lakenheath in Britain—will serve with the active duty. Some 54 F-15Cs are on contract to be fitted with an AESA radar, and all F-15Cs are now fitted with the Joint Helmet Mounted Cuing System. The F-15Cs will also receive an IRST system to detect stealthy targets.

The F-15 fatigue test is "on contract," Andersen said but lags the F-16 test by "about a year and a half." It is planned to run from Fiscal 2012 to 2015. Assuming no big surprises show up in the test, "we could keep them well past 2025, into about the 2030 time frame," Andersen said.

Likewise, the Air Force has decided to do a stress test on an F-15E Strike Eagle. It will begin about a year after the F-15C test gets under way. A specific aircraft to undergo the test hasn't been chosen yet, but one will have to be sacrificed.

Unlike the F-15Cs, which will phase out in the next 15 to 20 years, the E fleet is expected to serve another 25 years or more. The aircraft was built later, with tougher, heavier load-bearing structures in order to carry a heavy attack weapons load. That, and expected use of lighter ordnance, should mean the Strike Eagles can make it into the late 2030s.

No Blanket Upgrade

Like the F-15C, Andersen said the E models will get an AESA radar—the APG-82—plus all the other enhancements. Right now, helmet mounted sights are only funded for the front seat of the two-seat airplane, but ACC wants to fit backseaters with the JHMCS as well.

The A-10 fleet is in the midst of a billion-dollar upgrade in which the aircraft that USAF will retain are getting new wings. At the same time, these aircraft are receiving the precision engagement package, giving the airplane new displays and a digital backbone to allow it to carry most of the most modern munitions in the inventory. About the only air-to-ground weapons the A-10 will not use are Small Diameter Bombs.

The new wings and structural improvements will boost the A-10's life expectancy from 16,000 hours to 20,000 hours, buying it a place in the inventory until about 2035. The GAO reported that ACC thinks a helmet mounted cuing system is the "No. 1" upgrade needed to make the A-10 more effective, on top of the improvements already in the pipeline. Software development also is a key requirement for the A-10.

Funding will be a critical issue affecting upgrades of any kind. The Air Force sharply reduced its fighter inventory in the last two years, under what was called the Combat Air Forces Reduction, or CAF Redux. This saw some 250 fighters retired early, the savings meant to be plowed back into fighter force modernization. No F-15Es went away as a result of the CAF Redux, however.

"We didn't touch the E fleet," Andersen said, "basically, because it has unique capability." In addition to its ground-attack role, the F-15E will also be fitted with the AIM-120D, "so it will have air-to-air capability. … It will be a multirole aircraft," Andersen noted.

However, Marine Corps Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff, said in December that he feared budget-cutting pressure would steal away some of the savings generated by moves such as the CAF Redux and a Pentagon-wide initiative to save $100 billion over five years by reducing overhead.

In November, ACC Commander Gen. William M. Fraser III said the money issue could mean that only selective parts of the fighter force get modified.

"If I have aircraft that are principally back here flying air sovereignty alert, they do not need to be exactly the same as our F-16 Block 40s and 50s," Fraser said, because the ASA mission is typically more benign than the ground-attack missions over hostile territory that the rest of the F-16s would have to be able to do.

Breedlove echoed Fraser, saying, "What we are not going to do, I am relatively sure," is create a blanket upgrade program for every F-16. "That's not what we need," Breedlove said. Some aircraft, with missions such as Operation Noble Eagle, require certain kinds of capability; other aircraft facing "the more challenging digital threats that are out there in the world may need a different kind of capability, and that's the analysis that we've embarked on."

The Air Force is working closely with the Air National Guard and Air Force Reserve on upgrade programs because USAF recognizes that the reserve components' F-16s are aging out and that its equipment must be comparable to that in the active force.

"We all want to get this right, because, as you know, the iron moves back and forth—some down to the Guard and Reserve and even in some cases from them to the active duty," Breedlove said. "So we have to make sure that we have the right capabilities in each." ■

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The Air Force derives great value from its complex experiments, which will continue even if Joint Forces Command is shut down.

Experimental

During an intensive joint experiment a few years ago, a new Air Force communications concept was tested against a series of real-world and simulated scenarios at the testing range near Nellis AFB, Nev. Air Force planners hoped their idea would successfully marry up a range of communications tools needed in combat.

Forces in Southwest Asia at the time needed a way to join disparate data links and cellular voice systems which didn't plug in to one another, and allow a main server to store the data from these devices and share it with forces from an Army unit on the ground to a pilot in the air.

The Battlefield Airborne Communications Node, known as BACN to the troops, proved successful.

BACN was just one innovation that underwent testing during Joint Expeditionary Force Experiment 2006—an effort run by the Langley AFB, Va.-based US Global Cyberspace Integration Center, now known as the Air Force Command and Control Integration Center.

"We are the focal point for Air Force experimentation," said Col. Todd

Photo by Kevin Whitehead/Jetwash Images

An E-3 AWACS taxis at Nellis AFB, Nev., after having served as the airborne air traffic control platform during a Joint Expeditionary Force Experiment mission.

Payoff

By Marc V. Schanz, Senior Editor

Whitlow, director of modernization and innovation at the AFC2IC. A great deal of the center's work, such as the successful BACN effort, finds its way quickly to the front lines in Southwest Asia. "We delivered that on a leased platform; now they need it so much we are pulling new capability in," Whitlow said. The center this year will experiment with products and enhancements to add to the BACN tool. Air Force plans call for integration of BACN onto long-loiter platforms such as the RQ-4 Global Hawk remotely piloted aircraft.

Feeding Off the Input

With Secretary of Defense Robert M. Gates' announcement last summer of the planned closure of US Joint Forces Command at Norfolk, Va., questions about the future of service-level integration and experimentation efforts have returned.

From the Air Force perspective, those involved with the tricky work of tying together networks and capabilities say they don't expect much to change, regardless of whether JFCOM remains open or closes. From his perspective at the AFC2IC, Whitlow said, the Joint Staff will still put out joint taskings for needed capabilities, and the center will address them. "Some things we obviously don't know," he added. But "the truth is," that process comes from the Joint Staff; it "still puts out the warfighter gaps, [and] we feed off those inputs," he said.

What JFCOM calls "joint concept development and experimentation projects" are derived from combatant commanders and service challenges and needs submitted through the Joint Staff's assessment process, according to Maj. Gen. Joseph Reynes Jr., the director for joint experimentation at JFCOM. Speaking with reporters after

USAF photo by Maj. Richard Johnson

Royal Australian Air Force Wing Cmdr. Roger McCutcheon (l) and USAF Lt. Col. Mike Heyser work in the combined air and space operations center during JEFX 2006.

Photo by Bill Krause

Global Hawk Block 20 aircraft will be the next airborne platform to carry BACN, which was validated at an earlier JEFX.

USAF photo

Leased civilian airliners, such as this BACN-configured Bombardier Global Express aircraft, are now performing missions in Afghanistan. They link up disparate data links and voice systems and share them between air and ground forces.

a meeting of senior NATO and allied leaders in Brussels, Belgium, he noted JFCOM helped coordinate a two-year multinational and interagency effort called Multinational Experiment 6 that focused on developing and improving tools and capabilities to help counter irregular warfare threats, from intelligence sharing to campaign assessment tools.

In the Joint Arena

The lessons from MNE 6 will go into NATO doctrine, Reynes said, and DOD and the allies now have a better understanding of the difficulties faced in irregular environments. An example he highlighted was a successful effort to develop a software program to allow all coalition partners—not just NATO nations—to get visibility into the logistics networks, requirements, and assets used today to support efforts in Afghanistan. "Before this, everyone had to do this manually, if you were outside of the NATO system," he noted, adding that the tool is being fielded directly from the experiment to NATO's International Security Assistance Force headquarters in Afghanistan.

"Now when we go into action, we will have better visibility in these environments. ... We will more effectively move parts around and support our allies," he said when asked about the implications of the tool for deployed airmen. "The logistics transparency will be beneficial to us as airmen, because we will be able to be more effective and more efficient in support of coalition forces."

Efforts such as MNE 6 are assembled from ideas that start down at the service and combatant command level. Each service has an experimentation plan, and JFCOM provides the direction for overarching gaps in capabilities between services, Whitlow noted. "We look at those gaps, and we use that to derive experiments."

Joint experimentation is not confined to the dictates of JFCOM planners, either, and he doesn't anticipate this aspect changing regardless of JFCOM's fate. The services are all "working hard in the joint arena," Whitlow said of past JEFX

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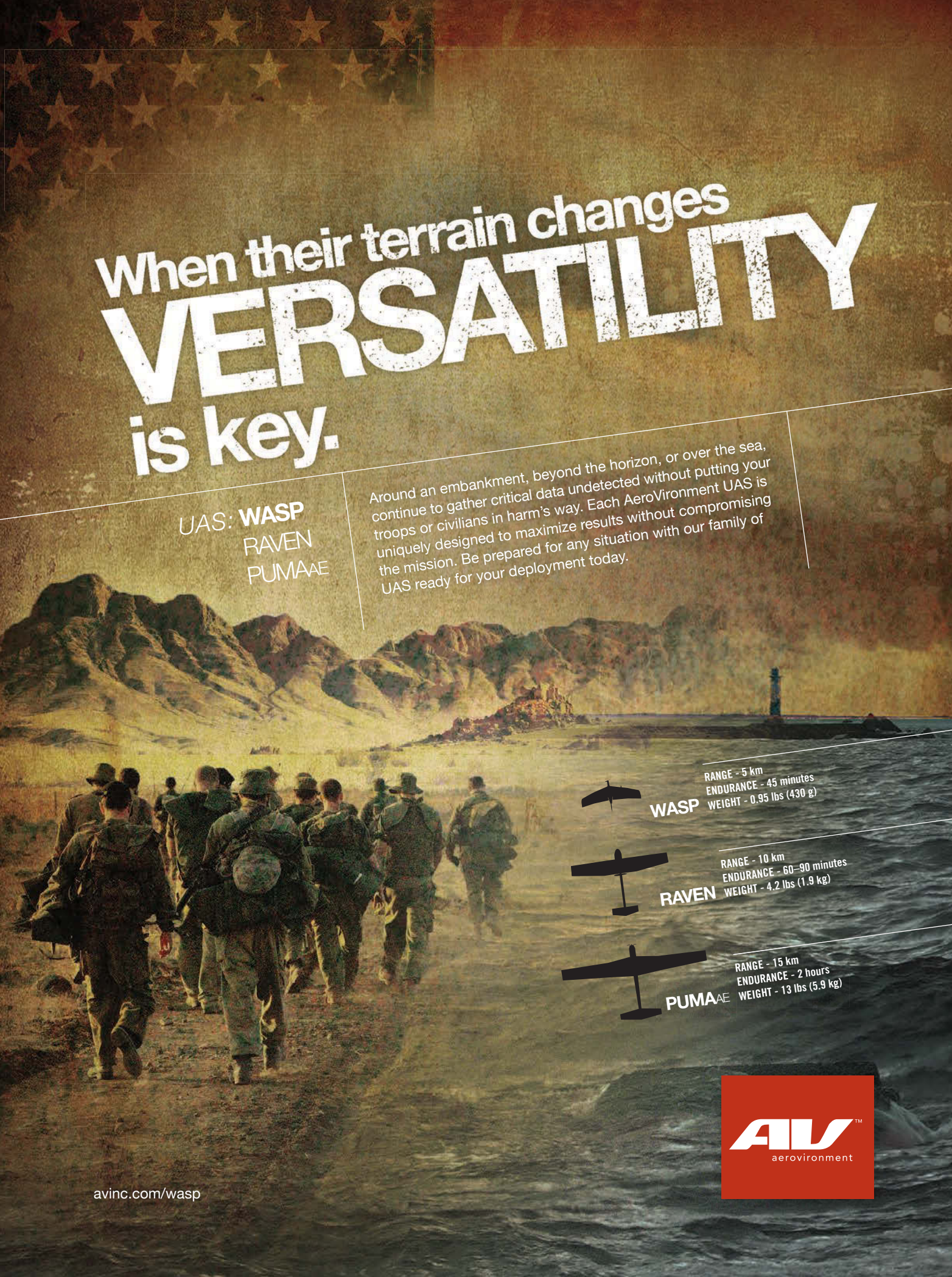

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JEFX Brings Home the BACN

The Joint Expeditionary Force Experiment (JEFX) franchise, now entering its 13th year, is a series of live, virtual, and constructive experiments designed to rigorously assess and recommend certain tools needed to plug gaps in capabilities between the Air Force and other services. The program is credited with proving and speeding critical concepts and technologies, such as the Battlefield Airborne Communications Node, to the front line.

Today, BACN is operational in the skies over Afghanistan, helping patch together a vast network of US and coalition communications networks, radios, and data links to speed valuable intelligence-surveillance-reconnaissance information to and from commanders on the ground and operations centers far from the battlefield.

BACN works as an airborne server on a leased civilian airliner, storing and sharing data for a wide range of users. It allows troops with different radios to speak with one another over long distances, or past obstructions such as building or mountains. Ground-based units can call an aircraft above, and share accurate targeting information on beyond-line-of-sight targets. Via BACN, aircraft without data links can connect with newer aircraft equipped with modernized links.

In addition to BACN, JEFX is hailed for shepherding the Strategic Worldwide Integration Capability, a tool for planning and executing global strike missions, and for Project Suter, a command and control tool for targeting networked threats with both kinetic and nonkinetic operations.

efforts and coordination with other entities such as the Navy's US Fleet Forces Command's Second Fleet. Everything they do, "it really doesn't change for us," he said. "If we are not operating joint, then what are we doing?"

The AFC2IC, in addition to being the caretaker of JEFX, works with organizations across the Air Force, from Electronic Systems Center at Hanscom AFB, Mass., to the 505th Command and Control Wing at Hurlburt Field, Fla., Whitlow mentions, in addition to the test community and the respective commands. All of these organizations have large stakes in the outcome of their experiments, as do other service organizations involved, such as Second Fleet. "All these partners help us with bits of technology and procedures. They've all got equities in this," he said.

Experimentation venues, unlike exercises, are arenas where USAF and others can bring in new technologies or procedures and try them out—and for every one that succeeds, many will fail. While JEFX efforts at the AFC2IC are funded by USAF, partners such as the Navy are critical to making them work, Whitlow added, as there will be planning conferences—which examine certain technologies and what can be done with them in various environments—and in some cases shared assets. Whitlow indicated a JEFX effort later this year will run side by side with the Navy's Trident Warrior, a sea-trial experiment series. "We will share airplanes and assets and networks, and as we both look towards our objectives, we will share resources and synergize," he said.

The AFC2IC has themes it establishes for JEFX. Fiscal 2010 focused on irregular warfare activities, and 2011 is stressing degraded space capabilities.

"We want to see what happens when you degrade the capability you're getting from space," Whitlow said.

"How would we operate without all of this marvelous technology we've gotten used to?" he said of upcoming experiments. How would USAF, the Navy, and other services address not being able to access tools such as the GPS constellation or communications satellites?

While OSD is now pressing services hard to ferret out operational efficiencies, the JEFX experiments have already focused on many of the same issues. "We have been working on efficiencies for a number of years in a joint capacity," Whitlow said. He highlighted a recent experiment in Fiscal 2010 between the Air Force and Army that tested the process of combat air control, and how those lessons and procedures could be passed on to the next unit taking on a troop rotation. Between close air support and other support missions, coordinating artillery, and other issues, there is a great deal of cooperation needed between the two services. "It's a matter of how we coordinate that airspace and get our procedures more efficient," he added.

Integration efforts through experimentation will grow in importance in the coming years, not diminish, regardless of JFCOM's fate, according to USAF's senior integration and information technology official.

Lt. Gen. William T. Lord, the Air Force's chief of warfighting integration and chief information officer, wonders what happens to stakeholders of a big program such as the now-canceled Transformational Satellite Communications System (TSAT). What is the impact of that on systems such as BACN, the Mobile User Objective System (MUOS, the Navy's ultrahigh-frequency satellite communications system designed to replace legacy UHF

USAF photo by Maj. Damien Pickart

SrA. William Allen (l) and A1C Roberto Armas maneuver a case carrying components of the Roll-on-Beyond-Line-of-Sight Enhancement system onto a KC-135 at Manas AB, Kyrgyzstan. ROBE allows Link 16 information to be sent or received beyond line of sight. It was used in JEFX 2008.

Photo by Kevin Whitehead/Jetwash Images

A B-1B heads back to Nellis after flying a JEFX bombing mission. Future experiments will focus on improving AirSea Battle capabilities, which lean heavily on long-range platforms.

systems and improve access, mobility, and quality of service), and a host of other programs and systems? Making sure the services and coalition allies can all plug in and talk with one another is important to the success of future operations, and since USAF maintains and develops much of the networks from orbits to ground stations, it must tackle these problems.

When asked during a November meeting with reporters what the Air Force would do differently if JFCOM were shuttered, Lord said he didn't know, but noted the work of the Air Force Agency for Modeling and Simulation, one of the organizations that collaborates on JEFX experiments and works under his chain of command. "We do think there is some live, virtual, and constructive work that we can use, along with the distributed mission operations stuff, to model things that maybe can get after some of that experimentation that potentially could go away … if Joint Forces Command does disappear," he said.

Blending live and virtual simulation is crucial to proving concepts, Whitlow said. "The things I cannot do modeling and sim for, I have to live-fly." The goal is a realistic operational environment, but some pieces have to be replicated and simulated and must plug into live efforts at the same time.

With USAF facing budget reductions and tasked with maintaining high-end platforms for years to come, a great deal of synergy can be obtained by networking platforms together, Lord said. "I think we're good at [networking] the terrestrial layer and we're good at the space layer. We need to get better at the aerial layer," he said. As the Air Force's senior leader for communications, Lord said the air piece is the part of the spectrum he wants to solve and will push hard for solutions in the near term.

"What happens when you put effective blades, which are routers, on devices that are traveling at Mach 3? Or in a missile at Mach 6?" he asked.

Tying In AirSea Battle

Similarly, how do airmen and other troops get in and out of a network, or use the nontraditional intelligence-surveillance-reconnaissance capability of an F-35? As an F-35 collects intelligence data in its stealth mode, and then returns to secure airspace, how do airmen get that fighter to broadcast and share its information? "What kinds of networks are available?" Lord asked. "What's the wave form of those networks? There are a lot of programmatic things associated with that."

Lord said he will focus in the near term on sorting out wave forms and communications such as the Tactical Targeting Network Technology concept, software programmable radios, and other tools. There are many questions that need answers: How does the Joint Tactical Radio System fit in? Is the Multifunction Advanced Data Link going to be the network of the future? Is it Link 16, or Link 11?

"All of that … needs to get integrated and architected and that's what I'm going to go after," Lord said.

The emphasis on tying together networks does not surprise those who work in USAF experimentation. Connectivity and command and control are crucial to almost all experimentation efforts and capabilities, Whitlow noted. Command and control "rubs up against everything," he said.

Cyber warfare and network protection may be getting a lot of attention, and experiments with capabilities such as tactically unbreakable communications with unmanned systems involve cyber tools, but they all tie in to C2 and the ability for air, space, sea, and land forces to reach and control capabilities.

Future experimentation will involve some of USAF's newest doctrinal concepts, such as the AirSea Battle. In Fiscal 2012, JEFX experiments will focus on solving questions and gaps related to integrated missile defenses and AirSea Battle. Currently, a team at AFC2IC is assembling strategy and plans for experiments, and coordinating combat forces talks with the Navy.

"Those develop a lot of the things we'll work with that will be very tightly integrated with the Navy," Whitlow said, "and we won't be doing much without them." ■

Verbatim

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Hey, Let's Disarm Ourselves

"For those who say we can't touch it (the Pentagon budget) and shouldn't touch it, that's absurd. We've got to. There's no way we're going to have the fiscal responsibility we need without addressing defense spending."***—Rep. Jeff Flake (R-Ariz.), member of the House Appropriations Committee, interview with Reuters, Jan. 4.***

Seeing Is Believing

"Gorgon Stare will be looking at a whole city, so there will be no way for the adversary to know what we're looking at, and we can see everything."***—USAF Maj. Gen. James O. Poss, assistant deputy chief of staff for ISR, on the capabilities of Gorgon Stare, a revolutionary airborne surveillance system. Quoted in*** **Washington Post,** ***Jan. 2.***

Auld Lange Psycho

"The danger of war should be removed and peace safeguarded in the Korean Peninsula. If a war breaks out on this land, it will bring nothing but a nuclear holocaust."***—North Korea's annual New Year's message, carried in official state press dispatch, Jan. 1.***

Jaws Drop, Minds Boggle

"Our jaws just dropped. I expected a couple dozen garage-shop operations. I didn't believe there would be an industrial-scale facility, ready and available. ... It was a modern facility and with three rows of pairs of centrifuges—altogether, 2,000 centrifuges. It really was mind-boggling."***—US nuclear scientist Siegfried S. Hecker, commenting on North Korea's new uranium enrichment plant at Yongbyon at a seminar at Stanford University, Nov. 29.***

Chinese Trajectory

"Today, per capita GDP in China is 19 percent that of the US, compared with 4 percent when economic reform began just over 30 years ago. Hong Kong, Japan, and Singapore were already there as early as 1950; Taiwan got there in 1970, and South Korea got there in 1975. ... Only a foolhardy man would bet against China's following the same trajectory in the decades ahead."***—Niall Ferguson, Harvard Business School professor,*** **Wall Street Journal,** ***Nov. 18.***

Our Man in Kabul

"If I had to choose sides today, I'd choose the Taliban [over the US and the international community]. ... We will fight with you against terrorism. But terrorism is not invading Afghan homes."***—Afghan President Hamid Karzai, from an interview quoted in*** **Washington Post,** ***Dec. 13.***

No Unscheduled Leave

"This is a survivable event. L.A. isn't going to fall into the ocean and be gone forever. It will be a really bad day, but we need everyone to show up to work and save lives."***—Brendan Applegate, Naval Postgraduate School Center for Asymmetric Warfare, on prospects for surviving a terrorist nuclear attack in California. Quoted in*** **USA Today,** ***Dec. 16.***

Totally Out There

"We're starting it in July of 2011, and we're going to be totally out of there, come hell or high water, by 2014."***—Vice President Joseph Biden, remarks about US troop withdrawal from Afghanistan, NBC's "Meet the Press," Dec. 19.***

Invitation of China

"Clearly, China's communist leadership is not impressed by the Administration's ending of F-22 production, its retirement of the Navy's nuclear cruise missile, START treaty reductions in US missile warheads, and its refusal to consider US space warfare capabilities. Such weakness is the surest way to invite military adventurism from China."—***Richard Fisher Jr., Washington, D.C.-based China military-affairs specialist, quoted in*** **Washington Times,** ***Dec. 27.***

The Power of Stuxnet

"It is obvious that several years of preparation went into the design of this attack. ... Stuxnet is like the arrival of an F-35 fighter jet on a World War I battlefield. The technology is that much superior to anything ever seen before, and to what was assumed possible."***—German Cyber expert Ralph Langner, in a blog post about the Stuxnet computer "worm" that had attacked Iranian nuclear sites, Nov. 19.***

Or For That Matter, the Huns'

"To oppose ROTC, as I have since my college days in the 1960s, when my school enticed too many of my classmates into joining, is not to be anti-soldier. I admire those who join armies, whether America's or the Taliban's."***—Colman McCarthy, director of the Center for Teaching Peace, Washington, D.C.,*** **Washington Post,** ***Dec. 30.***

A Small World After All

"We are heading for five Typhoon squadrons and one JSF [Joint Strike Fighter] squadron. It will be a six-squadron world. That's what's on the books."***—RAF Air Vice Marshal Greg J. Bagwell, commander of RAF's air combat group, quoted in*** **Defense News,** ***Dec. 11.***

High-end Riflemen

"The Marine Corps used to say, 'Our weapons system is the marine,' and tout its affordability as a service, but they seem to have become enamored with the very high-end programs that in previous years they would have criticized the Army or the Air Force for pursuing."***—Retired USMC Lt. Col. Dakota Wood, senior fellow at the Center for Strategic and Budgetary Assessments in Washington, D.C., as quoted in*** **New York Times,** ***Jan. 6.***

A Hundred Questions Bloom

"When we talk about a threat, it's a combination of capabilities and intentions. The capabilities are becoming more and more clearly defined, and they're more and more clearly targeted at limiting American abilities to project military power into the western Pacific. What's unclear to us is the intent. China's military modernization is certainly their right. What others question is how that military power is going to be used."***—Abraham M. Denmark, former China country director in the office of Defense Secretary Robert M. Gates, quoted in*** **New York Times,** ***Jan. 5.***

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BMT Gets Real

By Amy McCullough, Senior Editor

Ten years ago, the curriculum at basic military training was designed to prepare Air Force trainees for future conflicts, although no one knew exactly where those may be or what capabilities might be required. Military training instructors were an elite cadre of teachers who worked long, grueling hours to develop the next generation of airmen, but few had actual combat experience. Trainees spent six-and-a-half weeks at Lackland AFB, Tex., learning how to pay attention to detail through drill and dorm life. Little emphasis, though, was placed on field training, and the warrior ethos had not yet infiltrated Air Force culture.

The terror attacks of Sept. 11, 2001, and nearly a decade of fighting two wars changed that. Basic military training has evolved significantly, mimicking changes to the operational Air Force and incorporating lessons learned from Operation Iraqi Freedom and Operation Enduring Freedom. Today's MTIs typically have multiple deployments under their belts and some have received Bronze Star Medals or Purple Hearts for their actions in theater. In today's conflicts, a personnel technician could find himself driving convoys from Kuwait City to Baghdad or working alongside soldiers or marines outside the wire. These new, often joint, roles make it necessary for all airmen, regardless of their specialty, to adopt the warrior mindset.

"Our roles, traditionally, are a lot different now than they were then. It doesn't matter what your job is, every single airman is vital to the war," said SSgt. Chi Yi, an MTI with the 331st Training Squadron at Lackland. "That's what drives a lot of young people to come here. They want to go fight, and that's exciting to me to hear that they are ready to go. It sends a message that BMT is doing something right when these young kids are more excited to deploy than to go back home and see their friends."

A year after the Sept. 11 attacks, the Air Force overhauled its chemical warfare training, building two gas chambers in a remote area of the base known as the Torch site. Although chemical attacks have not been a factor

USAF photo

Basic military training has become intense preparation for an expeditionary force.

in Iraq and Afghanistan, it was once believed that Saddam Hussein had an abundant stockpile of chemical agents, mostly because of the poison gas attacks that killed thousands of Kurds in the closing days of the Iraq-Iran War in the late 1980s.

BMT officials say that providing that foundational training for future airmen remains critical because other countries possess chemical, biological, radiological, or explosive weapons capabilities and the Air Force needs to be prepared for the future fight.

The Hard Part

The gas chambers, each of which holds about 20 people, challenge those inside to trust their equipment and face their fears. Trainees, dressed in full chem gear, line up on orange footprints along the perimeter of the chamber. As the tear gas spews from the center, they are instructed to sound off and do 10 jumping jacks to make sure the seal on their masks is tight.

That's when the hard part begins. Trainees are then instructed to remove their hoods. Immediately their necks and the back of their heads begin to burn as the gas irritates their skin. Two at time, they step to the front of the chamber and remove their masks. Each trainee is told to inhale deeply, open his eyes and attempt to give a reporting statement, although the coughing fits, runny noses, and watery eyes make that almost impossible.

In September 2004, the 20th Basic Military Training Review Committee met and recommended perhaps the most significant overhaul in the focus, curriculum, and schedule since basic training moved to Lackland in 1946. The committee, chaired by the Chief Master Sergeant of the Air Force, the director of force development, and the vice commander of Air Education and Training Command, received input from all active major commands, the Air National Guard, and Air Force Reserve Command. It recommended

Left: Trainees high crawl up the final stretch of the tactical course, which is part of Basic Expeditionary Airman Skills Training. Below: A trainee receives some personalized feedback from his instructor.

USAF photo by Melinda Mueller

USAF photo

Trainees take on the gas chamber during chemical, biological, radiological, nuclear, and high-yield explosives training at Lackland AFB, Tex.

first that BMT mirror the Air Force expeditionary cycle. Today, just as in the operational Air Force, trainees go through a predeployment period (zero week up through the fifth week), an actual deployment (sixth week), and a reconstitution period which takes them through graduation.

During the predeployment phase, trainees learn initial skills, such as how to salute and how to maintain a clothing drawer. Self-aid and buddy care has been expanded dramatically, from a single one-hour class 10 years ago to multiple three-to-four-hour blocks of instruction and practical application that cover everything from how to treat a gaping head wound to CPR. During the fifth week, trainees go through combat arms training to include one-minute bouts with pugil sticks.

Full "Battle Rattle"

The committee also recommended extending M-16A2 training. Every trainee at BMT receives on Day 1 an M-16 rifle, which they carry through the sixth week of BMT. The rifle is identical to those issued in the operational force, except for its inability to fire live ammunition.

Unlike before, today's trainees become intimately familiar with their weapon, learning how to tear it down, reassemble it, and clean it. "This training immediately connects the trainees with a warrior role, ingrains weapon safety and security, and allows the trainee to become comfortable with the weapon prior to the field deployment exercises," according to a BMT factsheet.

After the 2004 panel review, most of the basic skills classes at BMT were moved to the first few weeks of training. Classes such as Air Force doctrine, which had previously been taught in the first two weeks, were moved closer to graduation. BMT officials say it's important to make sure trainees can become expeditionary warriors, before going into the finer details of what it means to be an airman.

"When you deploy you go through a lot of stress, no matter what career field you are in. Some people are going to have post-traumatic stress syndrome. Some people are just going to be a little different because they've been to the war zone. So the Air Force is really working on what it calls airman resiliency," said Col. William H. Mott V, commander of the 37th Training Wing at Lackland. BMT officials report to the 37th TW, which is aligned under 2nd Air Force at Keesler AFB, Miss.

"You ... build up to deploy, go over there, survive whatever goes on in combat, and then come back and get on with it," was how Mott summarized an airman's deployment routine. "That's exactly how BMT is set up."

In February 2006, Air Force leaders decided to extend BMT to eight-and-a-half weeks. When the extension was implemented two years later, officials were able to incorporate Basic Expeditionary Airman Skills Training with the additional time. BEAST—a $31 million program—replicates the scenarios airmen might experience while deployed.

The BEAST grounds include 110 acres of rugged terrain, which is broken into four zones where trainees live in tents, eat MREs, and are tasked with protecting their comrades and warding off attackers while dressed in full "battle rattle." The most grueling part is the tactical course, where trainees low crawl to wooden barriers, charge the enemy with their rifles, and make spur-of-the-moment ethical decisions such as deciding whether a woman

USAF photo

Trainees find an improvised explosive device as they make their way down Alison Alley, a mock IED trail that winds around the outskirts of the BEAST grounds.

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and her child pose a threat. Finally, they make the exhausting high crawl up a steep, sandy hill as they dodge "sniper fire." The five-day field training makes the old Warrior Week look like Candy Land.

No longer are instructors leading the events. Trainees now run everything from the command centers to tactical patrols down the 1.25-mile Alison Alley—an improvised explosive device-laden dirt path that winds around the outskirts of the BEAST grounds. Alison Alley is named after retired Maj. Gen. John R. Alison, a founding father of Air Force special operations and a former AFA Chairman of the Board.

Instructors intentionally keep "junk" along the path to make it difficult for trainees to spot the IEDs. In one area, a maroon sedan with blackened windows sits on a small hill. If you look closely, you can see a tiny green wire hanging out of the trunk, which is much lower than the front of the car, signifying a large amount of explosives buried inside. Around the corner, trainees may get distracted by a flip-flop hanging on a high chain-link fence, but the inevitable boom demonstrates it's already too late.

The flip-flop represents a daisy chain bomb. Instructors, acting as insurgents lurking in the woods, wait until someone walks past the sandal before detonating a high-powered explosive farther up the trail.

"It took me 20-plus years to get that kind of training; now they get it in the first eight weeks," said SMSgt. Mark Heath, the first sergeant for the 319th Training Squadron.

You will be hard pressed to find anyone at Lackland or in the Air Force senior leadership who won't tell you that BEAST was the best thing to happen to BMT in decades. The MTIs love it because it significantly expands training for the next generation of airmen, giving them the skills they need to operate effectively starting Day 1 in their new units. Despite the sometimes daunting challenges, the trainees also love BEAST because it gives them the opportunity to truly earn the title of "airman" and the confidence to begin their military careers.

"I like physically challenging things; BEAST was awesome," said seventh-week trainee Cory Mayo, 20, from Lebanon, Maine, in early December. At the time, Mayo, who plans to be an environmental electrician on KC-135s at Pease ANGB, N.H., had just completed the field training exercises. "The most difficult part of basic is working with individuals, working with your flight to get tasks done on time and correctly. We all have different ways to do things, but it's just a matter of getting everyone to work together."

USAF photo

A trainee carries an M-16A2 after completing the tactical course. Trainees are assigned the rifle on the first day of BMT and carry it every day for six weeks.

Mayo, who admits to "being a little bit lazy" before he joined the Air Force, now says he wishes it were a little more challenging to tackle the BEAST. Oddly enough, he is not alone and BMT officials are answering the call.

Precious Cargo

Officials are souping up the tactical course with realistic-sounding sniper fire and pop-up targets designed to force trainees to communicate and think on their feet. Instead of 50 trainees running the course in what typically turned out to be organized chaos, instructors will break the flights down into teams of 11 to 15. Each team will have one person who is responsible for carrying a "precious cargo" through the course.

"They need to realize that if the person carrying the precious cargo goes down, the entire mission is a failure. They are going to have to communicate more and pay attention to the entire team," said Lt. Col. Shane Haughian, who as the commander of the 319th Training Squadron is responsible for operational and field training at BMT.

Officials also are reworking Alison Alley. Instead of being tasked with finding one IED hidden somewhere along the trail, the same small tactical teams will be tasked with finding four to five IEDs. Since 2008, trainees have walked down the path in groups of approximately 50. That meant those in the middle or in the rear often would hear the loud boom of an explosive detonating long before they had an opportunity to spot the warning signs. Only the trainees leading the pack really received the full benefits of the exercise. That won't be the case anymore. Trainees will rotate running point, so each person will have an opportunity to spot the IED, call it in, and cordon it off, said Haughian.

"We are the only people in DOD [with] IED training in basic training, and we are trying to make it better," said Haughian with obvious enthusiasm. "These guys aren't going to be EOD guys after this," but they will be able to tell what a victim-activated device is and "they'll be able to recognize an IED."

In mid-December officials said they planned to launch a leadership course known tentatively as the Expeditionary Team Challenge. The course, designed by MTIs and emergency management instructors, strives to make the BEAST experience even better for trainees. It will include about 10 checkpoints, or challenges, each to be named after a core value or a line from the Airman's Creed. For example, at one point trainees will be tasked with carrying their "precious cargo" across raging



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BOEING

USAF photo by SSgt. Desiree N. Palacios

Exhausted basic trainees take a break inside a hard shelter after inspecting each others' body armor during the BEAST five-day deployment exercise.

waters—a roughly 20-foot-wide dirt path marked off by green sandbags. Tree stumps are strategically placed throughout the "river," and trainees will have to take various-size planks meant to simulate a raft or boat to carry themselves across. The obstacle course will require teamwork and creative thinking.

The biggest change, though, will be the incorporation of "Baghland Village," a mock village made of shipping crates. MTIs will act as civilians milling about, as a local mosque plays Arabic music. Trainees will have to battle a sniper hiding high up in the mosque's minaret, while they carry a casualty past a mock land mine alley to a designated landing zone about a football field away. As they treat the victim, helicopter sounds will echo from a loudspeaker, making the scenario even more realistic. The training is similar to the predeployment training ground forces receive.

These changes have been in the works for about nine months and recently received AETC's final approval, Haughian said. Instructors started running beta classes through Baghland Village, and cutting new trails for the leadership course in the fall.

The 22nd BMT panel review, held last May at Lackland, decided to add hand-to-hand combatives into the curriculum, although the details are still being developed. Airmen coming out of Officer Training School, the Reserve Officers' Training Corps, and the Air Force Academy receive a 10-hour block of instruction in hand-to-hand combat techniques. But, because combatives is a "perishable skill" and pugil sticks are already built into the curriculum, the panel voted down a similar plan for BMT, said Col. Shane P. Courville, the BMT commander.

More Challenges

"When we are looking at the eight-and-a-half-week program, we are just now approaching its two years of existence, so a lot of the changes that have occurred have not fully taken effect," he said. "We are not to the point where we should be making any drastic changes—at least I don't think so."

That doesn't mean combatives can't be implemented into already existing training now, and then have the next triennial review vote on a more formalized program in 2013, he said.

Mott, the 37th Training Wing commander, has been working with the Army to see what the Air Force can borrow from its modern combatives program. He also has visited Naval Station Great Lakes, just north of Chicago, and was planning a visit to the Marine Corps' Camp Pendleton, Calif.

"When I thought of combatives, I thought of Chuck Norris and [two guys] on a blue mat trying to do take downs. No. Combatives is building upon all the skills we already have, and then it goes to that extra level that gives [trainees] that warrior mentality," Mott said.

Despite the close relationship between Air Force and Army leaders, everyone agrees that for the program to be successful the Air Force needs to make it its own distinct program. Army combatives is meant to train infantrymen how to fight in close quarters with all their gear. The Air Force doesn't have that mission, but more and more airmen are going outside the wire so it's important to teach them how to protect themselves and use their weapon if the enemy does attack.

"I'm going to pick and choose from [the Army program] and tailor it for what I want," Mott said. "I want it ... for everyone to get that warrior ethos and be comfortable with their mission, so when we deploy with the Army, we are ready. But I don't need the full program."

Training is not the only change in the works at BMT. The Air Force intends to replace its existing 1,000-person recruit housing and training dormitories, which were built in the 1960s, with more modern dormitories, classrooms, and chow halls. The new, larger facilities will be known as airman training complexes. The 1,200-person ATCs were designed with input from MTIs and will have a single open bay, instead of the double bays now, giving MTIs a chance to scan the entire dorm.

Classrooms and dining facilities also will be in a separate building and each ATC will have its own running track and drill pad, limiting the need to deconflict schedules. The 40-year-old dormitories accrue hefty maintenance bills and limit the training officials can incorporate into BMT, Courville said.

To house and feed nearly 10,000 trainees, the total price tag for eight ATCs and four classroom-chow halls comes in just under $1 billion. The first two have already been funded and the first new generation facility is slated to open in January 2012, with the entire campus scheduled for completion in Fiscal 2016.

"Once this comes online you are going to see an entire redesign from the tactical level to the size of the flights in the classroom, to the types of instructional material that is used," said Lt. Col. Michael Paquette, the commander of the 331st Training Squadron. "It will be a whole new world in how we use the classroom space." ■

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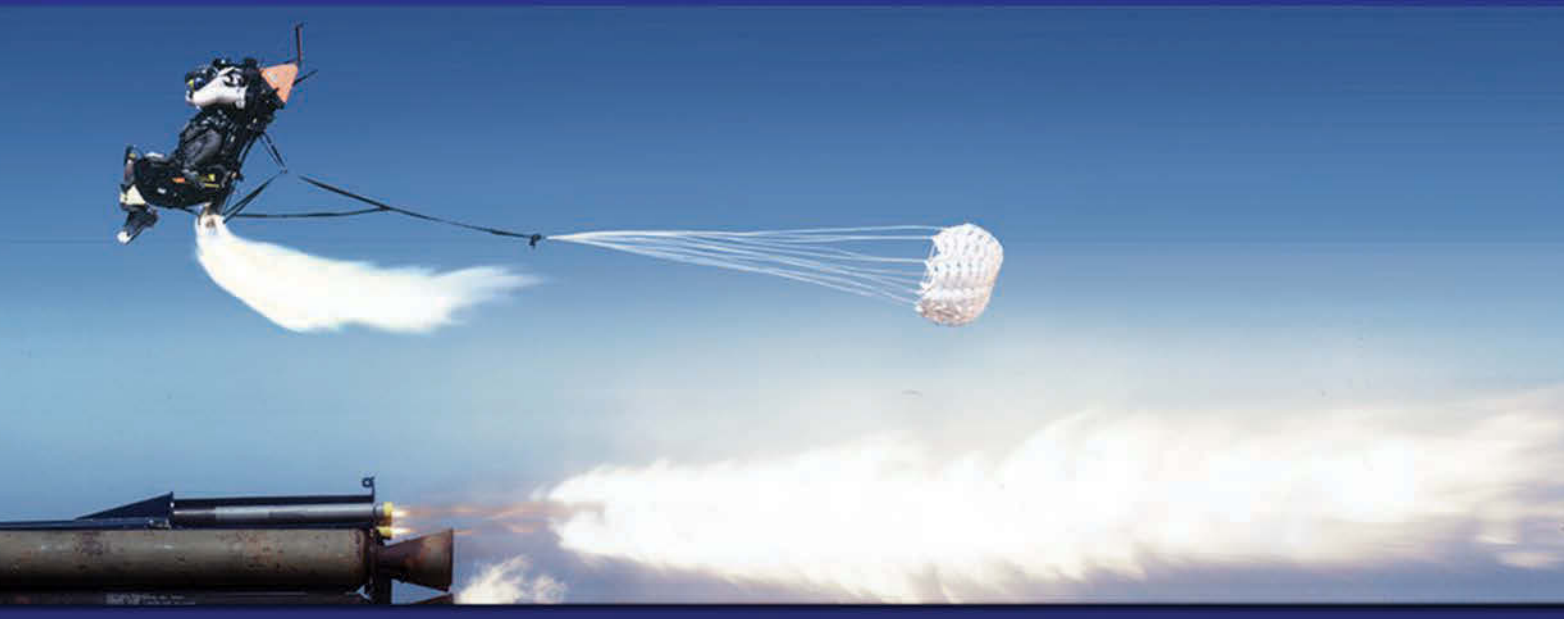

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The Evolution of Airpower Under Gates

By Rebecca Grant

Defense Secretary Robert Gates, over time, has dramatically reshaped the Air Force.

USAF photo by TSgt. Erik Gudmundson

"As Second Lieutenant Gates at Whiteman Air Force Base [Mo.] 40 years ago, I would never have imagined being on the same stage with the Air Force Chief of Staff and the Secretary of the Air Force. ... It is a real honor." So said Secretary of Defense Robert M. Gates in a formal ceremony marking USAF's 60th anniversary in September 2007.

Nine months later, he fired both the Air Force Secretary and Chief of Staff. And early the next year, Gates altered the Air Force's combat force structure with an early end to production of the F-22 and cancellation of the 2018 Bomber program. Higher on his agenda were "JSF and Reaper," as he said in his April 7, 2009, press conference detailing the budget decisions.

Of course, Gates has often praised the Air Force, too. His lengthiest and most gracious pronouncements on airpower came in September 2009. He commended everything from increasing Predator remotely piloted aircraft orbits to battlefield airmen to airpower legend Billy Mitchell himself.

Gates' initiatives also have cut a much wider swath. Program cancellations hit all services, and the Secretary once famously singled out the Navy for having too many ships.

The larger issue is whether the Gates-led remix of airpower will cause weaknesses in American military power over the long term. In 2010, the impact of the Gates cuts on major military muscle began to draw criticisms from experts concerned with maintaining forces to counter rising peers like China.

"Gates is running the Pentagon at a time when other risks facing the United States have been growing while American power relative to those risks has been declining," wrote former Sen. James M. Talent in *The Weekly Standard* in December 2010.

Surprising Changes

The SecDef may or may not exit the Pentagon in 2011. When he does depart, he will leave as one of the longest-serving Secretaries of Defense, and his tenure will have left a deep mark on airpower.

Gates declined, through his public affairs staff, an interview for this article. What follows is a review of the major themes and influences at play over the last four years as major decisions on American airpower were made.

Little evidence of the changes to come was visible when Gates was sworn in as Secretary of Defense on Dec. 18, 2006. The war in Iraq was at a frustrating and deadly low, and conflict in Afghanistan was picking up. His first testimony to Congress in January 2007 centered on adding 65,000 soldiers to the Army and 27,000 to the Marine Corps. By 2011, the increase approved for Iraq would bring the Army's active force to a post-Cold War peak of 547,000 and would vault the Marine Corps above Cold War levels, to a total end strength of 202,000.

Gates' defense of the budget was an eloquent plea to go forward with the troop increase and with major strategic funding. This was no ordinary budget. The Fiscal 2008 defense budget was 11 percent more than the previous year and would in fact become the peak defense topline of the post-World War II era, adjusting for inflation.

"Five times over the past 90 years, the United States has either slashed defense spending or disarmed outright in the mistaken belief that the nature of man or behavior of nations had somehow changed, or that we would no longer need capable, well-funded military forces on hand to confront threats to our nation's interests and security, Gates said, adding, "Each time we have paid a price."

He warned of the perils of not investing in defense and even recommended four percent of gross domestic product as a goal. Gates fully defended the F-22, the Army's Future Combat Systems program, Navy shipbuilding, and the F-35 Joint

An MQ-9 Reaper lands at JB Balad, Iraq. The unmanned aerial vehicle—and the F-35—should be priorities, says the Defense Secretary.

Strike Fighter. He supported missile defense, too.

"I have believed since the Reagan Administration that if we can develop a missile defense capability, it would be a mistake for us not to do so," he added.

Gates repeated the same themes in what he termed "my second and last posture statement" delivered in February 2008, as Congress was wrestling with Iraq war supplemental costs. All told, it was a defense of broad and balanced military investment.

Yet while Gates was defending the gigantic budget requests, several of his speeches suggested he was germinating an idea that the US was, in fact, investing too much in conventional force structure.

Three main parts to the concept emerged. First was the idea that conventional, theater forces would not be used anytime soon.

"It is hard to conceive of any country challenging the United States directly on the ground—at least for some years to come," he said near the end of a speech to the Association of the United States Army in late 2007.

It coordinated with the second part, which was an assumption that the war on terrorism was more or less a permanent institution. "The War on Terror is not likely to end any time soon. Radical Islamists are on a different clock altogether, a clock that records time a millennium or so into the past and generations into the future," he told another group in the fall of 2007.

The third and final theme was tactical. Gates observed that adversaries had "gone to school on us" from the Gulf War of 1991 onward, as he put it in the AUSA speech. Hence, they would not dare a direct challenge, in his view.

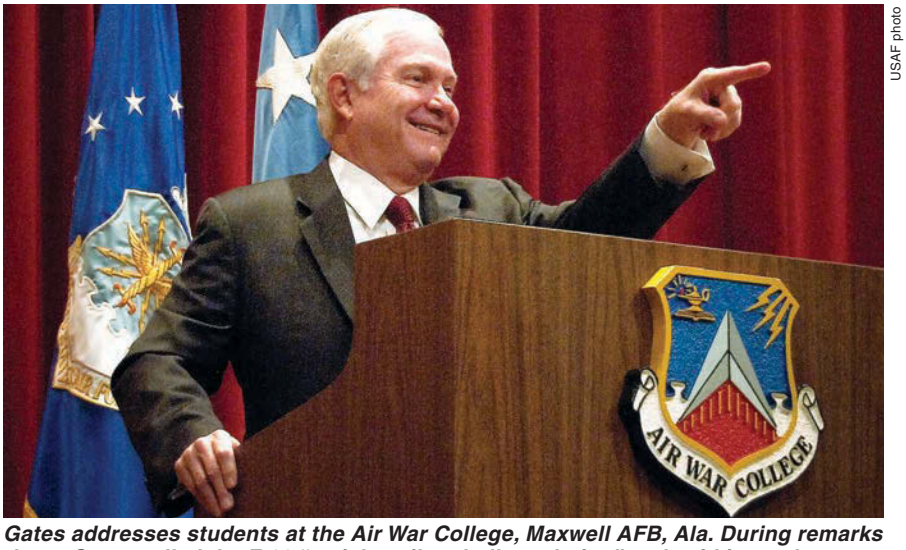
A New Defense Strategy

In April 2008, he delivered a speech to students and faculty at Air University, Maxwell Air Force Base in Alabama. The speech started with praise for Air Force operations and a thoughtful discourse on the late Col. John Boyd, noted tactical airpower theorist.

Then, near the end, came a new insight: With 16 months as Secretary of Defense under his belt, Gates was fed up.

"I've been wrestling for months to get more intelligence, surveillance, and reconnaissance assets into the theater," he said. "Because people were stuck in old ways of doing business, it's been like pulling teeth. While we've doubled this capability in recent months, it is still not good enough."

His emphasis on unmanned vehicles stemmed from his focus on war efforts. However, it was taking on wider significance as a prospective new defense planning rubric.



USAF photo

Gates addresses students at the Air War College, Maxwell AFB, Ala. During remarks there, Gates called the F-22 "a niche, silver bullet solution" and said it was better to bank on the F-35.

The best exposition of how Gates saw the strategic situation came in an article derived from his West Point speech and later published in *Parameters.*

"At the turn of the 21st century, the US armed forces were still organized, trained, and equipped to fight large-scale conventional wars, not the long, messy, unconventional operations that proliferated following the collapse of the Soviet Union," the SecDef wrote. "The same traditional orientation was true of our procurement procedures, military health care, and more."

Gates went on to say that the wars in Afghanistan and Iraq had been longer and more difficult than foreseen.

It was with this focus that Gates developed a new, classified National Defense Strategy that encapsulated his shift of priorities.

Here lay the likely point of debate between the Secretary and the Joint Chiefs. As he later summed up in an article in *Foreign Affairs:* "We must not be so preoccupied with preparing for future conventional and strategic conflicts that we neglect to provide all the capabilities necessary to fight and win conflicts such as those the United States is in today."

His course for defense policy began with the idea that the US would not get involved in a major ground war requiring the Army's canonical combination of maneuver and fires from mounted vehicles. "Where on Earth would we do that?" he asked in the article. Beyond this, Gates saw no real competition. He called on his years of preparing CIA intelligence estimates and dubbed Russia's military power "a shadow of its Soviet predecessor."

If conflict arose, Gates contended that "US air and sea forces have ample untapped striking power should the need arise to deter or punish aggression—whether on the Korean Peninsula, in the Persian Gulf, or across the Taiwan Strait.

"So although current strategy knowingly assumes some additional risk in this area, that risk is a prudent and manageable one," he concluded.

No longer was he out defending record budgets. The new themes of the strategy quite simply downgraded many of the core modernization programs of the services in favor of a new focus on "the wars we are in."

Gates did so over at least early objections of the Joint Chiefs. "Defense sources said Gates' strategy met resistance among the Joint Chiefs of Staff because of its focus on irregular warfare," reported Josh White of the *Washington Post* in July 2008.

This was dramatically resolved behind the scenes. According to a participant, the Chiefs could not in good conscience approve a lack of focus on fundamental capabilities—the more complicated forms of theater warfare that make up the essentials of joint operations in a contested battlespace. Gates simply brought in the new strategy document and signed it in front of them.

Still, with President George W. Bush's second term expiring, the strategy ap-

Lockheed Martin photo

peared to have a short shelf life. It was a "strategy destined to be overtaken by events" since a new Administration would write its own strategy, Michele Flournoy, then president of the Center for a New American Security, told the *Washington Post.*

Aside from the *Foreign Affairs* article, the strategy itself barely made headlines, given the economic crisis and the election campaign. Gates himself deferred many major decisions, such as how to restart the KC-X aerial refueling tanker competition in order to leave it to the next Administration.

The change of Administration in January 2009 and the surprise request to Gates to stay on was a major shake-up. Not only did Gates remain, thereby becoming the first Secretary of Defense ever to do so, the new political landscape gave him an opportunity to insert some of his strategic concepts in the Fiscal 2010 defense budget.

The Yawning Gap

"I punted all these balls to my successor and discovered I was the receiver," Gates told Fred Kaplan of *Foreign Policy* in a July 2010 interview.

By all accounts, he soon forged a strong working relationship with President Obama.

"Their biographies were very different, but their executive sensibilities were nearly identical," Kaplan wrote of Gates and Obama last fall.

Six months into the shift, the late John P. Murtha, then a US Representative (D-Pa.) and chairman of the House Appropriations Subcommittee, elaborated on the politics of Gates' changed situation in more detail. "There's a big difference in his authority and responsibility now," Murtha told defense reporters in June 2009. "Under the other Administration, he was a figurehead. He was ready to leave. He was not pleased or happy with the job," Murtha said.

In contrast, with the Obama Administration, Murtha said he thought Gates was "very happy with the way things are working out and the authority he has to run the Defense Department as it should be run."

The result was a series of cuts in conventional forces that executed many of the themes for which Gates had argued in his defense strategy.

Hints came first with Gates' January 2009 statement to the Senate Armed Services Committee. "Efforts to put the bureaucracy on a war footing have, in my view, revealed underlying flaws in the institutional priorities, cultural preferences, and reward structures of America's defense establishment—a set of institutions largely arranged to plan for future wars, to prepare for a short war, but not to wage a protracted war," he said. As a result, Gates said he intended to concentrate on the "yawning gap between the way the defense establishment supports current operations and the way it prepares for future conventional threats."

"I believe that the FY 2010 budget must make hard choices," Gates warned. DOD would pursue greater quantities of systems that represent the "75 percent" solution instead of smaller quantities of "99 percent" exquisite systems.

On April 6, 2009, Gates announced the list of cuts to bring Pentagon investment more in line with his stated priorities. It was not just airpower that was cut: Major Navy and Army systems got the ax, too. However, the cluster of decisions on fighters, the new bomber, helicopters, and airlift scrambled modernization plans.

The larger context for airpower reflected a desire to push quantity, specifically, the F-35 and the Reaper. Gates accordingly did not himself take on any detailed discussion of the qualitative differences between the F-22 and F-35, and he was dismissive of direct air-to-air threats.

"The intelligence that I've gotten indicates that the first [operational capability] for anything like a fifth generation fighter in Russia would be about 2016, and in China would be about 2020," he said.

So what should the US prioritize? "JSF and Reaper," summed up Gates.

Despite the push for quantity, the Secretary did not emphasize industrial base concerns. Issues such as protecting the skills of design teams or coping with the lack of new starts in military aerospace programs "did not play a significant role in most of the decisions," Gates acknowledged. There was no favoring of capitalists. "You guys know better than I do that most of these companies have multiple programs with us," he said.

The strategic rationale for putting off revitalization of core capabilities was pulled tight as taffy in debates surrounding early termination of the F-22. The primary public phase of the debate lasted from Gates' announcement in April until

DOD photo by Cherie Cullen

Top: The F-35 in test. Along with unmanned aerial vehicles, the F-35 program, with the possible exception of the troubled B variant, is fully supported by the Secretary. Above: Gates speaks at a Veterans Affairs summit in Washington, D.C. He believes the F-35, existing F-22s, and legacy aircraft will ensure air supremacy far into the future.

the Senate floor vote on July 21, 2009.

Gates spoke at length on the F-22 at Maxwell in April 2009. "There is no doubt the F-22 has unique capabilities that we need," he began. "But the F-22 is, in effect, a niche, silver-bullet solution required for a limited number of scenarios to overcome advanced enemy fighters and air defense systems," Gates concluded.

Better, in his view, to bank on the F-35 in part because it would be bought in greater numbers.

"In assessing the F-22 requirements, we also considered the advanced stealth and superior air-to-ground capabilities provided by the fifth generation F-35s now being accelerated in this budget, the growing capability in range of unmanned platforms like the Reaper, and other systems in the Air Force and in other services."

The Gates assessment was that overmatch would continue, because Russia and China would not develop their own fifth generation fighters for several years. "By then we will have more than 1,000 fifth generation fighters in our inventory," Gates said.

"The combination of F-22s, F-35s, and legacy aircraft will preserve American tactical air supremacy far into the future. Moreover, a key additional—and yet untapped—part of this mix of capabilities is unmanned aerial vehicles," Gates declared in September 2009.

Emphasizing unmanned aerial vehicles fit well with major Gates themes of focusing on irregular war and lowering the priority on forces for peer conflict.

"We know that the future will see an increase in unmanned systems of all kinds, with further reach and more capabilities. What are the implications of this reality on the number and types of manned fighters we need since the UAVs must be considered a key component of our air capabilities? And since UAVs do not [need to] refuel midair, how will this affect the number of tankers we buy?" he asked.

"These UAVs are a new piece of the equation," Gates said during a media roundtable. "It's not just Predators doing strikes. It is long distances, long dwell. If I recall correctly, an F-16 has a range of about 500 miles. The Reaper has a range of about 3,000 miles." Per USAF fact sheets, the Reaper's range is 1,150 miles and the F-16's is 1,955 miles. (Gates' comparison did not account for air refueling.)

Reapers, therefore, would be "an increasing part of the Air Force arsenal going forward."

To be sure, bringing unmanned strike aircraft into the fold was not so different from the Air Force's own plans. Chief of Staff Gen. Ronald R. Fogleman had put unmanned vehicles into the mainstream of Air Force operations in the mid-1990s. Subsequent leaders pushed developments such as arming Predator with Hellfire and worked to increase combat-ready systems.

DOD photo by TSgt. Jerry Morrison

L-r: Gates, Air Force Secretary Michael Donley, and USAF Chief of Staff Gen. Norton Schwartz at Donley's swearing-in ceremony at the Air Force Memorial in 2008. Gates insists he is committed to long-range strike capability.

The Wisdom of the Mix

The lingering question was not about more UAVs, but about deliberately taking more risk with the very forces that might come in handy for deterrence in the Pacific, for example. While Gates spoke of the "ample, untapped striking power" of USAF and Navy airpower, officials of both services were testifying to fighter gaps and shortfalls.

Some analysts taking stock of the Gates decisions in 2010 pointed out that the risk was growing faster due to steady progress by China and others on a range of conventional forces.

"Mark my words, for all *Newsweek's* veneration of Gates' budgetary visions, today's thinking about defense spending is hobbled by the Pentagon's inability to distinguish sufficiently between the serious challenge of irregular wars, and the need to deter truly existential threats posed by nation-states," wrote retired Air Force Maj. Gen. Charles J. Dunlap Jr. in a September 2010 commentary for foreignpolicy.com.

Muted warnings about long-term risks never went away. "Now if you look at the threat, you have to consider China as one of the threats down the road," Murtha told defense reporters in June 2009. The independent panel reviewing the QDR in summer 2010 shot back with specific entreaties to beef up long-range strike capabilities and naval power.

Picking up this theme was former Senator Talent. "There is real concern in Washington over Gates' leadership," he said. "He uses the current counterinsurgency missions as an excuse for not sustaining programs that are necessary to ensure the United States will be able to contain Russia, Iran, and especially the growing power of China."

Talent, for one, left the door open for a change in direction on the part of Gates. "He still has the time to say that, unless Congress adds substantial funding to modernize the military and fully supports changes necessary to reform the Pentagon, no responsible Secretary of Defense can continue to guarantee American security within an acceptable margin of risk," Talent suggested.

Long-range strike may end up being the litmus test. "I am committed to seeing that the United States has an airborne long-range strike capability," Gates said in his September 2009 address to the Air Force Association. "Whatever system is chosen to meet this requirement—be it manned, unmanned, or some combination of the two—it should be one that can realistically be produced and deployed in the numbers originally envisioned," he added.

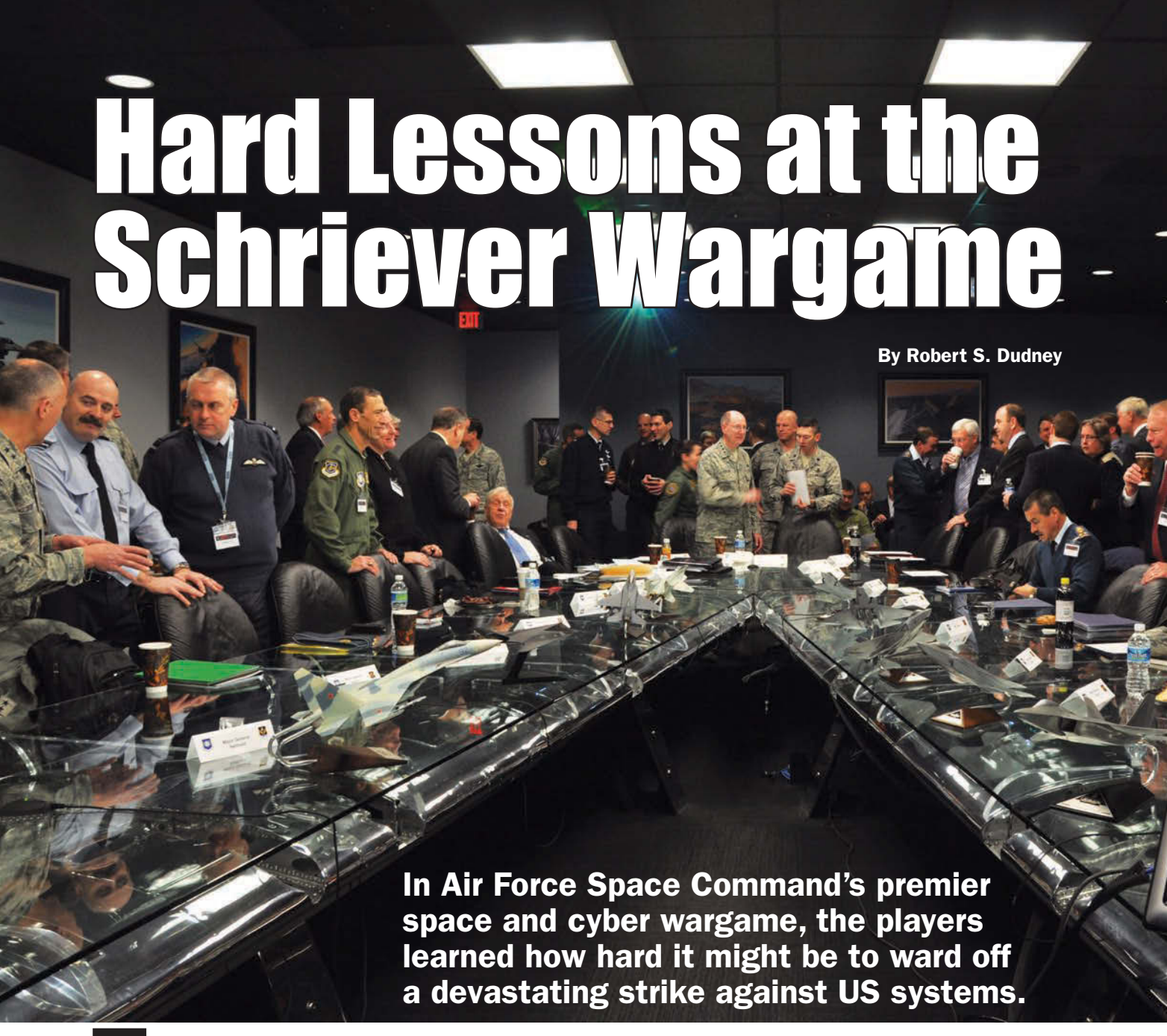
The Gates airpower strategy of 2008 to 2010 deliberately put a hold on investment in the most advanced and high-intensity systems in favor of those needed to win today's wars or which could be purchased in large numbers.

The wisdom of this airpower remix may not be known for years. ■

Rebecca Grant is president of IRIS Independent Research. She has written extensively on airpower and serves as director, Mitchell Institute, for AFA. Her most recent article for Air Force *Magazine was "Desert Storm," which appeared in the January issue.*

Hard Lessons at the Schriever Wargame

By Robert S. Dudney



In Air Force Space Command's premier space and cyber wargame, the players learned how hard it might be to ward off a devastating strike against US systems.

The global space and cyber war of 2022 started out small, in a corner of the Pacific. One of America's allies in the region engaged in some sort of local action. A US "peer" adversary—and China would certainly seem to fit the description—viewed that action as a severe provocation.

The peer responded violently. It swiftly knocked out the US ally's cyber and space systems, crippling it. Tensions escalated, and the next move was Washington's.

So began Schriever 2010, the latest edition of Air Force Space Command's premier wargame. The scenario did not include specific nations. However, US military personnel simulated what they thought could happen in the space and cyber realms a decade hence. The objective: Learn how to deter war in those domains.

The classified game featured some 600 military, civilian, and allied players. It unfolded over four days last May at Nellis AFB, Nev. Recent briefings, interviews, and articles have begun to lift the veil on some key conclusions.

Among them: Combat in space or cyberspace can instantly go global. Conflict in those domains cannot be isolated from other domains. Cold War-era deterrence theories are ill-suited for the space and cyberspace worlds of the near future. "From the very first move of the wargame," said Maj. Gen. Susan J. Helms, a player, "the entire scenario served to remind us all how difficult it can be to think through and implement an effective deterrence strategy to forestall a crisis."

According to participants, the game's world of 2022 will be extraordinarily complex. It would be inhabited by peer space and cyberspace competitors, as well as rogues. Civilian and commercial interests will be engaged. Vital assets could be hit with all types of weapons, kinetic and nonkinetic.

Following the game's opening gambits, things moved fast. The US ally invoked mutual defense agreements, and Washington responded positively to its entreaties.

The US response started a new dynamic. As some of the briefings show, the China-like "adversary" then took

SIDC Visualization Lab photo by Dan Santistevan

Senior military and civilian officials discuss the Schriever wargame during a break at a planning meeting in Washington, D.C.

pre-emptive action, focusing on denying US and allied access to space and cyberspace enablers, vital to any successful US military action such as air or naval operations in the Western Pacific.

This was described in one Air Force Space Command briefing as "Red Blockades Blue." The next move was "Blue Responds." In the next phase, the two sides engage in what was described as a "Major Attack."

Lt. Gen. Larry D. James, then commander of 14th Air Force and its Joint Space Operations Center at Vandenberg AFB, Calif., was a key participant. In a recent issue of *High Frontier,* the journal of Air Force Space Command, the general outlined some of the problems the US faced.

One was the fiercely assertive behavior of Red, the "peer" nation's leadership. "The adversary attacked aggressively, deliberately, and decisively on a variety of vectors to deny US and coalition forces access to space capabilities," James wrote.

In addition, James said, adversary forces had "a significant offensive advantage against US space capabilities" in the game. They executed "counterspace operations" at the time and place of their choosing, with little warning, he said. US decision-making and responses, in contrast, lagged badly.

This was more or less baked into the scenario, according to Col. Roger M. Vincent, commander of USAF's Space Innovation and Development Center at Schriever AFB, Colo.

"We had a much smaller group making decisions for the Red," said Vincent. "They clearly had in their minds certain trip points, what they were going to do. We portrayed Blue more like the decision apparatus of the United States."

In Washington, it seems clear, many more players were involved, and thus decision-making took longer.

Worse, said James, the US and coalition forces had only a limited ability to reconstitute those space forces that had been targeted. In fact, he noted, Blue "suffered from significantly degraded

Illustration by Erik Simonsen

A ground-based laser "blinds" an intel satellite in orbit in this artist's conception. One question asked at the game was what constituted a "red line" in space.

SIDC Visualization Lab photo by Dan Santistevan

Retired USAF Gen. Lance Lord, a former head of Space Command (l), and Gen. Robert Kehler talk over the wargame at the planning meeting. Kehler led AFSPC at the time, but has since been confirmed to head US Strategic Command. The exercise taught participants that the US should not try to go it alone in space.

space capabilities during the conflict and well into the post-conflict period." Helms, who at the time of the wargame was the director of plans and policy at US Strategic Command and who has since been confirmed to be the new commander of 14th Air Force, noted the swift escalation of the conflict. Over four days, "the crisis escalated to the senior executive level, and soon encompassed us all, including partners beyond our own government and nation," she said.

US interagency leadership, Helms continued, "gathered to weigh in on how to counter and deter future conflict—and how to coordinate actions among multiple nations to achieve the best effect." However, "the enemy was not deterred from further escalation," Helms wrote in an article in *High Frontier.* Red simply continued to attack time after time.

"The leaders of this provocative regional state had defined their objectives ... and had already thought through the overall costs and benefits of their plan," said Helms. "They had assessed our likely behavior in the context of the scenario at hand, determined that, for them, the benefits of action outweighed the risks, and they made their decision to 'move out.'"

In one postgame assessment, several USAF officers from Pacific Air Forces offered a bleak view of US command and control in the game. "As the adversary challenged our access to space and cyber critical enablers," they wrote, "it was difficult for military leadership and the National Security Council to appreciate and predict the full impact of those actions."

They added, "At one point, ... it became clear that we had better intelligence and understanding of the state of Red's C2 than we had of our own systems."

Evidently, the attacker's specific objective was never totally clear. As Helms noted, it appeared to the Blue side that "the space and cyber attacks and the motivations behind them were more about disruption than mass destruction."

Disruptions to Deterrence Efforts

One could easily perceive them as "attempts to create an environment of disruption for information flow" and to generate a thick "fog of war" to weaken US capabilities, she said.

Without doubt, space and cyberspace assets give US forces critical capability to see, communicate, navigate, and operate in superior ways. Current and future adversaries recognize this and will almost certainly seek to deny those capabilities in time of conflict, said Air Force space officials.

"If you are a logical adversary, you say, 'Well, if I want to slow that juggernaut down, it probably is to my advantage to reach out and touch those information things that we are using to great advantage,'" said Kurt Nelson, a contractor supporting the Schriever wargame. "You could logically expect, in a crisis of the future, for someone to be dithering with your information systems."

In a recent study, RAND Corp. space analyst Forrest E. Morgan said a combination of factors "suggests that first-strike stability in space is eroding." Morgan added, "With a growing number of states acquiring the ability to degrade or destroy US space capabilities, the probability that space systems will come under attack in a future crisis or conflict is ever increasing."

This could happen in ways both standard and exotic, if the actions analyzed in Schriever 2010 are any guide.

A science and technology cell led by Werner J. A. Dahm, then chief scientist of the Air Force, considered various small, micro, and nano satellites.

Dahm reports that he emphasized the adversary's possible use of "grappler" satellites. Such satellites attach themselves to a target spacecraft, changing its momentum and center of mass, inducing drift and tumble while robbing the satellite of ability to control and orient its motion. Dahm said the game analyzed small satellites "designed to provide an on-demand kinetic kill capability" and "microwave-based directed energy capabilities to degrade or destroy the target satellite."

The challenge of coming up with effective policies and strategies to deter attacks or limit their effectiveness was only too apparent in the wargame.

The first problem was the congested nature of the space and cyberspace realms. With so many players—nations, companies, criminals, military units, hackers—on the scene, it was hard to know who was doing what to whom and why.

"We found that it is difficult to conduct attribution for actions in space," James noted at a recent US Strategic Command conference, where he discussed aspects of the wargame.

"Certainly, if there's an ASAT launch or something like that, generally we can see that and know what's going on, but if there are on-orbit objects that perhaps have been there for months or years, we ... can't necessarily know what their function is. How to attribute an action, based on what that object does? It can be very difficult."

Space Command currently tracks more than 20,000 objects and performs conjunction analysis on more than 1,000 satellites each day. Even more difficult is knowing the intent of a spacecraft's operator.

Equally disruptive to deterrent efforts in the game was a lack of clearly demarcated "no-go" zones or trip wires which the enemy knew he had to honor and avoid.

"What are the red lines in space?" James asked rhetorically. "How does an adversary understand what our red lines are as we operate in the space

domain? Is jamming a satellite a red line? Is destroying a satellite a red line? There was a lot of debate at Schriever about that."

As several space officials tell it, the adversary seems to have frequently misunderstood Blue signals about what was or was not off-limits.

Beyond the problems of attribution and red lines, the matter of proper response and escalation came up time and again.

"We saw that what is a regional conflict when you start conducting operations in space ... can rapidly become more than a regional conflict" if you start "removing capabilities in space," said James. "How do you contain something to a region when space assets are global in nature and strategic in nature?"

Vincent, whose office was responsible for setting up and running the game, put it a different way.

"With some of our strategic nuclear systems, we've told the world, 'You touch those, we are going to respond accordingly,'" he noted, adding that with nuclear weapons, there is a clear threat of retaliation. "Cyber is a domain where we have to figure out what that means. It might be we can't [respond fully], because the cyber domain is ... so global. Once you hit the [global information grid], you're everywhere."

The prospect of collateral damage within the web of space and cyber systems was of concern to former Rep. Tom Davis, a Virginia Republican, who played the part of the President in Schriever 2010.

"Choosing to initiate an attack, cyber or otherwise, would disrupt this web with inevitable—and potentially significant—adverse effects to both aggressor and victim," said Davis. "Increasingly, a no-holds-barred approach is simply not an option."

Indeed, said Nelson, the lesson is obvious: The space-cyberspace theater is global, and can't be limited. "Whereas, in air, land, and sea, I can confine my fight to a theater, to a geographic area, and there are natural firebreaks there, in space and cyberspace there are no natural firebreaks," he warned. "This underlies our current rules of engagement. We've realized that I can start a fire here, and pretty soon it's everywhere."

Officials who took part in Schriever 2010 believe it yielded important conclusions about how to build deterrence in space.

One big lesson, said officials, is that the US military should not try to go it alone. A comprehensive system pulling in many different contributors from around the world adds depth and strength to the nation's space and cyber infrastructure.

Maj. David Manhire, SIDC's deputy director, pointed to the existence of five major groups in the wargame: the US military (combatant commands, Pentagon officials, the services); the commercial space and cyber industries; allies (Britain, Canada, and Australia); other US agencies (Departments of State, Homeland Security, and others); and the US Intelligence Community.

Of these five elements, Manhire noted, four fall outside of US military control, making wide cooperation essential. The idea is, should the US lose some of its capability, it would be able to fall back on others.

Consequences, Reactions

Joseph D. Rouge, then director of the National Security Space Office, told the STRATCOM audience that the US should become "selectively interdependent" with commercial and foreign operations. In that way, any attacker would have to ponder the fallout from unwanted collateral damage.

"When an attack on one is an attack on all, it becomes much more difficult to take on one of the partners, without taking on all," said Rouge. "I think that is a very key part."

For these reasons, many are pressing to develop a "space order of battle" that includes both commercial and foreign space systems. Even more important: further development of a so-called Combined Space Operations Center, or "CSpOC," to direct space and cyber moves in a war. In the wargame, foreign and commercial space officials joined in CSpOC deliberations, generating what James called "one of the clear successes" of the exercise.

The game also highlighted the need for much greater space situational awareness, officials said. Davis put the matter as bluntly as any: The Commander in Chief "likely will not initially know who is initiating the assault. … What would global reaction be to retaliation if the identity of the aggressor was in doubt? It is safe to say it would be unpredictable, at best."

James noted many events, even natural ones such as solar maximum events, can cause disruption. "Unless you have some sort of sensor that tells you this was indeed caused by solar activity, how do you know that that action wasn't taken by an adversary with something that you couldn't see?"

The upshot: If the US can positively "finger" an attacker, then it can credibly threaten retaliation. If the threat of retaliation is credible, deterrence might hold. As many officials see it, the game also demonstrated the need for much stronger and detailed declaratory policies about space and cyber issues.

Vincent said the game participants "had quite a few conversations" about establishing red lines, trip wires, and "keep-out" zones, as a way of warning an adversary away from tampering with the Blue team's "crown jewels" in space and cyberspace. "If you don't articulate those red lines to the adversary, they will never know when they get close," said Vincent. "If they don't know when they're close, how can they be deterred?"

Rouge called for a major effort to "develop and enhance norms of behavior in space." With that, he said, must come plans for rewarding space operators who follow these rules and dealing with malefactors. "One thing we learned at Schriever," said Rouge, "was that we can't afford to do it ad hoc." Planning for retaliation in space or cyberspace "requires something like a DEFCON system" that has applied in the strategic nuclear world. Rouge said there should be "an automatic response" laid out in the wake of any decision to escalate.

"We need to give rules of engagement to our field commanders," said Rouge. "What can they do? What can't they do? The enemy needs to understand that they're going to get a consequence, that they're going to see a reaction."

Space officials are quick to note that the situation is neither desperate nor beyond repair. They emphasize the wargame postulated threats which might be a decade or more in the future.

According to Nelson, it is not accurate to say "this has become an Achilles' heel, and a single swing from a single sword" is going to take down the US military space setup.

However, "if we continue along the trends that we see, we may find ourselves in the near future arriving at a place where we do indeed have this Achilles' heel," Nelson said. ■

Robert S. Dudney is a former editor in chief of Air Force *Magazine (2002-2010). His most recent piece was "The Lavelle Syndrome" in the September 2010 issue.*

High Fliers at

Photography by Sagar Pathak and USAF photographers
Text by Aaron Church

A 9th Reconnaissance Wing U-2S turns on final approach at Beale. The Dragon Lady is notoriously difficult to land given the tendency of the highly efficient wings to float over the runway.

USAF's U-2 and Global Hawk reconnaissance aircraft require unique skills at Beale Air Force Base.

Beale

Operating the cutting-edge RQ-4 Global Hawk alongside the still potent U-2 Dragon Lady, the 9th Reconnaissance Wing at Beale AFB, Calif., forms the nexus of US Air Force airborne strategic reconnaissance. With manned or unmanned aircraft, Beale has long been home to USAF's eyes in the sky. True to the motto on the U-2 patch, "In God We Trust—All Others We Monitor," it ably carries this role into the future. At the request of the 9th RW, some airmen in these pictures are not identified.

I1I *Global Hawks, such as this one, are tasked with high-altitude, long endurance, wide-spectrum intelligence gathering, complementing manned and space reconnaissance systems.* ***I2I*** *Crew Chief SSgt. Justin Weeks, 9th Maintenance Squadron, readies a U-2.*

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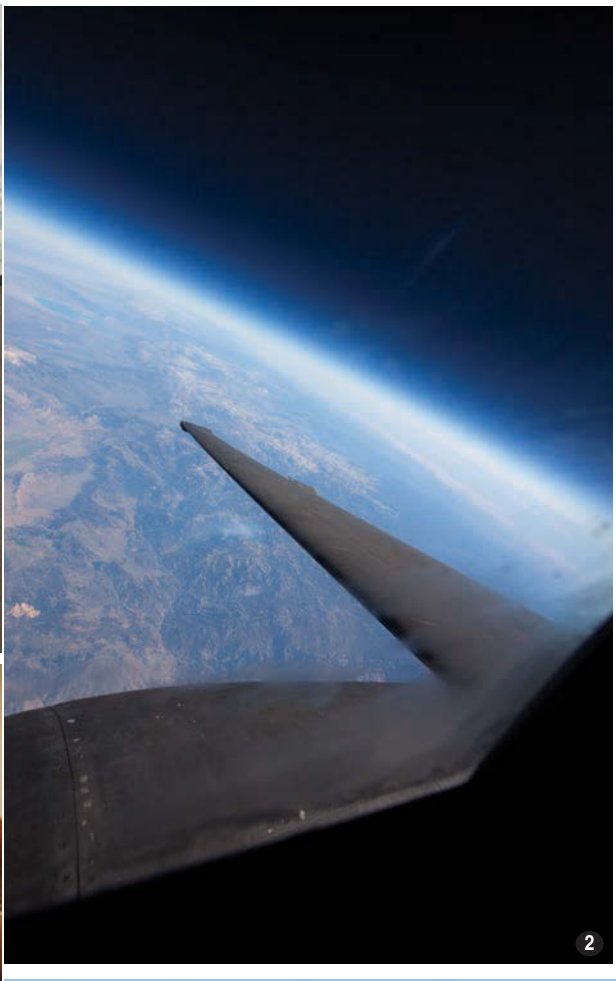
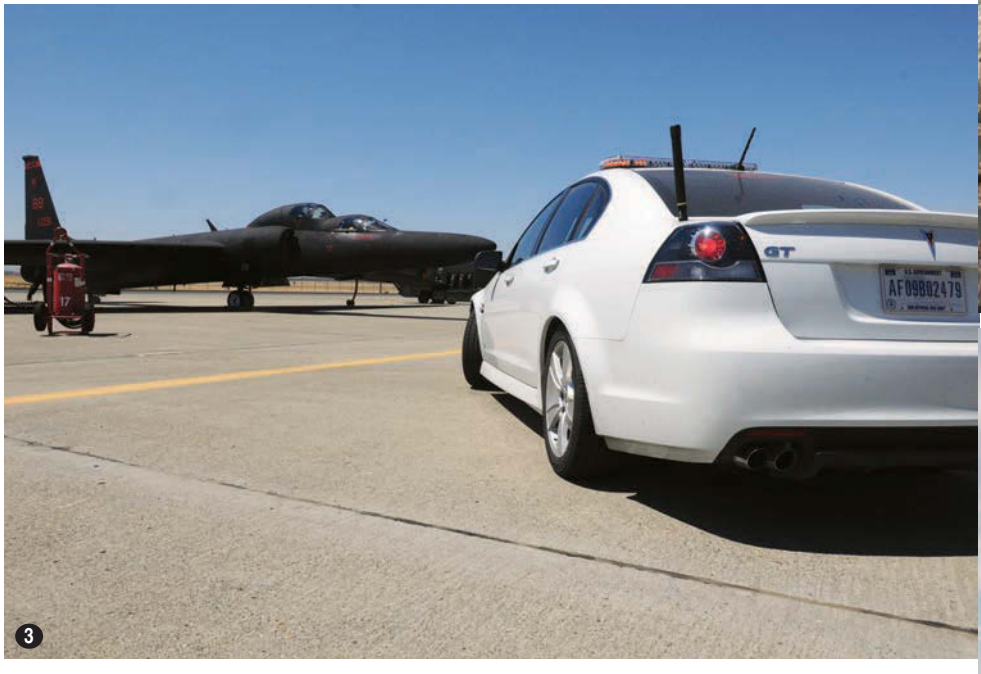
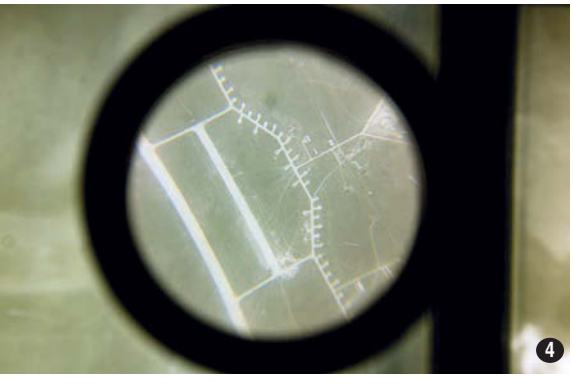
I3I *U-2 pilot Lt. Col. Jon Huggins is helped into a custom-fitted pressure suit designed to combat the physical effects of sustained flight at extreme altitudes where the U-2 routinely operates.* ***I4I*** *The U-2 executes a left turn over Lake Oroville, just north of Beale.*



I1I *A U-2 soars at 20,000 feet over the foothills of the Sierra Nevada in Northern California. With glider-like efficiency, the U-2's 105-foot wingspan enables it to cruise in excess of 400 mph at 70,000 feet—more than twice the altitude of an average commercial airliner.* ***I2I*** *Over Northern California at 70,000 feet, the curvature of the Earth, edge of space, and darkness of space are clearly visible.* ***I3I*** *Each U-2 undergoes regular, intensive inspections requiring complete disassembly, including removal of the engine and tail section. Here, the air brakes are deployed for hydraulic inspection.* ***I4I*** *Specially modified TU-2s, such as the one shown here, operate as trainers and keep current pilots proficient. The U-2 is a difficult aircraft to fly, and the instructor's aft cockpit is equipped with full flight controls.* ***I5I*** *A 9th Maintenance Squadron maintainer slithers into a U-2 air intake. The U-2 is powered by a single General Electric F118-101 turbofan, making meticulous inspections vital.*

|1| *Similar to NASA spacesuits, the U-2 flight suit protects the pilot from adverse physiological symptoms such as hypoxia and barotraumas—the result of oxygen deprivation and a change of atmospheric pressure.* *|2|* *Decked out in a glossy version of the U-2's overall black paint scheme, T-38 Talon trainers such as this one provide a cost-effective way to maintain flight currency and training requirements. A U-2 in flight passes behind it.* *|3|* *A Pontiac G8 chase car waits for an incoming U-2 on the flight line. The chase cars give pilots input as needed during landing.* *|4|* *A photo of a foreign airfield taken by a camera in a U-2 sensor bay. Such film is developed and analyzed immediately upon landing.* *|5|* *SSgt. Adam Rodgers, an imagery analyst, reviews photo negatives taken on a mission.*





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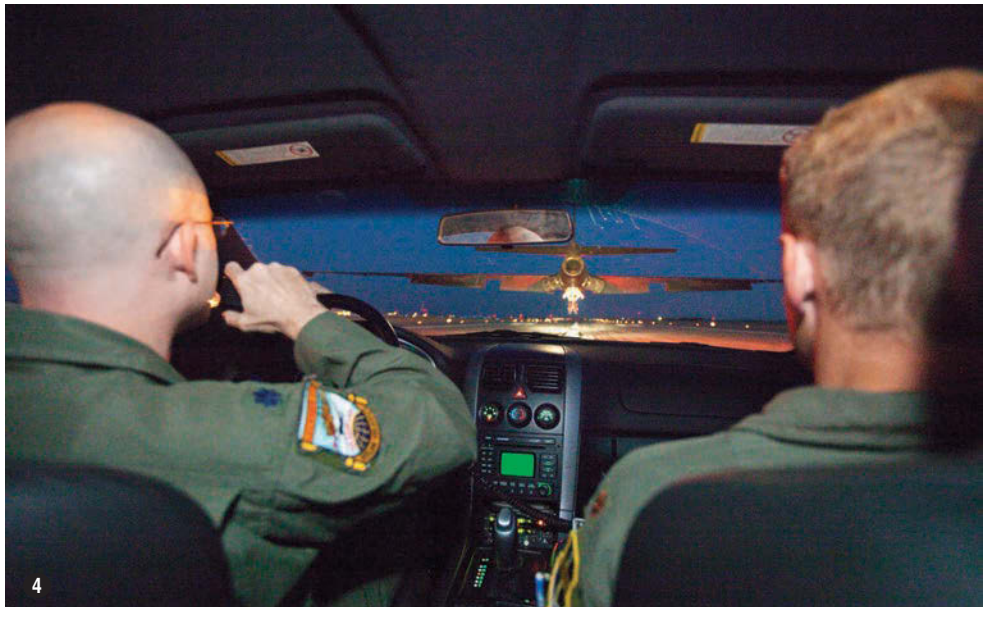
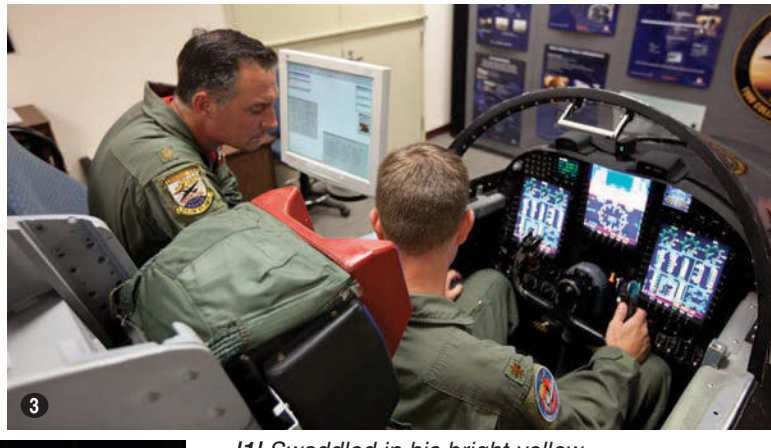
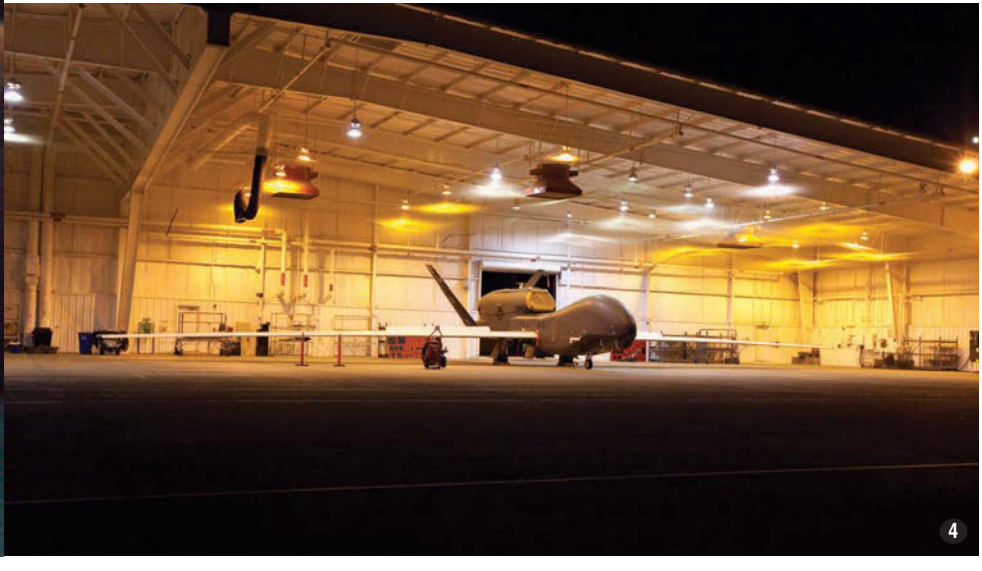
I1I *Global Hawks on the ramp at Beale. The remotely piloted RQ-4 aircraft performs missions similar to the U-2, and many feel the Global Hawk is the future of intelligence-surveillance-reconnaissance.* ***I2I*** *An airman inspects the tail section of a U-2—every rib, stringer, and rivet is scrutinized to prevent structural failure.* ***I3I*** *A U-2 overflies Beale. The aircraft was adapted from the fuselage of an F-104 Starfighter mated to a high-aspect-ratio wing.* ***I4I*** *The Block 40 variants of the RQ-4B Global Hawk (such as the one seen here) boast a range of more than 10,000 miles and a suite of synthetic aperture radar, electro-optical, and infrared sensors. Eventually, they will also carry a signals intelligence package.* ***I5I*** *A Dragon Lady and its T-38 chase plane cast fleeting shadows, passing low over Beale's main runway.*

I1I *Aided by airmen from the physiological support squadron, a crew climbs into a tandem TU-2 trainer. The yellow containers supply pure oxygen, which when breathed, decreases the amount of nitrogen in the bloodstream, mitigating the risk of decompression sickness.* ***I2I*** *With its extended nose and wing-mounted sensor pods in silhouette, a U-2 is marshaled to a stop by a crew chief at Beale.* ***I3I*** *A U-2 banks over Lake Oroville at 15,000 feet. The Dragon Lady is very manueverable and requires a deft touch to control in the thin air at high altitudes. With less than a 12 mph difference between maximum and stall speeds, the aircraft demands constant attention.* ***I4I*** *Racing behind a landing U-2 in a chase car, 99th RS pilots talk one of their own through touchdown. The high-altitude pressure suits restrict visibility, making communication between the pilot and the chase car crucial to judging distance to the ground.*







I1I Swaddled in his bright yellow pressure suit, a 99th RS pilot guides a U-2 over a lineup of Global Hawks on the flight line at Beale. I2I Large air brakes, seen here deployed, are required to fully stall the U-2 on landing. A highly efficient wing and small profile render the aircraft vulnerable to crosswinds. I3I A senior U-2 pilot helps a potential program applicant become familiar with the U-2 cockpit in one of two simulators housed at Beale. Applicants will fly three evaluation flights in the U-2 to determine if they would be a good fit for the program. I4I A Global Hawk in its hangar at Beale. The RQ-4B's hangars had to be purpose-built to accommodate the aircraft's 130-foot wingspan.

A U-2 soars over the Lake Oroville area. Far from a Cold War relic, the U-2 continues to undergo upgrades, and is outfitted with the latest sensors and equipment. Outlasting even its "replacement" aircraft—the SR-71—the U-2 remains an indispensable asset, providing real-time intelligence to commanders on the ground. ■

Keeper File

The Folly of "Strategic Persuasion"

Gen. John P. McConnell became Chief of Staff in February 1965, as the Vietnam War was expanding. By fall, the US was engaged in a major air war. It was a strange type, though. As McConnell told a Dallas audience, US objectives "are not military." He outlined, instead, a goal of "strategic persuasion," in tune with the views of Secretary of Defense Robert S. McNamara. While the US was busy sending signals to Hanoi, however, North Vietnam was fighting a real war. That explains why the USAF war effort, though enormous, had limited impact. Incrementalism, gradualism, micromanagement, hesitation, stops, and starts—they all served to hamstring US airpower. In this speech—and with 45 years of hindsight—you can see it all coming.

"The Role of Airpower in Vietnam"

Gen. John P. McConnell, USAF Chief of Staff
Address to Dallas Council on World Affairs
Dallas
Sept. 16, 1965

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

In his pronouncements and talks, President [Lyndon B.] Johnson has made it unmistakably clear why we are in Vietnam and what our objectives are. As he has emphasized, these objectives are not military, because they do not call for destruction of the enemy and his unconditional surrender, but rather, for peaceful and mutually acceptable settlement through unconditional negotiations. ...

Turning first to what I [term] "strategic persuasion," we must bear in mind that, in effect, we are fighting a war with two different elements in Vietnam, of which one pertains to the north and one to the south. In turn, airpower has a dual objective in North Vietnam. One objective is to interdict the flow of supplies to the Viet Cong in the south.... The other objective is to apply a measured amount of strategic airpower in order to persuade the North Vietnamese leaders to cease their aggressive actions and to accede to President Johnson's offer of negotiating a peaceful settlement of the conflict. ...

Strategic warfare is defined as aerial operations designed to "destroy the enemy's capability and will to continue the war." This is accomplished normally by progressively destroying fixed military as well as industrial and urban complexes, that is, targets of strategic significance in the territory under the enemy's domination. ...

Being well-known to any potential aggressors, [America's massive nuclear arsenal] has acted as a powerful deterrent to nuclear aggression. It not only helped prevent an all-out general war to this date but also provided a "nuclear umbrella" which gave our statesmen more freedom of action in dealing with local crises and conflicts.

The question has been raised: Why we are not using this powerful strategic capability to force an end to the war in Vietnam? There can be no doubt that we could destroy all of North Vietnam virtually overnight. But while this might end the war in Vietnam, it could easily spark a general nuclear war—the very contingency we are determined to avoid and deter. Moreover, such drastic action is neither necessary nor in accord with the declared intentions and policies of this country.

Our policies in this respect were spelled out by President Johnson in his historic address at Johns Hopkins University last April when he declared: "We have no desire to devastate that which the people of North Vietnam have built with toil and sacrifice. We will use our power with restraint and with all the wisdom that we can command. But we will use it."

And use it we do, but only to the extent necessary to achieve our declared aims. Toward this end, our strategic capability is utilized in two ways.

First, our full nuclear strategic capability must continue to act as a deterrent, that is, provide us freedom of action in taking whatever military measures are required in Vietnam without risking escalation into nuclear war.

Second, our conventional strategic capability is being applied, as the President said, with restraint and discrimination until the rulers of North Vietnam become persuaded to agree to negotiations on an equitable basis. That point will be reached when these rulers recognize that the price of continued aggression is higher than they are willing and prepared to pay.

It is evident, therefore, that the principle of "strategic persuasion" is not meant to achieve total military victory, as all-out strategic airpower helped to achieve in World War II. Rather, it is designed solely as an instrument of foreign policy for the attainment of a diplomatic objective.

The great advantage of such strategic persuasion lies in its flexibility. Under the protection of the nuclear umbrella, its pressure can be increased in measured steps, as may be necessary, while still being kept well below the level [of] uncontrollable escalation. By the same token, the pressure can be decreased if warranted by a reduction in the intensity of the enemy's aggressive actions, as Secretary of Defense McNamara indicated in a TV interview a few weeks ago. Finally, the pressure can be discontinued altogether at any time if it has achieved its purpose or if such action is expected to foster its achievement.

There are indications that this measured application of the principle of "strategic persuasion" in Vietnam is beginning to take effect. This is not surprising, if it is realized that, in the past six months, South Vietnamese and US aircraft have flown over 15,000 sorties against carefully selected targets in North Vietnam and dropped more than 14,000 tons of bombs on them. ...

Of course, airpower is only one phase of the overall military effort needed in Vietnam. In turn, the military effort is only part of the total effort that will be necessary to bring peace, security, and economic health to ... South Vietnam. But to achieve this goal in the face of armed aggression, our military effort must continue until we have convinced the aggressors that a peaceful settlement of the conflict is in the best interests of all concerned, particularly their own. ■

Sharpening the Spear

By Richard P. Halloran

USAF photo by SSgt. Lakisha A. Croley

US Pacific Command will oversee 146 military exercises this year to build relationships and hone combat readiness.

Far more than any other military force in the Asia-Pacific region, US Pacific Command trains airmen, soldiers, sailors, and marines in an extensive array of exercises intended to give them an advantage over likely adversaries—and thus deter potential enemies.

Some of the 146 exercises on PACOM's schedule for Fiscal 2011 are those of a single service; more focus on joint training. Others are bilateral, where the US seeks to build trust and confidence in the forces of another nation. Still others are multilateral coalition-building efforts. Among the newer type of exercises is training for humanitarian operations.

Cobra Gold is representative. In the spring, all four US services are scheduled to head to Thailand to take part in Cobra Gold alongside Thai forces and those of Singapore, Japan, Indonesia, South Korea, and Malaysia, with a total of 11,000 participants. The US Army and Marine Corps alternate each year as the US ground element, with the Marine Corps playing the role this

USAF photo by TSgt. Shane A. Cuomo

Left: An F-15 is refueled during December's Keen Sword exercise at Kadena AB, Japan. Above: USAF, Thai Air Force, and Singapore Air Force members track a "downed" aircraft during a Cobra Gold exercise. Below: Photographers snap a C-17 Globemaster III during 2010's RIMPAC exercise. PACOM participates in the most exercises of any military force in the region. All focus on the unique challenges of the Pacific theater.

USAF photo by TSgt. Matthew McGovern

year. In its 30th year, Cobra Gold is one of the longest running multilateral exercises, a three-week drill with an array of command post, field training, and humanitarian challenges.

In conjunction with Cobra Gold, the Marine Corps will conduct exercise Freedom Banner in which two ships from the maritime pre-position force will sail to Thailand to offload weapons, equipment, and supplies. They will then reload the ships, as getting the sequence right takes training. The gear urgently needed has to go in last so it can come off first.

In contrast to Cobra Gold, this spring's Terminal Fury exercise will be for US forces only. PACOM headquarters in Honolulu will turn into a combat command post for Adm. Robert F. Willard and staff to practice executing a large-scale operations plan.

Marine Col. Javier Ball, chief of PACOM's exercise division, said, "Leaders at all levels are involved in all phases of this training to exercise the command and control that will ensure they are ready to respond if a crisis emerges."

A similar exercise, Ellipse Charlie, will be a no-notice command post and field training exercise to evaluate communications between the staffs of PACOM and Special Operations Command Pacific and build force capabilities in another nation. Given the no-notice nature of the exercise, PACOM officials declined to disclose when this effort would take place or what other nation is involved.

Developing Military Relations

In recent years, PACOM has put increasing emphasis on training for humanitarian assistance and disaster relief, which some critics contend detracts from military readiness. "Not at all," Ball responded. "Combat readiness means being able to execute missions across the range of military options. We can move a lot of food, water, and shelters in a short time. We can bring in hospital capabilities, and we can bring in water purification units. We must be prepared to answer the call not only to assist allies and friends but to help anybody in distress."

Overall, these military exercises cost relatively little. PACOM's 2011 budget is $140 million, out of a national defense budget of slightly more than $700 billion. Each of the components, such as Pacific Air Forces, also has a budget of $5 million to $12.5 million for its own exercises. Most of those funds are spent on additional fuel and spare parts needed to transport people and equipment across the area of operations.

The purpose of exercises attended by US forces alone is, obviously, to train for war. Many grow directly out of an operational plan. Northern Edge, for instance, is a joint exercise of air, sea, and land tactical units. It takes place across the Joint Pacific Alaska Range Complex, Joint Base Elmendorf, Eielson Air Force Base, and the Gulf of Alaska. An educated guess says the exercise trains airmen to help defend South Korea from North Korea.

When US forces get into bilateral and multilateral exercises, the training assumes a new dimension. The objective is to develop military-to-military relations that help deter a potential aggressor. In the worst case, the drills help to forge a coalition ready to go to war in combined operations. Just how effective the exercises are in deterring a potential aggressor is impossible to know. China has occasionally been invited to send observers to an exercise, but their reactions have so far been difficult to read.

Some PACOM exercises are long standing. Commando Sling is a tactical fighter exercise in which USAF sends six or so fighters to Singapore three times a year to train alongside the Republic of Singapore Air Force—or to square off against them. Key Resolve is a command post exercise with South Korea to prepare to repel an assault from

A B-52 taxis at Andersen AFB, Guam, during Green Lightning, a bilateral exercise performed with Australian joint terminal attack controllers. Of late, Australia has become increasingly important as an American ally in the Pacific region.

USAF photo by A1C Courtney Witt

North Korea. Foal Eagle is a separate but related field exercise with the same objective. Talisman Saber is a command post and field training exercise with the armed services of Australia, a longtime ally that has become even more important as PACOM has turned its attention toward the South China Sea and Southeast Asia. "The focus," said a PACOM officer, "is on high-end combat operations transitioning into peacekeeping or other post-conflict operations."

None of these exercises are aimed at a particular nation, say American officials in public. That posture is intended to preclude a diplomatic protest from an offended nation and to avoid placing an American ally or partner in a politically difficult position with another Asian nation. Even so, the "countries" in the exercises sometimes bear close resemblance to certain nations. For example, "Redland" clearly resembles China, while "Blueland" is recognizable as North Korea.

The Chinese People's Liberation Army lags well behind PACOM in size, complexity, and frequency of its exercises, according to knowledgeable officials. The PLA, encompassing all of China's military forces, conducts about a quarter of the number of exercises run by PACOM.

Yet, the PLA has come a long way in the last 25 years. At a Chinese naval base in the mid-1980s, a US naval officer on duty as an attache in Beijing was asked how much time the PLA Navy warships that were tied up to piers trained at sea. "They don't go to sea. They just chip and paint," the officer quipped. Then he relented, noting each ship ran training drills while in port and might go to sea once or twice a year. In another measure, US aviators noted three years ago that Chinese fighter pilots got seven to eight hours of flying time a month compared with the 20 to 22 hours a month USAF and the Navy sought for their pilots. An intelligence officer said a North Korean pilot would be lucky to get 20 hours of flying time a year.

PLA Navy, or PLAN, ships perform live firing exercises in the South China Sea, according to Beijing's Ministry of National Defense. The PLAN executed one such drill in July without disclosing the number or class of warships involved. The ministry reported "warships and submarines from the Navy's South China Sea Fleet performed precision strikes on surface targets by firing guided missiles." After Gen. Chen Bingde, chief of the PLA general staff, called on the PLAN to make a "solid preparation for military struggle," in November the PLAN conducted a similar live fire drill, including marines, to train for an amphibious invasion of Taiwan.

In the air, the PLA Air Force called out fighters, transport, and reconnaissance aircraft to participate in an exercise called Mission Action 2010, centered on a large troop maneuver in the Beijing Military Area Command. The PLAAF provided air cover, transport, and intelligence to the ground force, and participated in the joint command center (US observers have long asserted that the PLA was weak in command and control).

The Indian Connection

In a separate maneuver, the ministry reported, a mechanized infantry brigade with artillery, signal, and engineer troops undertook a long-distance maneuver last fall covering thousands of miles by air, rail, and highway, and a river crossing. The ministry noted that for three years, troop commanders had struggled to achieve swift movements after receiving orders, the ability to overcome obstacles and win a battle at the end.

Within the last decade, the PLA has begun exercising with the forces of other nations, including some that regularly train with US forces. The PLA has sent contingents to Thailand to train with Thai marines, invited Pakistan to send units to China to exercise with the PLA in counterterror tactics, and sent units to India to train jointly in anti-terror operations.

Among the newer US exercise partners is India, with which the US does not have a mutual security treaty. The US has put on a full-court press to cultivate India, according to US officers and diplomats, because New Delhi has shucked much of its affiliation with the nonaligned movement and its reliance on Russia for military equipment and economic aid.

Although Indian and American political leaders profess not to be seek-

An Unrelenting Exercise Schedule

Last February, Japanese F-2 fighters flew from Tsukui Air Base southwest of Tokyo to Andersen Air Force Base on Guam to train alongside Air Force and Navy pilots in an exercise called Cope North.

In March, USAF A-10s flew from Osan Air Base in South Korea to a Thai airfield at Udon Thani to exercise with Thai and Singaporean aviators in Cope Tiger.

Then, in April, came Cope West at Halim Air Base, Indonesia; it involved flying with Indonesian aviators.

This past May, Total Force airmen and soldiers trained in Thailand with Thais and Cambodians in Operation Pacific Angel, focusing on humanitarian missions.

Another Pacific Angel took Air Force personnel to Bangladesh in June, and yet another featured a USAF team in Vietnam.

The US forces were just getting warmed up for what came next: the world's largest maritime exercise, Rim of the Pacific. RIMPAC brought together 32 ships, five submarines, 170 aircraft, and 20,000 personnel from 14 Asian, European, and Western Hemisphere nations around Hawaii in July for amphibious, air defense, and live fire drills.

In July, the F-22 deployed to South Korea for the first time ever. Several F-22s participated in a bilateral exercise, Invincible Spirit, with South Korea.

In August, medics from USAF, Mongolia, Maldives, and Sri Lanka trained together in Sri Lanka.

Air Force, Navy, and Marine Corps aircraft exercised in Valiant Shield at Guam and in the central Pacific in September. It tested operational plans to defend islands in the Western Pacific belonging to allied or friendly nations.

In October's Max Thunder, the 18th Aggressor Squadron, flying F-16s with paint schemes reminiscent of Russian MiGs and Sukhois, flew from Eielson AFB, Alaska, to Kwangju, South Korea, to scrimmage against USAF and South Korean F-15s and F-16s. That same month, B-52s flew from Andersen to Australia in Exercise Hamel, in which Australian controllers guided them on close air support missions.

Finally, December's Keen Sword saw 10,500 American troops join about three times as many Japanese for a week of drills throughout Japan. The Americans were led by Lt. Gen. Herbert J. Carlisle, then commander of 13th Air Force, which plans and executes the Pacific Air Forces exercise program. The training included integrated air and missile defense, base security and force protection, search and rescue operations, and maritime interdiction.

Australia DOD photo by Cpl. Chris Moore

In July 2005, Brigadier James Baker (l), then Australian International Stabilization Force commander, and Adm. Robert Willard, then US Navy Pacific Fleet commander, shake hands after a successful meeting at Camp Phoenix in Dili, East Timor. Fictional adversary countries in exercises sometimes bear strong resemblances to real countries in the region.

ing to contain China, India is seen as a counterweight to an emerging and sometimes belligerent China. India has a long-standing border dispute with China in its northern mountainous reaches, and has become a logical strategic partner for the US. Military relations are essential to this embryonic partnership.

In October 2009, PACOM began Joint Exercise India as a staff exercise initially concentrated on humanitarian assistance and disaster relief. In November 2010, about 200 Indian soldiers were flown into Joint Base Elmendorf for an exercise called Yudh Abhyas 2010, during which they performed a parachute jump from a C-17, live fire drills, and a command post exercise.

In other bilateral and multilateral exercises, the initiative for some events comes from the US, for others from allies or possible partners. "Since we actively look for opportunities to increase training with other nations, off the top of my head, I'd venture a guess" that half the exercises are US suggestions, half foreign initiatives, Ball said.

In 2009, for instance, the Indian Army asked PACOM to send a detachment of Stryker armored vehicles to train alongside Indian troops. The Strykers come in several versions, including a troop carrier and another mounting a 105 mm gun. They are relatively new but earned a good reputation in Iraq, and presumably the Indians wanted to compare them to the Soviet-era infantry vehicles with which they have long been equipped.

Lt. Col. James P. Isenhower III, then a battalion commander in the 25th Infantry Division at Schofield Barracks outside of Honolulu, led 300 soldiers with 17 Strykers that were airlifted to India. They spent a month there, mostly in hard training. After individual and small unit instruction was completed, the Indians and Americans swapped units. An American platoon was integrated into an Indian company and an Indian platoon joined an American company. Since most Indian officers spoke English, communication with Americans was easy. With Indian sergeants and enlisted soldiers, the Americans relied on arm and hand signals; this worked reasonably well. Beyond that, the troops depended on their common experience as soldiers.

No Jungle in Sight

Lt. Gen. Benjamin R. Mixon, the commanding general of US Army Pacific, has urged his soldiers to be "combat ready, technologically advanced, and culturally astute." Experienced American officers say young Army and Marine officers and NCOs sometimes get frustrated and impatient when working with Asians for the first time. Middle-grade officers and NCOs find it easier to adapt, even if they must work hard not to overwhelm their Asian counterparts with modern US equipment and communications.

Among aviators this is less an issue. Brig. Gen. Scott D. West, vice commander of 13th Air Force, said, "All exercises are geared toward building long-lasting relations" with allies.

West said two points are critical: "We must reach an agreement on training objectives and we must respect each other's sovereignty."

Subtle differences emerge. An American F-16 pilot who has trained with Singaporean pilots noted the Singaporeans are more rank-conscious than Americans. In an after-action debrief, the younger pilots deferred to their seniors. In USAF, everyone is expected to speak up, although with due respect toward senior aviators.

Navy officers seem to think cultural differences are even less of a problem because sailors of each nation in an exercise sail their own ships, and most communication is in writing. Many Asians read English well, even if they are not practiced in speaking and listening. In addition, many Asian navies, like the US Navy, have historically been influenced by the British Navy, which gives them much in common.

The shorthand code names for the exercises are sometimes a puzzle. The origin of long-running exercises such as Ulchi Freedom Guardian with South Korea is lost.

Ball said a joint Defense Department publication assigns letter combinations to combatant commands. After the PACOM staff picks a name, they seek the approval of other nations involved. "We want to make sure we take cultural sensitivities into account," he said. A few exercises have code names in an Asian language, such as Yama Sakura; it is Japanese for "Cherry Blossoms in the Mountains."

Balikatan in Tagalog, a language of the Philippines, is "Shoulder to Shoulder."

Yudh Abhyas in Hindi, India's most widely spoken language, means "Training for War."

But often the code names have little to do with the exercises. Jungle Shield, running between Andersen Air Force Base on Guam and Joint Base Pearl Harbor-Hickam on Oahu in Hawaii, is intended to test the Air Force's ability to protect US air lanes over the Pacific Ocean—with no jungle in sight. ■

Richard P. Halloran, formerly a New York Times *foreign correspondent in Asia and military correspondent in Washington, D.C., is a freelance writer based in Honolulu. His most recent article for* Air Force *Magazine, "Pacific Push," appeared in the January issue.*

The Air Force's fleet has dramatically increased its capability over time, allowing inventory numbers to come down. But even the most powerful aircraft can't be in two places at once.

Arsenal of Airpower

By James C. Ruehrmund Jr. and Christopher J. Bowie

The breadth of the Air Force's expanding missions is revealed in a startling statistic: Even if the service retired its entire fighter, bomber, and ICBM inventories, USAF spending would decline by only about 25 percent. The bulk of Air Force spending today goes to air mobility, space operations, enablers of joint forces, and intelligence-surveillance-reconnaissance capabilities.

After 1962, spending on joint force support grew by almost 40 percent, consuming about 45 percent of the budget in the past decade. Today, combining operational overhead with joint-force enablement, only 25 percent of the budget remains dedicated to combat forces.

As shown in Fig. 1, the Air Force began a period of significant growth in 1950, with the confluence of the outbreak of the Korean War, the growing Soviet threat, and the Eisenhower Administration's adoption of nuclear deterrent strategy. The service reached a peak of more than 26,000 aircraft in 1956. A masterful advocacy campaign by USAF illustrated airpower's value to the new strategy, and resulted in nearly 50 percent of the military budget belonging to the Air Force.

Shortly thereafter, the advent of ICBMs led to three major adjustments in the service's force posture.

First, to reduce vulnerability to a Soviet first strike, the Air Force fielded a large force of tankers. This increased the number of heavy bombers that could be airborne at a given time, and extended their range such that they could now strike their targets from bases within the United States.

Second, as the Air Force began deploying ICBMs—1,000 Minuteman missiles and a small number of Titans—it concurrently retired roughly an equal number of bombers, primarily B-47s.

Third, the Soviet deployment of a growing number of ICBMs raised questions about the utility of the vast interceptor fleet devoted to continental air defense.

As a result, the Air Force began the drawdown of continental air defense forces, numbering about 2,000 aircraft, shrinking it as a proportion of the overall force throughout the 1960s and 1970s, to just a few hundred aircraft.

After the accelerated retirement of most of the air defense fleet in the

FIG. 1 USAF FORCE POSTURE OVER SIX DECADES

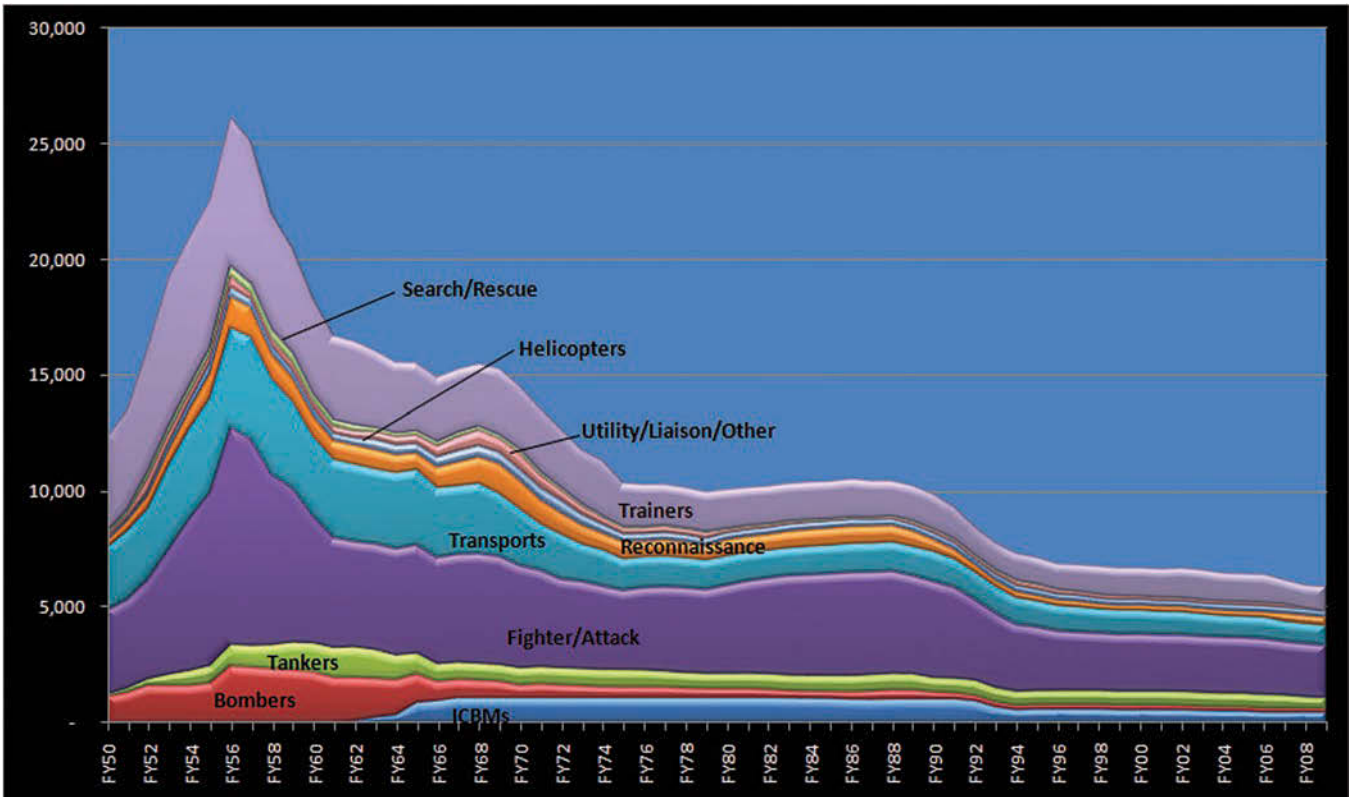
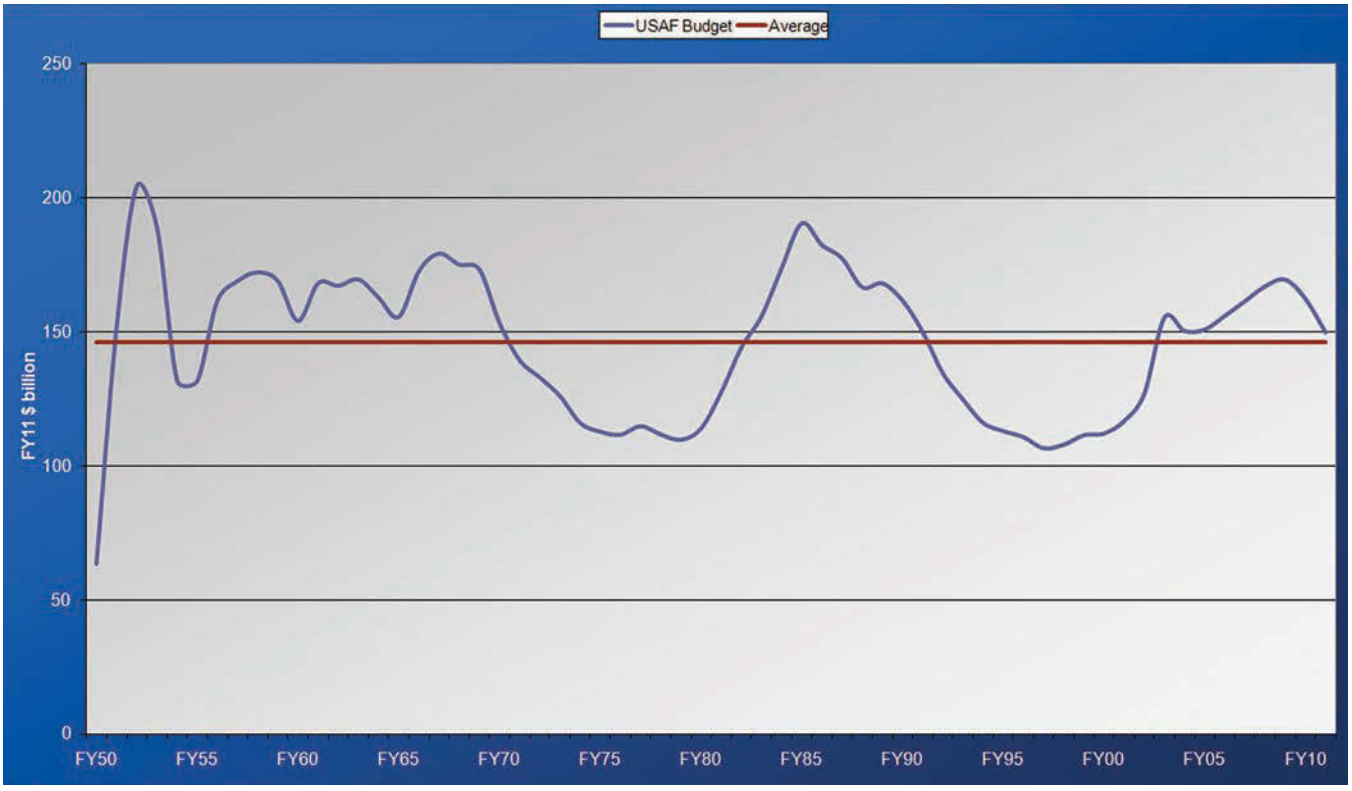


FIG. 2 USAF BUDGET OVER TIME



late 1950s, the Air Force maintained a force level of about 15,000 aircraft and ICBMs until the early 1970s. As the Vietnam War wound down, the service's force posture declined to a level of roughly 12,000 aircraft and ICBMs. Except for a slight growth during the Reagan years, it stayed at that level until 1991. The next drop was even more precipitous.

With the collapse of the Soviet Union and the reductions ordered under President George H. W. Bush under the Base Force plan, force structure quickly shrank to about 6,500 aircraft.

However, indications are that USAF may reach a new "inflection point" with yet another significant reduction in force levels. At best, forecasts show the Air Force maintaining its budgetary topline, but a decline is more likely. Overall aircraft procurement is low, and the average ages of aircraft are unprecedentedly high, forcing the prospect of imminent retirement for major portions of the air fleet. Given that spending on personnel and operations, as a percentage of the budget, is growing, in all likelihood the USAF inventory is about to shrink even further.

Complicating matters for Air Force planners is variability in the service's budget. As seen in Fig. 2, the nation has invested approximately $9 trillion in land-based air- and space power since 1950, averaging $146 billion per year. Budgets exceeded the average in the 1950s and 1960s, with much of that investment going to strategic forces (bombers, tankers, and ICBMs) and, in the 1960s, supporting operations in Vietnam.

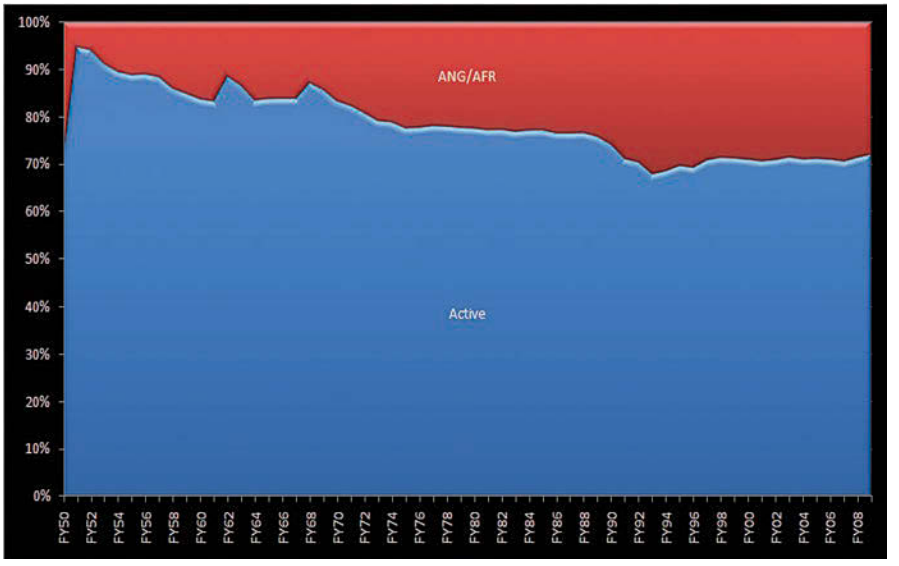
Today's decline in overall force posture closely parallels that of the post-Vietnam budget decline. The Reagan buildup enabled modernization, but little growth in force levels. With the end of the Cold War, the budget again declined, followed by force levels. Once the force posture stabilized in the early 1990s, USAF was able to maintain its numbers, living off the fruits of the Reagan buildup.

Defense spending increased following the terrorist attacks in the US on Sept. 11, 2001, but little actual pro-

FIG. 3 COST PER TOTAL ACTIVE INVENTORY AIRCRAFT

(ICBMs not included)

FIG. 4 THE GROWING ROLE OF THE AIR NATIONAL GUARD AND RESERVE COMPONENT



curement of new systems took place, while operational demands grew.

It is hard to maintain force levels for significant periods of time because the cost of personnel, equipment, spares, and fuel all grow over time. An F-15 Eagle, for example, cost more than an F-4 Phantom II, which in turn cost more than an F-100 Super Sabre. The average cost of a flying hour over the past decade is around $23,000 (in constant Fiscal 2011 dollars), compared to about $11,000 in 1985, and roughly $4,800 in 1970. Fig. 3 provides a view of the steady overall increases in costs by simply dividing the annual USAF budget by the total number of aircraft fielded that year. The trend rises steadily.

Attempting to maintain force levels and critical capabilities in the face of budget variability and inexorable cost growth, USAF has employed various strategies to extract maximum capability for lower cost. Like the other military services, USAF is one of the few agencies in the US government that has undeniably increased in capability while its share of the overall federal budget has declined. In 1960, the Air Force accounted for 21 percent of total federal expenditures; by 2000, that number had dropped to just 4.7 percent.

Although force levels are lower, the capability of the current force, in almost all respects, far exceeds that of the huge Air Force of the 1950s. Today's Air Force can constantly survey the planet with a variety of space and air-breathing systems; precisely strike any point on the globe within hours; deploy airpower with unprecedented speed and agility; and provide secure, high-bandwidth communications and navigation to the entire joint force.

Over the past 60 years, the Air Force strove to eke out every last measure of efficiency to keep force levels at the "agreed upon" level. Historical budget analysis indicates that the spending on "overhead," such as bases, service schools, training, etc., has dropped 16 percent since the early 1960s. While a significant achievement, the ability to extract more from overhead is probably limited, since most of the low-hanging fruit has already been picked.

Service Lives

USAF has also steadily increased the role and responsibilities of the Air National Guard and Air Force Reserve, both of which can provide capabilities at a lower cost than active duty units. For example, Fig. 4 shows the percent of the Total Force provided by the Guard and Reserve as compared to the active component. The overall percentage of forces in reserve components increases over time, primarily due to a corresponding shrinkage in the active component. In the case of tankers and airlift units, the Air Guard-Air Reserve percentage of the fleets grew to nearly 50 percent, enabled partly by the fact that a Guard or Reserve member can support airlift or tanker operations overseas and still be home to meet civilian commitments. This is not the case for most Army, Marine Corps, or Navy units. However, constraints come with increased reliance on the Air Guard and Air Reserve organizations. Balance between active and reserve components must be maintained, because the active force channels manpower to the reserve.

Advances in aircraft structures, materials, and upgrades now enable the Air Force to keep equipment in service far longer than originally planned. Thus, for a time, USAF could maintain force structure while buying fewer aircraft.

As Kevin N. Lewis of RAND Corp. noted in 1990, the Air Force procured more aircraft between 1952 and 1956 than it did between 1956 and 1990. Indeed, the 1950s total of more than 12,000 aircraft exceeds the total aircraft procured from 1956 to 2011.

The KC-135, built in the late 1950s and early 1960s, was planned as an interim tanker solution. Instead, the Air Force has continued to upgrade the KC-135 and expects to fly the veteran tanker until 2040.

Another example is the Minuteman ICBM. First deployed in the early 1960s, the Minuteman III remains on alert today through regular upgrades and refit.

The B-52, also produced in the late 1950s and early 1960s, flew in the Vietnam War and continues to fly combat missions over Afghanistan.

In the 1950s, fighters had service lives of five years or less, while the service lives of modern fighters now extend beyond 30 years.

These long operational lifetimes are a tribute to the US aerospace industry, which over this lengthy period has improved safety and reliability, reducing the need for attrition reserves. The US aerospace industry has consistently developed and produced the best military and support aircraft in the world.

Fighters procured in the 1950s—such as the F-86, F-84, and F-80—were bought rapidly and in large numbers, and they were retired in the same manner, as can be seen in Fig. 5.

The Air Force shifted to a quality-over-quantity emphasis in the mid-1950s to rapidly procure Century Series aircraft—F-100, F-101, F-102, F-104, F-105, and F-106—but kept most of these fighters in service for 20 years. That tenure was significantly longer than the service lives of their predecessors, flattening the sharp curve of the 1950s.

Then came the F-4, comprising more than one-third of the fighter force by the mid-1970s, followed by the F-15,

F-16, and A-10. Each of these post-Vietnam fighters remains in service today, and will probably fly and fight for another decade or more, attesting to the remarkable longevity of these systems.

Cutting-edge design and subsystem upgrades have helped modern aircraft maintain effectiveness over long periods. A new F-16C Block 50 is a significantly more capable aircraft than an F-16A procured in the 1980s.

A related point is that aircraft designed with multiple missions in mind from the outset tend to have the space, weight, power, and cooling capacity necessary to easily adapt them to emerging missions. Consider the case of the F-106 interceptor and the F-4 multirole fighter. Both were conceived at about the same time and were equally "cutting edge," but the F-4 proved much more adaptable due to broader Navy requirements for a fighter-bomber. The F-106 today is long gone, while the F-4 still flies with several allied and foreign air forces.

For mobility aircraft, the Air Force was able to increase its airlift capabilities while operating a smaller fleet by acquiring more capable aircraft and making organizational improvements.

The airlift force in the 1950s, as illustrated in Fig. 6, was a hodgepodge of types, typically limited in both range and payload. In the 1960s, the Air Force procured its first dedicated jet airlifter—the C-141—followed by the huge C-5. Operation Nickel Grass, which supported Israel in 1973's Yom Kippur War, highlighted the value of aerial refueling because only the C-5 was capable of reaching Israel without a refueling stop.

The Air Force promptly retrofitted its fleet of C-141As with refueling receptacles and extended fuselages. The resulting C-141B greatly increased the fleet's capacity and strategic flexibility, at modest cost. It led to the development of today's C-17 airlifter, combining the best attributes of the C-5 and C-141 in a single airframe. Today, a single C-17 can carry a payload equivalent to 15 World War II-era C-47s—including bulky loads that could never fit in the C-47—and deliver it worldwide, directly, within hours.

The C-17 demonstrates how improved performance and organizational changes can generate higher capability at lower cost. The C-17 offers higher availability rates and requires fewer backup aircraft and lower operating costs, compared to a C-141, to transport an equal amount of cargo.

FIG. 5 USAF FIGHTER FORCE COMPOSITION

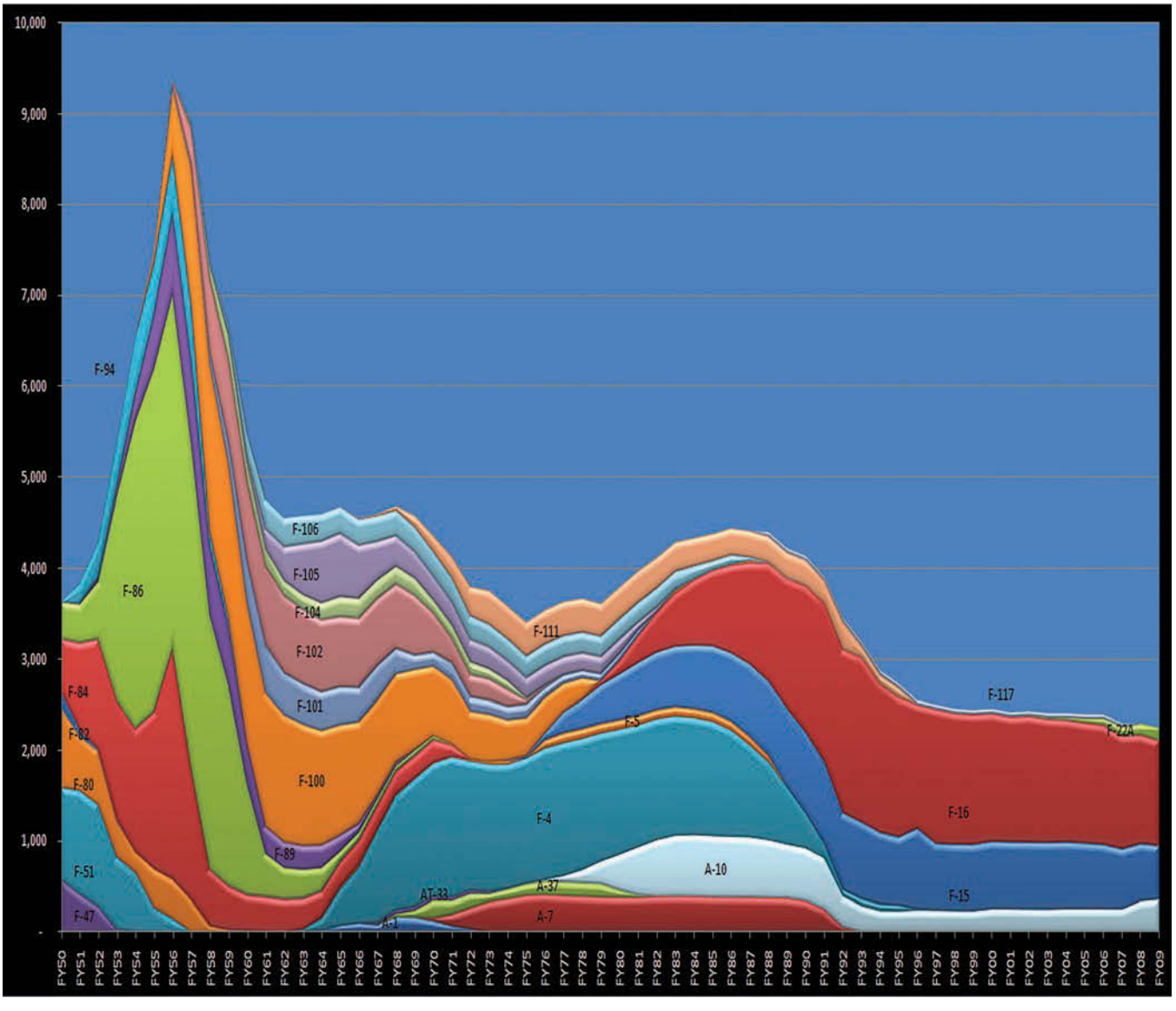
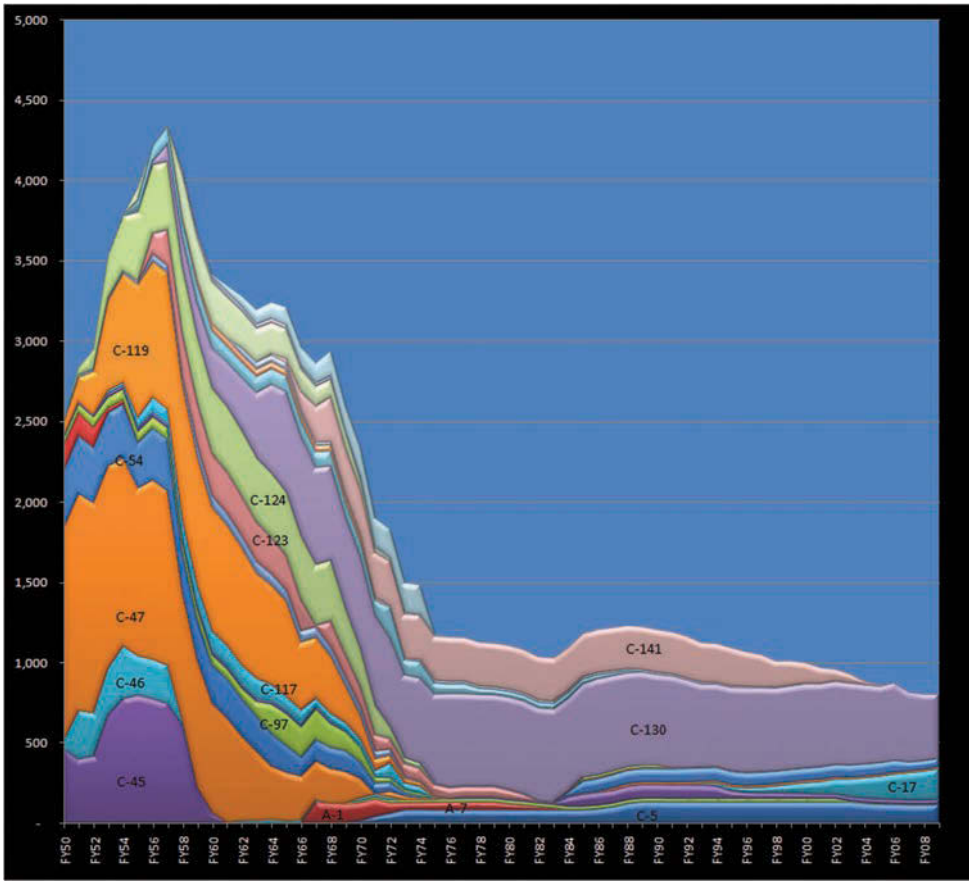


FIG. 6 EVOLUTION OF USAF AIRLIFT FLEET



Taking advantage of this, USAF increased the crew ratio from the 3.6 on C-141s to 5.0 on the C-17. This drove the Air Force's decision to replace the aging force of 265 C-141s with (initially) 120 C-17s offering a similar "ton-mile" capability.

Cutting Into the Bone

The Air Force also adopted new technology to achieve mission requirements at reduced cost. The development of stealth technology is a prime example.

Due to the growing capabilities of enemy air defenses, military planners were forced to dedicate larger numbers of aircraft to each strike package, providing jamming, fighter escort, and defense suppression, all of which required more air refueling. A famous chart released in 1991 illustrated that two stealthy B-2 bombers could carry out a mission that would otherwise require a package of 75 nonstealthy aircraft. The B-2s, though expensive, were considerably more cost-effective than the 75-aircraft gaggle and placed fewer crews at risk.

Further examples are numerous. The development of space-based systems permitted USAF to retire portions of its reconnaissance fleet, such as the Mach 3+ SR-71 Blackbird. The re-engining of KC-135 tankers boosted refueling capacity at less cost than a new fleet. Vast fleets of medium bombers were replaced by fewer ground-based ICBMs.

Still, in the absence of steadily rising budgets, at some point, force levels have to be cut to accommodate rising costs in operations and infrastructure. In these cases, the Air Force has historically elected to divest itself of the aircraft needed for tangential missions.

In the 1950s, the service flew B-17s fitted with lifeboats on coastal search and rescue; fielded Bomarc nuclear-tipped surface-to-air missile systems; and maintained a fleet of assault gliders. The largest divestment, as we have seen, cut the vast majority of continental air defense forces. This significantly reduced force structure and associated costs.

Strategic strike, air supremacy, interdiction, close air support, airlift, and ISR received priority over these less critical missions.

Today, the Air Force has arguably reached a point where all tangential missions already have been eliminated, meaning that if future USAF planners choose to pay bills by reducing force structure, they will be cutting into the bone, reducing fundamental capabilities in core mission areas.

Studying USAF posture trends illustrates how airpower planners adjusted the force to support the changing role of airpower over time. The inventory trends demonstrate a decline in force quantity, but given combat performance, suggest enormous advances in overall quality and capability.

The use of cutting-edge design, where possible, has provided the margin necessary to maintain operational effectiveness over long service lives. This contradicts the current drive to emphasize "75 percent" solutions. Advanced aircraft in turn can leverage "off-board" improvements such as GPS, precision weapons, advanced radars and sensors, aerial refueling, and data links to enable capability growth despite lower force levels.

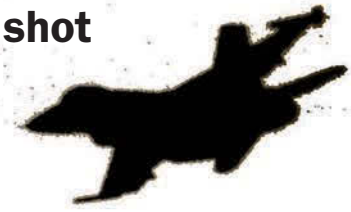
As past planners grappled with inexorably growing costs and limited resources, replacing medium bombers with ICBMs must have presented a serious culture shock to an Air Force then run by "bomber barons." However, the move enabled the Air Force to meet requirements at lower overall cost.

Similar consternation must have attended the retirement of 2,000 interceptors, but these bold moves paved the way to today's more capable and cost-effective force.

As we move to the future, the force structure procured primarily during the Reagan buildup is reaching the end of its life. The average age of most elements of the force structure is reaching unprecedented levels. This difficult dilemma will dominate the Air Force planning agenda for the next decade or more. Understanding how past planners confronted similar decisions should inform how Air Force leaders today weigh the tough choices ahead. ■

This article is adapted from a study for the Mitchell Institute for Airpower Studies. The full report and the USAF aircraft inventory database are available at www.afa.org/Mitchell. James C. Ruehrmund Jr. is a retired Air Force colonel and is currently employed by Deloitte Consulting. Christopher J. Bowie is corporate director of the Northrop Grumman Analysis Center. His last article for Air Force *Magazine, "The Unmanned Tipping Point," appeared in the September 2010 issue.*

Bill Andrews was on the ground in the Iraqi desert with a broken leg, about to be captured. His warning calls saved his wingman from also getting shot down.



Call From the Desert

By Peter Grier

Air Force Capt. William F. Andrews could not stand up to surrender because the two long bones of his right leg were broken at the top of his boot. He raised his hands to try to get the Iraqi soldiers coming at him to stop shooting.

It worked.

The Iraqis crept forward with AK-47s raised and motioned at Andrews to rise. He motioned that he couldn't. They were cautious and moved in slowly. When they were about 30 feet away, Andrews saw in the distance a puff of smoke and a white missile trail. An Iraqi air defense unit was firing at an F-16 circling overhead. Andrews knew the F-16 was his wingman trying to save him. It was Feb. 27, 1991. Ten minutes earlier, Andrews had been flying back to base, then was hit by an Iraqi surface-to-air missile. His airplane exploded in flames, and he was pinned against the canopy by negative Gs. He had a second to grab the ejection lever, knowing he was dead if he missed.

Now he was prone in the sand, his leg a mess, his F-16 wreckage. He did not want another US pilot to join him. "I'm thinking, 'I'm in a world of hurt, I don't want any company, I've got to do something,'" he recalled in a recent interview. With the Iraqi guns trained on him, Andrews grabbed for his radio.

It took maybe two seconds for Andrews to pull his hands down, grab his

USAF photo

survival radio, and yell, "Break right, flare, flare, flare!" The F-16 overhead broke right. Flares came tumbling out.

"I was stupid right; I was crazy," said Andrews. "These guys had guns trained on me from 30 feet away. But I just knew I had to do something."

The Iraqi soldiers pulled their triggers and ran. Bullets hit all around Andrews. He threw the radio down—he thinks that he said, "They're attacking me!" as he did so—and surrendered again. The soldiers swept up to and around him, still shooting. They shot everything: his radio, his helmet, his survival kit, and raft.

Andrews does not know why he didn't get shot, or how many aircraft heard his call. Broadcast on an emergency frequency, every US pilot for 50 miles might have heard it and decided to break right and drop flares.

The Iraqis were scared to death. They grabbed him, threw him in a jeep, and dumped him off at their headquarters. Then more Iraqis took him to the next headquarters up. Several soldiers started to beat him, but their officers told them to

USAF photo

Left: An F-16 like the one Andrews flew over Iraq. Right: An F-16 with AIM-9 Sidewinder missiles takes off on a mission during Operation Desert Storm.

USAF photo

F-16s are refueled by KC-135 tankers during the second day of Desert Storm, Andrews' first day of combat.

stop. The officer in charge—a regiment or division commander—was older, in his mid-40s.

For a moment, he and Andrews locked eyes. Andrews realized then that he had to make a decision about how he was going to act. "What was I going to do from then on? Was I going to be defiant? Was I going to be submissive? Was I going to be neutral? How was I going to comport myself?" Andrews said.

As a boy, he always wanted to fly. The place he wanted to fly, however, was outer space because he was a child of the space race. He checked out every book about space from the local library, and then every book about the Air Force—noting most astronauts had a military background. "You can look at all those records, and my library card was on all those [books] 10 times over," Andrews said in a 2008 oral history interview for Virginia Military Institute.

In high school, he paid for private flying lessons, spending all the $500 in his bank account earned from delivering papers. In 11th grade, he applied for the Air Force Academy and got in in 1976. Andrews was so eager to begin that he skipped his high school graduation to travel to Colorado Springs, Colo., because training for cadets started the next day.

Andrews graduated from the academy in 1980. He and many of his classmates were "crazy into flying," he recalled. The first solo flight in a jet aircraft in undergraduate pilot training was (and still is) a big deal. The student would fly around the pattern several times with an instructor, until the instructor said to pull over in front of the tower and let him out, said Andrews.

Constant Carrot

He flunked a few rides but had few difficulties learning to fly. After he finished UPT, they kept him around as a T-37 instructor pilot for three-and-a-half years. He found teaching others an enjoyable dimension to flight. But he also wanted to be the person with his hands on the controls, not the one in the other seat with his arms folded. "For me, right, I was just revving my motor. I wanted to get going to Tactical Air Command," he said.

He racked up flight hours, but career advancement was competitive. To get into fighters, you had to be at the top of the corps of instructors, none of whom were slouches.

One day in the mid-1980s, Andrews' squadron commander came up to him and said, "I got your assignment." It was EF-111s. Andrews asked the commander if that meant he was going into TAC. The commander assured him he was. "I wasn't sure, because [EF-111s] didn't shoot or bomb," said Andrews.

The T-37 was a tiny airplane; the EF-111 was not, a 43-ton swing-wing Cadillac stuffed with jamming equipment.

It was enjoyable to fly, and Andrews got to fly it a lot. The mid- to late-1980s were the time of the Reagan-era flying renaissance. Flight hours climbed. New airplanes flowed in. Training became more demanding and realistic, and readiness rates climbed.

EF-111s were in great demand. Over four years piloting the aircraft, Andrews participated in 11 Red Flag deployments. "That really tweaks your flying skills," he said. But what he wanted was a single-seat fighter.

Andrews' wing got one F-16 transfer assignment every year. They called it "constant carrot"—waving the lure of a fighter spot in front of everybody so they keep hustling.

Four years in, Andrews caught the carrot. He'd been in the Air Force about eight years and was at that point a mid- to high-level captain. Andrews was thrilled. He'd seen lots of the F-16s and thought they were the coolest of Air Force aircraft. Ultimately he would fly F-16s from 1988 to 2002.

Andrews' first operational F-16 assignment was in West Germany. It was 1989, the year the Berlin Wall fell. Flying levels were still very high, and airspace was crowded. There were some 17 fighter wings from various nations stationed in a country then about the size of Oregon. "It was just a wonderful, exciting place to be," said Andrews. It was also dangerous. He lost a neighbor to a midair collision.

In August 1990, Saddam Hussein invaded Kuwait, and the Air Force's

focus switched from Central Europe to the Middle East.

In September, as the end of the fiscal year neared, the flying schedule began to shut down, so Andrews and his fellow pilots could not fly more to prepare for what looked like coming combat. Andrews, by then a flight commander, told his eight pilots they wouldn't be in the air for several weeks, but should use the time to study Iraqi defenses, think about tactics for desert fighting, and prepare their families for a long deployment.

Andrews' unit—the 10th Tactical Fighter Squadron—was tapped for Desert Shield. The 10th TFS joined two squadrons from Shaw AFB, S.C., as part of the 363rd Tactical Fighter Wing. Both Andrews' unit and the Shaw units flew Block 25 F-16Cs and were based at Al Dhafra Air Base in the United Arab Emirates, about 550 miles southeast of Kuwait.

His first combat took place on the second day of Desert Storm, the bombing target an Iraqi air base. The weather was bad, so Andrews had to identify the target with radar.

The real wake-up call came on his third mission. He and his wingmen were out in west Iraq on a Scud hunt. An SA-2 anti-aircraft missile site came up and started shooting. Andrews, heading away from it, looked back and saw a missile coming for him at Mach 3. The SA-2 has been described as a flying telephone pole, but what Andrews saw was smoke, a lengthy flame, and a black dart in front, moving incredibly fast. It tracked underneath him before its motor burned out. "It left me speechless for a couple of seconds," he said.

A few weeks later, he flew one of his defining missions, providing close air support for US Special Forces trapped behind Iraqi lines. An intense mission, he and his fellow airmen knew if they did their job right, eight Americans would survive. If they did poorly, they would be killed—either by Iraqis or inaccurately aimed US cluster bombs. The fighters circled over the top of the good guys for 20 minutes and dropped bomb after bomb.

They hit exactly where the forward air controllers wanted. After the sun went down, a rescue helicopter extracted the Special Forces team.

The day he was shot down, as he locked eyes with his captor, the Iraqi commander, Andrews knew he could behave in a number of ways. He had a pantheon of Air Force heroes to guide him.

Getty Images photo by Dirck Halstead

Andrews (on crutches) and other POWs arrive back in the States at Andrews AFB, Md. He was a prisoner of the Iraqis for five days.

"I had this menu in my head of what airmen had done in the past," said Andrews. He thought of World War I ace Frank Luke, who shot at his captors; Lance Sijan, who evaded the North Vietnamese for 46 days; and Bud Day, the F-100 pilot who refused to cooperate through nearly six years of captivity. "I mean, we have these people who have gone before us, and their stories serve as something incredible to aspire to and a way to model our own behavior, ... and I knew their stories resided in my heart because I guess from the minute my parachute opened, I could see that the endgame was going to be a test of my integrity in an interrogation room," he said.

Escape From Death

Andrews decided, staring at his captors, that he would try to not react to anything they did. He was not going to help them in any way. Perhaps an opportunity to escape would present itself.

Later that night, the Iraqis decided to drive him into Basra and turn him over to intelligence personnel. They proceeded down a dark highway in a jeep—Andrews, a driver, a lieutenant, and a guard who kept his AK-47 pressed against Andrews' head.

The engine kept stalling. The driver would get out, fiddle around under the hood, pronounce things fixed to the lieutenant, and off they would go.

Finally the engine stalled for perhaps the 10th time. The driver hit the brakes and started to get out. The moment his boot hit the pavement, bombs from a CBU-87 went off right in front, sweeping across the road—looking like incredible copper and gold sparklers accompanied by a roar sounding like a chain saw going off in Andrews' ear.

Andrews knew right away what had happened. Overhead an unseen Block 40 F-16 had locked up the jeep in ground-moving target track. The fire control computer had calculated a perfect lead point for a vehicle moving at 40 mph. During the 30 or 35 seconds it took for the released munitions to fall, the jeep engine coughed and stopped. The bombs exploded where the jeep should have been.

Everyone froze, then the driver piled back in and the jeep veered off into the desert, circling back.

That night, they ended up back where they'd started.

Having survived a cluster bomb attack by a fellow airman, Andrews got dragged into an Iraqi Republican Guard bunker, a 12-by-12-foot dugout. The Iraqis gave him some food, splinted his leg with bamboo, and they all went to sleep. In the middle of the night, Andrews awoke to hear Iraqis running around like crazy and yelling.

They dragged Andrews out and set him next to their vehicle as they packed. But they were clearly tired of hauling him around—Andrews weighed about 200 pounds, and the individual Iraqis weighed about 130. They appeared to figure the pilot was no threat to them, so they quit watching.

So he crawled away. Andrews hid underneath a piece of canvas in the now-empty bunker. He heard a lot of yelling. Eventually the Iraqis drove off.

He had escaped. "And then I thought, 'OK, genius, you've got a broken leg

Photo via USAF

Bill Andrews is greeted by his son, Sean, at Andrews Air Force Base after his release.

in the middle of the desert. What are you going to do now?'" he recounted.

He came up with a plan. He needed water. If he found it, he could just sit and wait for the US Army to sweep over him. He knew he was in no-man's land because all night he had heard rockets and US artillery booming overhead, heading in the direction in which his Republican Guard captors had fled. He fashioned a white flag from a piece of cloth.

But his freedom was brief. The next day, the Iraqis re-entered the area, searching for deserters, he thought. They looked under all the debris they'd left behind and they found him.

This time his captors made it to Basra without incident. Iraqi medical personnel in a hospital splinted his leg in a more professional manner then sent him off to Baghdad, where Andrews knew full well he faced an interrogation.

To ship their captive pilot to Baghdad, the Iraqis in Basra put him on a bus, which stopped to pick up some other passengers. Andrews was blindfolded, but he peeked under the cloth and could see flashes of US uniforms. The guards warned him not to talk, but he felt he had to tell the others who he was.

He got his chance when a guard opened a window and cold air started blowing on him. "Captain William Andrews with a request, sir. The wind is cold. Will you close the window, please?" he said out loud. That way he got out his rank and name. The Iraqi grunted and shut the window. "The Air Force thanks you," Andrews said.

A Cold Wind

Andrews heard, from behind, someone mutter, "Airborne." He later discovered he had been seated in front of Sgt. Troy Dunlap, a pathfinder from the 101st Airborne Division, who had been on a helicopter with a search and rescue team diverted to try and find Andrews when he was shot down. Two others from the helicopter also were on the bus, one of them Maj. Rhonda Cornum, an Army flight surgeon. Tragically, the helicopter did not survive the environment that also destroyed Andrews' F-16. It had been shot down; Dunlap and the other survivors were injured and five of the crew were killed. "It's one of the hardest things, to know that other people died trying to save you," says Andrews today.

At intelligence headquarters in Baghdad, the passengers of the bus had their wounds attended to. The Iraqis started asking questions. Andrews said he would not tell them anything. They wheeled him down the hall. They said, "Look, we know you couldn't talk in front of the other Americans. Now you can talk. Nobody will ever know."

Andrews said at this moment, knowing what airmen had done before, he knew his duty. He said he would tell them nothing. So they turned him over to two people who "beat the crap out of me," he said.

It was an emotional roller coaster as well as a physical one, Andrews says today. Getting through one session, you tell them nothing, Andrews recalled, and you think you're OK. Another one starts, then you think, what can I tell them? I flew an F-16? They know that, they found me next to a flaming F-16.

Then the war ended, and everything changed.

Andrews was shot down on the next to last day of Desert Storm. After it ended, US Central Command's Gen. H. Norman Schwarzkopf made it clear what would happen if POWs weren't turned over—and turned over in good shape. "They said, 'Yes sir, three bags full,' and turned us right over," said Andrews in his oral history.

He flew out of Baghdad with other prisoners on a Red Cross charter. When they took off, everyone was quiet. When the pilot announced they were clearing Iraqi air space, everyone stayed quiet.

Then an F-15 pulled up on the right. Another one pulled up on the left. Everyone in the airplane went crazy, cheering the sight of the US Air Force.

Andrews was awarded the Air Force Cross for his heroism in the time immediately after he had been shot down. He "made numerous threat calls and directed members of his flight to execute a break turn and to initiate decoy flares in response to surface-to-air missile launches. Shortly thereafter, he was in radio contact with Nail 51, an OA-10 in the area, and twice directed the pilot to break and expend decoy flares when he saw missile launches," his Air Force Cross citation read. Andrews "provided the support despite the fact that he had just suffered a broken leg and could not move, was exposed in the open, and was being fired upon by enemy forces."

He returned to Iraq to fly combat missions enforcing the no-fly zones in 2001 and 2002 as commander of the 366th Operations Group. He subsequently served on the Joint Staff at the Pentagon and as a professor at the National Defense University. Andrews retired from the Air Force as a colonel in June 2010. ■

Peter Grier, a Washington, D.C., editor for the Christian Science Monitor, *is a longtime defense correspondent and contributor to* Air Force *Magazine. His most recent article, "Making Space Responsive," appeared in the December 2010 issue.*

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The worst offenders have not been who you'd think.

Rise of the Cyber Militias

By Robert S. Dudney

Staff illustration by Zaur Eylanbekov

The Zapatista National Liberation Army in 1994 opened a guerrilla war in Mexico. In 1998, the Zapatistas went cyber. This leftist band, aided by European hackers, first shut down Mexican police and other websites. Then, it ranged further, lashing at US targets and paralyzing the Frankfurt Stock Exchange.

This was a signal event—the first time that a "cyber militia" took part in a regional conflict. It is an increasingly common occurrence, say some cyber experts.

One is Scott Borg, director and chief economist of the US Cyber Consequences Unit, a nonprofit research institute that investigates the dangers of cyber attacks. At a recent conference in Colorado Springs, Borg listed some 20 "significant" cyber campaigns that have occurred since 1998. (See chart, p. 89)

One notable thing, said Borg: Most of these cyber wars stemmed from local conflicts. Moreover, they have not, for the most part, been the work of nation-states, but rather of informal and loosely organized civilian groups—sometimes aided by organized crime.

"The big theme here is ethno-nationalists, who are not governments, ... carrying out very aggressive and extensive cyber campaigns," said Borg. He went on, "They often have the tacit support of governments. They maybe are quietly, in the background, being encouraged by governments, but they are not really government operations. These are civilian operations."

While governments have encouraged and influenced these cyber conflicts to varying degrees, they do not control these cyber warriors. "They are militias," he said. "I don't know what else to call them."

Ever since the Zapatista operations in 1998, virtually all regional conflicts have had a cyber component. Later in 1998, for example, India performed some nuclear tests, and nongovernment Pakistani ethno-nationalists attacked Indian cyber targets. The campaign, which went on for months, was "quite significant," said Borg.

In 1999, the US mounted some cyber attacks in Operation Allied Force, the NATO air war over Serbia. The US action led to a counterattack by nongovernment Serb groups, and eventually by Russian hackers. In the OAF "kinetic" war, a USAF B-2 accidently bombed the Chinese Embassy in Belgrade. Chinese cyber militias soon launched a cyber campaign against US targets, and pro-NATO hackers responded with counterattacks on Chinese sites.

A Loss of Control

These unofficial cyber armies soon became organized and effective. Such was the case later in 1999, said Borg, when there was a "not so minor cyber war" between China and Taiwan, the two historic antagonists in the Far East.

Also in 1999 came a cyber war in connection with the long-running conflict in Kashmir. It again pitted against each other the cyber militias of Pakistan and India, though undoubtedly with government support on both sides. In this round, India was the more active fighter.

In the final cyber war of 1999, the Iranian-backed group Hamas attacked Israeli cyber targets. From that point on, cyber attacks have been chronic features of the Arab-Israeli tensions in the Middle East, said Borg.

Among the more interesting cyber campaigns was that staged simultaneously with Russia's 2008 invasion of Georgia. It was an extensive militia effort, and it came in two waves.

The first wave was carried out by Russian organized crime, which used botnets to attack 11 targeted websites in Georgia. Those sites were under attack throughout hostilities.

The second wave featured Russian attacks on 40 other targets on a detailed list. These were attacked by civilian hackers, organized by social websites. "It was a very disciplined attack," Borg noted. "They had a list of targets. They went after those targets in a prescribed set of ways, ... and they never deviated."

The perpetrators made no effort to conceal what they were doing. There were various reasons for this. Civilian militias wanted to show the attacks were not official Russian government operations. As for the Russian Mafia, said Borg, it wanted credit for its "patriotic contributions," and so "they let us watch."

According to US sources, Russian cyber militias mounted similar attacks on Estonia in 2007 and Kyrgyzstan in 2009. In the latter event, the attack shut down Kyrgyzstan's two main Internet service providers, temporarily eliminating roughly 80 percent of Kyrgyzstan's bandwidth.

Today, cyber experts see signs that groups in different nations are forming alliances. Worse, the militias, which to this point have been restrained and nationalistic, may slip the leash altogether and pursue their own independent goals.

In China, the government has been able to cue its cyber militias, indirectly, about what is expected of them, said Borg. So far, they have pretty much followed the rules. To a lesser degree, this has been the case in Russia, too.

"I'm sure that Russia is not going to be able to maintain control over time," warned Borg, "and I think it will break down in China as well."

This is true also in many other nations. "I worry that these [informal ties] could break down," said Borg, "and the cyber militias will stop showing the kind of restraint they've shown so far. No critical infrastructure has been targeted—yet."

Because cyber war is now so firmly entrenched as a feature of local conflicts, they have the potential to erupt quickly and to escalate, spread, and disrupt international affairs in heretofore unseen ways. As a case in point, Borg cites the aftermath of the 2008 Russia-Georgia fight.

He notes that, in that conflict, Georgia got pounded by Russian cyber mobs, but it made little effort to counterattack in any significant way. Georgian hackers were careful to avoid cyber attacks on Russian physical infrastructure indus-

tries such as oil refineries, chemical plants, pumping stations, and electric power generators.

Ever since, though, Georgian hackers have been organizing, determined that, if Russia hits them again, they will hit back as hard as they can. According to Borg, the same thing is taking place in Latvia, Kyrgyzstan, Kazakhstan, Estonia, and Lithuania.

"The attackers, if they are going against Russians, will not be restrained," said Borg. "They will hit Russian critical infrastructures if they can. At that point, it is very doubtful that the Russian government, even if it tries, will be able to keep its civilian militias from hitting back."

In short, the conflict will not only escalate and spread, but it will likely spin out of control and do significant damage.

Borg says similar situations are developing in other parts of the world, particularly the Far East. There, the biggest concern is China, simply because of the size and skill of its cyber militias. Indeed, China's Ministry of Public Security announced that, in a Nov. 30 crackdown, it had arrested 460 suspected cyber criminals and closed more than 100 websites catering to hackers.

"It is possible that China in the future will still be able to control its own cyber militia, as it has done in the past," said Borg, "but other countries definitely won't."

The dangers are enormous. The worst attacks would be ones that physically destroy infrastructure—wrecking big electric generators, blowing up oil refineries, disrupting pipelines, crashing trains in tunnels, causing toxic chemicals to leak from chemical plants, and so forth.

As Borg recently said, "The total economic destruction caused by an intense campaign of such attacks could be greater than the damage done to Germany and Japan by strategic bombing during World War II."

These kinds of attacks are very difficult to mount and at present are within the grasp of nation-states only. The worry is that such techniques are rapidly leaking out into the world of subnational civilian groups.

"So," said Borg, "we have a situation that could easily get out of hand."

While direct physical attacks are scariest, Borg notes, other types of cyber attacks could cause great harm. He points out that the US is "completely dependent" on global supply chains—not just for oil and other commodities but for services and specialized parts for industrial uses—and that these can quickly be disrupted by determined attackers.

Selected Regional Cyber Conflicts

1998

Zapatista sympathizers vs. Mexico
Zapatista sympathizers vs. DOD, Frankfurt Stock Exchange
Pakistan vs. India (after nuclear tests)

1999

NATO (in Kosovo) vs. Serbians (and Russians)
China vs. US (bombing of Chinese Embassy in Belgrade)
China vs. Taiwan
India vs. Pakistan (during conflict in Kashmir)
Hamas vs. Israel

2000

Azerbaijan and Turkey vs. Armenia
Hezbollah vs. Israel

2001

China vs. US (after downing of US Navy EP-3 aircraft)

2005

Indonesia vs. Malaysia (dispute over Celebes Sea)
China and South Korea vs. Japan (dispute over Japan war crimes)
German Neo-Nazis vs. the world

2006

Muslims vs. Denmark (during furor over Muhammad cartoon)

2007

Russia vs. Estonia
Israel vs. Syria (supporting air attack)

2008

Russia vs. Lithuania
Russia vs. Georgia (during invasion by Russian troops)

2009

Russia vs. Kazakhstan (news agencies)
North Korea vs. South Korea and US
Russia vs. Kyrgyzstan

2010

WikiLeaks' US opponents (and others) vs. WikiLeaks' supporters

Source: US Cyber Consequences Unit

What's more, cyber militias pose a threat to America's vast webs of business outsourcing to nations such as India, which is at daggers drawn with both China and Pakistan.

"India could easily be involved in a major cyber conflict," said Borg. "Suddenly, all of these call centers, all of these business outsourcing processing centers that do all of the back office support for our financial institutions and so on, could not only be suddenly knocked off line but also their activities could be corrupted."

Borg warns that, despite the prominence of regional cyber militias, there has been virtually no discussion of the threat at US Cyber Command or elsewhere in the US government.

"We talk a lot about nation-state attacks," he said. "I think that there is a great danger that we are neglecting—even missing—the main thing we need to be worried about." ■

Robert S. Dudney is a former editor in chief of Air Force *Magazine (2002-2010). His most recent piece was "The Lavelle Syndrome" in the September 2010 issue.*

World War II sea power required airpower. At Midway, the US sent four Japanese carriers to the bottom of the Pacific.

The Battle of Midway

By Barrett Tillman

"Midway Island" is a misnomer. Scene of the American naval victory in June 1942, Midway is actually two islands some 3,800 miles west of California and 2,500 east of Tokyo. But its near-center position in the Pacific Ocean was less important than its proximity to Pearl Harbor: Midway is 1,300 miles northwest of Oahu.

The strategic stage for Midway was set long before World War II. For more than 30 years, American and Japanese planners envisioned a decisive fleet engagement in mid-Pacific, a scenario with battleships as the major players. But aviation worked a stunning change.

The Japanese carrier striking force (Kido Butai) that ravaged Pearl Harbor in 1941 was unlike anything the world had ever seen. Vice Adm. Chuichi Nagumo's six flattops put 350 aircraft over Pearl Harbor, announcing with convincing violence that sea power now included airpower. Successive operations throughout the Pacific only reinforced Tokyo's military prowess.

Meanwhile, the US Navy was forced to rely upon its few carriers. At the start of the war, America possessed just seven fleet carriers—fast ships capable of more than 35 mph, embarking 70 or more aircraft.

Initially, Adm. Chester W. Nimitz's Pacific Fleet owned three flattops, USS *Lexington* (CV-2), *Saratoga* (CV-3), and *Enterprise* (CV-6). The need for another flight deck was undeniable, so *Enterprise's* older sister, *Yorktown* (CV-5), hastened to the Pacific.

The next months were spent in hit-and-run carrier raids from the Gilbert and Marshall Islands, to Wake Island, to New Guinea, and the Solomons. More significantly, in mid-April the newly arrived USS *Hornet* (CV-8) launched Lt. Col. Jimmy Doolittle's B-25s against Tokyo.

The Imperial Navy was at once embarrassed and outraged. America's carriers had to be destroyed.

Then, in early May, something completely unprecedented occurred. The two-day Battle of the Coral Sea pitted *Lexington* and *Yorktown* against three Japanese flattops in a carrier versus carrier engagement. For the first time ever, neither fleet sighted the other, the battle being conducted wholly by aircraft. *Lexington* was lost and *Yorktown* damaged, while a small Japanese carrier was sunk and the larger *Shokaku* damaged. The air group of her sister carrier, *Zuikaku,* was mauled, and would be unable to deploy anytime soon.

Left (top):* Yorktown *during the Battle of Midway and (bottom) on fire. It was torpedoed and attacked by Japanese dive-bombers.

Adm. Isoroku Yamamoto, commander of the Combined Fleet, predicted Japan would run rampant for six months, but subsequently nothing was certain. Therefore, he knew seizing Midway would threaten Oahu, forcing Nimitz into battle.

Fortunately for the US, American code breakers identified occasional plums of intelligence and began piecing together enemy intentions. They handed Nimitz the priceless advantage of advance notice of Operation MI, Japan's plan to occupy Midway.

Catalinas and B-17s

In all, Japan deployed more than 120 vessels in five task forces. They included Yamamoto's powerful "main body" trailing well astern of Kido Butai with 17 ships, none of which played a role in the battle—nor did the invasion and support forces with scores of vessels, plus submarines.

Nagumo deployed four veteran flattops, *Akagi, Kaga, Soryu,* and *Hiryu,* with 15 escorting battleships, cruisers, and destroyers. The Battle of the Coral Sea had reduced the forces that Kido Butai could commit to Midway, but the overall Japanese advantage appeared insurmountable.

Tokyo's dispersion lessened the odds faced by the US at any specific point of contact, but the odds were still long. Nimitz's two task forces totaled three carriers with 23 escorts. They departed in late May, *Yorktown* still bearing Coral Sea bomb damage.

(Simultaneous with the Midway attack in early June was Tokyo's operation against the American-owned Aleutian Islands. Some accounts still describe the Aleutians as a strategic diversion, but it was a serious effort intended to succeed on its own. Occupation of Attu and Kiska was expected to secure Japan's northern flank and draw off American assets from elsewhere. The Alaskan offensive included two carriers that would be sorely missed at Midway.)

Despite the huge disparity in ships, the Americans were far better matched in what mattered most: airpower. With 225 carrier aircraft and 125 more on Midway, Nimitz's assets matched Yamamoto's 248 tailhook aircraft and 16 recon floatplanes. Another daunting problem: At the time, Japanese designs invariably outperformed their American counterparts, especially Zero fighters versus Grumman Wildcats and Nakajima B5Ns (later Kates) versus Douglas TBD-1Devastator torpedo aircraft. The opposing dive-bombers—Douglas SBD Dauntlesses and Aichi D3A Vals—were both proven ship killers.

Nimitz crammed every available aircraft onto Midway, America's first fully joint operation of the war. Thirty-two PBY Catalina patrol aircraft operated mostly from Midway's seaplane base on Sand Island, while Marine, Navy, and Army units used all the ramp space on Midway's Eastern Island. The Marine air group flew a mixed squadron of SBD and Vought SB2U Vindicator scout-bombers, while the fighters mainly were Brewster F2A Buffalos with Wildcats.

The Navy debuted six TBF Avenger torpedo airplanes alongside the Army's B-26 Marauder torpedo bombers.

The Army Air Forces' main contribution was significant, comprising 19 B-17Es from the 5th and 11th Bomb Groups.

The ungainly, long-legged Catalinas made first contact with the enemy. On the morning of June 3, they sighted lead elements of the Japanese force more than 450 miles out. Late that afternoon, Lt. Col. Walter C. Sweeney Jr. was over the enemy with nine B-17s. He sent a contact report, then led a high-altitude bombing attack that predictably failed.

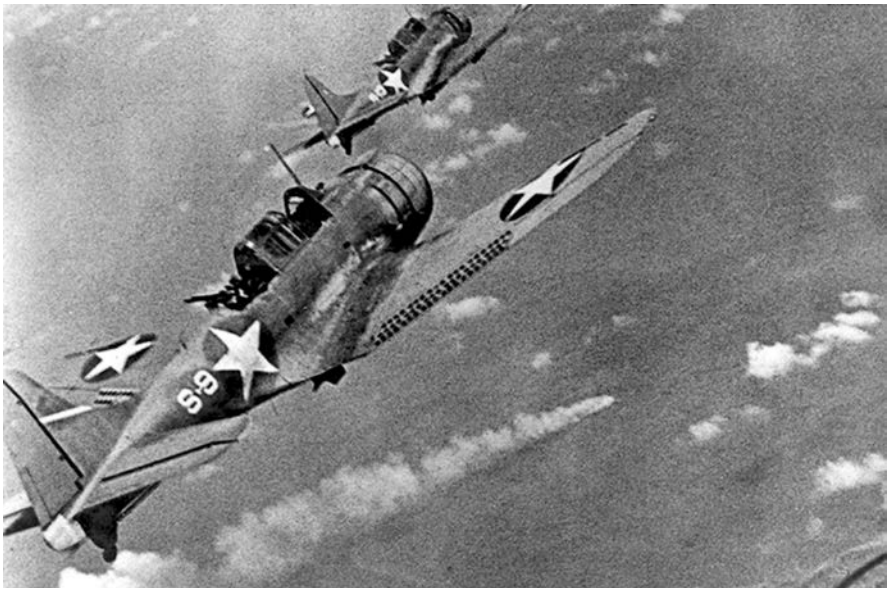
Hitting moving ships from 20,000 feet was a huge challenge that the Army fliers seldom trained to do. Nevertheless, the Flying Fortresses made their first contribution to the battle.

Early on the fourth, three PBYs attacked the enemy transport force and torpedoed an oiler. The ship and the attackers survived, knowing they faced a full day of battle. More Catalinas and the B-17s rose before dawn, flying long-range searches to re-establish contact.

Nagumo's air plan began with a 108-airplane attack. The formation was seen by airborne Americans who sent a warning: "Many planes heading Midway."

Beginning around 6 a.m., Midway began scrambling everything: 25 Marine fighters; 10 Army-Navy torpedo airplanes; and 28 Leatherneck scout-bombers. The pilots of Marine Fighting Squadron 221, led by Maj. Floyd B. Parks, barely managed to engage the raiders. Committed piecemeal, caught at an altitude disadvantage by superior aircraft flown by experienced pilots, the Marines suffered terribly.

In a few minutes, nearly all the Buffalos were shot down, with Parks and most of his pilots killed. For decades



Left: An aerial photo of the two islands comprising Midway. Eastern Island is in the foreground, Sand Island in the back. Below: Dauntless aircraft from USS* Hornet *approach the burning Japanese cruiser* Mikuma *during the battle.

thereafter, the Buffalo was considered a "death trap"—but under those conditions, a full squadron of Wildcats would likely have fared little better.

The Japanese lost a dozen airplanes to the defenders—mostly to anti-aircraft fire—but did a thorough wrecking job on Midway. They destroyed hangars, the power plant, fuel stores, and ordnance facilities. As the strike leader departed he signaled, "There is need for a second attack." Back at the strike group, Nagumo ordered another bombing mission readied.

Meanwhile, Midway's hodgepodge strike group neared the Japanese force. One of the Avenger pilots was Ensign Albert K. Earnest, who described a running battle over the last 15 miles. Fast, slashing Zeros knocked down five TBFs, leaving Earnest to press his attack with a dead gunner and wounded radioman.

He recalled, "My elevator wires were shot away. I released my torpedo at the nearest ship, a light cruiser, as I thought I was out of control, but regained control with the elevator tab." He returned his riddled airplane to make a one-wheel landing at Midway.

An AAF contribution came from Capt. James F. Collins Jr.'s flight of four speedy B-26 Marauders. They pressed their attacks to the limit. One B-26 nearly crashed on the flagship *Akagi's* flight deck, and ultimately only Collins' and Lt. James P. Muri's Marauders returned.

Next came the Marine bombers. Only partly trained, VMSB-241 was limited to glide-bombing attacks rather than steep dives. Eight Dauntlesses were lost attacking *Hiryu,* while the Vindicators fared no better. Unable to close on the carriers, they went after battleships, losing four airplanes to no avail.

Shortly, Sweeney was back with 14 B-17s attacking in small formations that fountained the sea around enemy carriers but scratched no paint. As if that weren't frustrating enough, the submarine *Nautilus* drew a bead on the carrier *Kaga* and scored a hit—with a dud torpedo.

By that time, Japanese scouts were aloft. A cruiser floatplane radioed alarming news: An American force was "accompanied by what appears to be a carrier."

A Flight to Nowhere

Nagumo now realized that he faced a serious threat at sea and ordered bombs on his Kates to be exchanged for torpedoes, costing precious time.

Of the two American units, Rear Adm. Raymond A. Spruance's Task Force 16 was first off the mark. Replacing the ailing Vice Adm. William F. Halsey, Spruance had *Enterprise* and *Hornet* begin launching their air groups when the range closed to launch distance. Meanwhile, Rear Adm. Frank Jack Fletcher, in overall command from *Yorktown's* Task Force 17, waited to recover his scouts before proceeding southwesterly. In the pivotal carrier battle, neither American admiral was an aviator.

Due to staff problems, "The Big E" and *Hornet* failed to coordinate their efforts, and both launches dragged out. *Enterprise's* air group commander, Lt. Cmdr. C. Wade McClusky, circled with his two SBD squadrons for nearly an hour before being ordered to "proceed on mission assigned." He led 30 Dauntlesses toward the expected interception point, separate from his torpedo squadron.

Meanwhile, *Hornet's* squadrons followed their enormously unpopular air group commander, Cmdr. Stanhope C. Ring, who led them on what has been called a "flight to nowhere" heading almost due west.

Torpedo Eight skipper Lt. Cmdr. John C. Waldron finally broke off to port, knowing that Kido Butai had to be to the southwest. The SBDs continued to the extent of their fuel before returning to *Hornet* or diverting to Midway, while the inept fighter group skipper ran 10 aircraft out of fuel with two pilots lost.

Waldron found the enemy, and about 9:30 a.m. led his 15 Devastators into Kido Butai. An unescorted daylight torpedo attack on an alerted fleet could only go one way: Some 40 Zeros awaited the attackers and quickly destroyed the squadron. All the TBDs were shot down with one pilot surviving; no ships were hit.

Next appeared *Enterprise's* Torpedo Six. It suffered nearly as much as Torpedo Eight. Lt. Cmdr. Eugene E. Lindsey was killed at the head of his group of 14 Devastators, only four of which returned.

All the while, McClusky's SBDs searched. Reaching the briefed contact point, he found empty sea and continued several miles beyond. Shrewdly reckoning that Nagumo had to be northerly, McClusky began a box search. In fact, the Japanese had turned off their southeast course to avoid successive attacks.

Burning fuel, the Dauntlesses continued the hunt.

The third and last American torpedo squadron was *Yorktown's* Torpedo Three. Launched later than the other units, Lt. Cmdr. Lance E. Massey arrived just as the smoke was clearing from the previous interception. The squadron's dozen Devastators were all lost, but they kept the pressure on Nagumo.

Then the sky rained Dauntlesses.

In an unintentionally coordinated attack, *Enterprise's* SBDs arrived over the target just as *Yorktown's* dive-bombers appeared. McClusky had taken a heading from a Japanese destroyer harrying the submarine *Nautilus,* and struck gold.

In the next few minutes, the Big E's squadrons experienced an aerial traffic jam as the scouts and most of the bombers went for *Kaga.* McClusky's pilots hammered her 36,000 tons into shambles.

The Bombing Squadron Six skipper, Lt. Richard H. Best, was left with only two wingmen, but he destroyed *Akagi* with a perfect center hit. As they pulled out amid the flak, *Enterprise's* fliers saw a third carrier burning: *Soryu* was victim of Lt. Cmdr. Maxwell F. Leslie's *Yorktown* SBD dive-bombers.

In a matter of minutes, the battle had completely reversed course.

Enterprise lost about half her Dauntlesses on the mission. The Yorktowners initially got off lightly. However, the surviving Japanese carrier, *Hiryu,* quickly launched dive-bombers that crippled *Yorktown* and left her adrift. Lt. Cmdr. John S. Thach's Wildcats exacted a heavy price for the success, but neither side was ready to quit.

Meanwhile, a *Yorktown* scout found *Hiryu* and provided her position. The remaining *Yorktown* and *Enterprise* SBDs integrated and prepared to finish off *Hiryu,* but not before *Hiryu's* Nakajimas attacked and put two torpedoes into *Yorktown,* forcing her abandonment. Shortly thereafter, the Dauntlesses were back, wrecking *Hiryu* and depriving Nagumo of his final flight deck.

Sweet, Sweet Revenge

Stunned at the reversal, Yamamoto realized that without air cover, he would lose more ships.

Operation MI was called off, yet the battle continued for two days.

Spruance assumed overall command from the displaced Fletcher and authorized search-strikes to pummel the retreating enemy. Still, very little came easily. On the fifth, three squadrons of SBDs found a lone Japanese destroyer that evaded every bomb and shot down a Dauntless to boot.

During the night, two Japanese cruisers collided, leaving them limping westward. They were soon discovered and pounced upon by *Enterprise* and *Hornet* dive-bombers which sank *Mikuma* and clobbered *Mogami.* By the afternoon of June 6, it appeared the battle was over.

A Japanese aircraft carrier burns after dive-bomber attacks. Four Japanese aircraft carriers were destroyed at Midway, and some 3,000 Japanese were killed.

However, a Japanese sub captain thought otherwise. The 1,400-ton *I-168* penetrated *Yorktown's* protective screen and fired a devastating salvo. Torpedoes ripped the bottom out of the destroyer *Hammann,* secured alongside *Yorktown*, and inflicted mortal damage on "Old Yorky." She lingered until the morning of the seventh, and with her sinking, the Battle of Midway finally ended.

The Midway scoreboard showed a decisive American win. Four Japanese carriers and a cruiser were destroyed, with some 3,000 enemy killed, including irreplaceable aircrew. For the US, principal losses included one carrier and destroyer, with 307 aircrew and sailors killed.

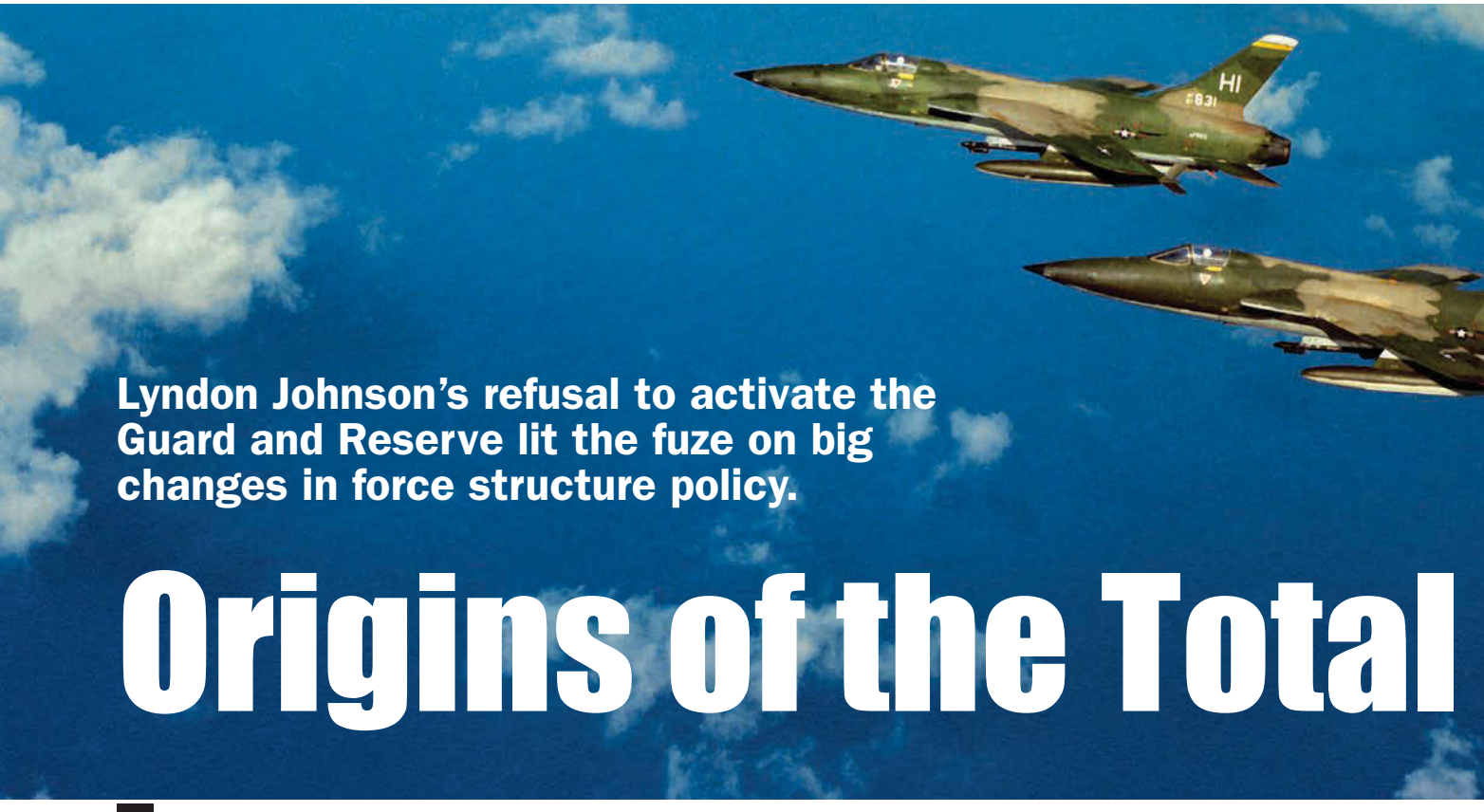
For decades after the war, conventional wisdom held that Midway averted a greater Japanese triumph in the Pacific. Two standard references were Walter Lord's *Incredible Victory* (1967) and Gordon W. Prange's *Miracle at Midway* (1982), which typified the battle's public image.

Over time, though, a more measured assessment has arisen. A Japanese victory at Midway never had the potential to end the war on terms favorable to Tokyo. Loss of two or even all three US carriers would have delayed the Central Pacific offensive, but not thwarted it. American resolve was unshakable following Pearl Harbor, and public opinion demanded a reckoning. V-J Day might have been delayed, but perhaps only one year.

In any case, Midway remains a source of intense pride for its participants. None expressed it better than SBD pilot Best, who had dropped the bomb that sank *Akagi.* "Midway was revenge, sweet revenge for Pearl Harbor," said Best. "The Italians say that revenge is a dish best served cold, and after Pearl Harbor, it was six months cold."

The battle may not have marked an indisputable turning point in the war, but it had enormous strategic importance. Midway was Japan's last major offensive of the war; afterward it ceded the strategic initiative to the United States. Only two months later, US marines landed at Guadalcanal, beginning a six-month battle of attrition that ensured Japan could not win and America could not lose. ■

Barrett Tillman is a professional author and speaker who has flown a variety of historic aircraft and has received six writing awards for history and literature. This is his first article for Air Force *Magazine.*



Lyndon Johnson's refusal to activate the Guard and Reserve lit the fuze on big changes in force structure policy.

Origins of the Total

In 1965, the United States entered the Vietnam War in strength, with large-scale deployments of air and ground combat units to Southeast Asia. President Lyndon B. Johnson rejected the advice of his Secretary of Defense and the Joint Chiefs of Staff that he request Congress for approval to call up the National Guard and Reserves.

Johnson stuck to his stand for three years as US troop levels in Vietnam rose steadily toward 500,000. He was determined to meet the need with active duty forces, increased recruiting, and larger draft calls.

In that, he was bucking almost 200 years of precedent. In every war since the American Revolution, the militia—which evolved into the National Guard and Reserves—was mobilized to fight. They were mobilized in both the Berlin Crisis of 1961 and the Cuban Missile Crisis in 1962.

The Guard and Reserve, already smarting under their image as havens for draft dodgers, disagreed with the President's policy. Air National Guard and Air Force Reserve volunteers on training tours flew missions in Vietnam from 1965 on, but Johnson's refusal to activate the reserve components in wartime undercut their fundamental purpose and mission.

Johnson said in his memoirs that he did not want to "make threatening scenes to the Chinese or the Russians by calling up reserves in large numbers." In truth, he was working a political problem. Campaigning for re-election the previous October, he had said he would not "send American boys nine or ten thousand miles away from home to do what Asian boys ought to be doing for themselves."

Mobilization would have been embarrassing for Johnson. Even though he deployed 44 combat battalions to Vietnam in 1965, the President said he would not be provoked into what

USAF photo

An F-100 from the New Mexico Air National Guard soars over Tuy Hoa AB, South Vietnam, in 1968. Johnson's refusal to activate the reserve forces for the Vietnam War smarted.

USN photo by PH3 (AC) T. J. Pfrang

Force

By John T. Correll

Two Air Force Reserve F-105s fly a mission over the Pacific Ocean in 1978. Lack of political muscle often left the Reserve with second-rate equipment.

he called a "major war." Activating the reserves would have had political repercussions. Johnson drew support from members of Congress who reported "heavy flak" from the families of young men who had joined to avoid the draft and who did not want to be activated.

The Guard's Political Muscle

Old line Guardsmen and Reservists were disgusted by draft evaders. The Reserve Forces Act of 1955 provided for enlistment in the reserve components of non-prior-service men, creating a legal opportunity for them to discharge their military obligation without active service. For many if not most of these short-term recruits, the motivation was different from that of the professionals and veterans who took pride in their service.

The Air Force and Army had two reserve components each: the Army and Air National Guard, with dual state and federal status, and the all-federal Air Force and Army Reserve. Neither the Navy or the Marine Corps had a Guard component.

The National Guard was designated in 1903 as the nation's militia force and reconfirmed in 1946 as the Army's first-line reserve component. The Air Force inherited its reserve force structure from the Army. The Air Guard and Air Force Reserve were designated equal components of the new Air Force in 1947, but the pre-eminence of the Guard was difficult to overcome.

Leaders of the independent Air Force were not enamored of the reserves, especially the state-dominated Guard, but deep budget cuts by the Truman Administration left them with a smaller force than anticipated, and reserve components helped to fill the gap.

Postwar, the Guard's political clout forced the War Department to retain it as the primary reserve force, and the Air Force accepted this as political expediency. "Its political muscle had insured that the Air Guard received priority over the strictly federal Air Force Reserve in the distribution of aircraft and equipment," said Air Guard historian Charles J. Gross. "Consequently, Air Guard flying units have usually been equipped with more advanced and more glamorous tactical aircraft than the Air Force Reserve."

In 1948, a board convened by the Secretary of Defense proposed eliminating redundancy by merging the Guard and Reserve into a federally controlled force called the National Guard of the United States. Among those supporting the proposal was Thomas G. Lanphier Jr., former president of the Air Force Association and the senior air officer of the Idaho ANG. Lanphier's article, "48 Air Forces Too Many," in the January 1949 issue of *Air Force* Magazine, drew angry rebuttal. The National Guard lobby had little difficulty in blocking the merger in Congress.

In 1964, Secretary of Defense Robert S. McNamara proposed the exact opposite, a merger of the Army Reserve into the National Guard. About the same time, the Air Force floated an "eventual" merger of the Air Guard

TSgt. Archie Sims (l) and TSgt. Stephen Rogers, Air National Guard maintainers, work on the leading edge of an F-100 wing at Tuy Hoa AB, South Vietnam. Some officials wanted to merge the Guard and Reserve into a single reserve component.

Theodore Marrs, the "architect of the Total Force."

and Reserve, but was defeated again in 1965. "McNamara then created a 'selected reserve' force in each of the military services," said Gross. "They had priority access to equipment, could recruit to full wartime strength, and were allowed to conduct additional training each year."

The active services were lukewarm at best toward the Guard and Reserve, but there was strong Congressional support for reserve forces, especially the Guard. The Navy stood out among the services in its resistance to the use of reserves, holding that most of its operations required active forces. The Air Force was considerably ahead of the others in its support and use of the Guard and Reserve.

Failure to mobilize for Vietnam was damaging for the Army, which got most of the draftees. Its end strength, driven by war demands, rose from 965,000 in 1964 to 1,527,000 in 1968. New units were organized from scratch and had little cohesive unity. Experience levels fell. Forty percent of officers and 70 percent of the enlisted force had less than two years of service. Breakdowns in discipline followed.

Two events in January 1968 brought matters to a head. North Korea seized the intelligence ship USS *Pueblo* and interned the crew. A week later, the North Vietnamese launched the Tet Offensive in Vietnam. In February, Gen. William C. Westmoreland of Military Assistance Command Vietnam requested 206,000 more troops be made available for deployment, in addition to the 500,000 previously requested. When the *New York Times* reported this, Westmoreland claimed he was misunderstood, but public opinion was aroused. Opposition to the draft, already rampant, intensified.

Tet was the beginning of the end for Johnson, who announced a curtailment of the war and that he would not run for re-election. In April, the new Secretary of Defense, Clark M. Clifford, initiated a limited call-up of the reserves, some 25,000 men and 88 units from all services for 24 months or less. The Army units were not combat ready and only a few of them were sent to Vietnam. The mobilization was further hampered by lawsuits challenging the call-ups.

By contrast, the activated Air Guard and Reserve forces, including fighter squadrons and tactical airlift groups, performed with distinction in Vietnam. Gen. George S. Brown, 7th Air Force commander, said the five Guard F-100 squadrons were the best in the field. "The aircrews were a little older, but they were more experienced, and the maintenance people were also more experienced than the regular units," Brown said. "They had done the same work on the same weapon system for years, and they had [personnel] stability that a regular unit doesn't have."

Circling the Ships

The Nixon Administration came to office in 1969 committed to ending the draft. The change agent was Secretary of Defense Melvin R. Laird, formerly a nine-term Congressman from Wisconsin. While an appointed commission studied the termination of the draft, Laird moved to "Vietnamization" of the war, reducing the American presence and shifting the combat burden to the Vietnamese.

The President's Commission on the All-Volunteer Armed Force gave considerable attention to the potential contributions of the Guard and Reserve, which set the stage for what would be known as the Total Force concept.

The term "Total Force" first appeared in October 1953 when the Air Force used it to describe its approach to employing its reserve components. Its foremost advocate was Theodore C. Marrs, whom Gross calls "the architect of Total Force." Marrs was a former Air Guardsman from Alabama. In 1966, when he was deputy assistant secretary of the Air Force for reserve affairs, he convinced the Chief of Staff, Gen. John P. McConnell, to request a RAND study of future roles for air reserve forces.

The study, completed in 1967, said that it would be in the national interest to increase air reserve participation in all major mission areas except for nuclear weapons delivery, and reserve flying units would cost about half as much as active duty units if similarly manned and equipped.

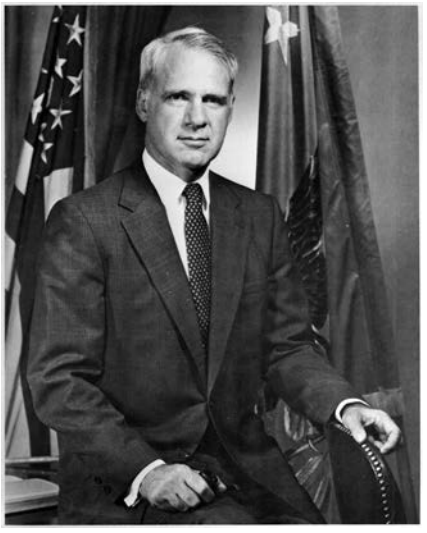
When Marrs moved up to be deputy assistant secretary of defense for reserve affairs in 1970, he took with him a "Total Force model in being." With the help of a few like-minded officials, he said, "I planned to convert the Air Force's Total Force concept to defense policy.

"A draft of the letter for the Secretary of Defense to sign was leaked to the services. The Air Force was silent. The Navy Secretary said this looked good, but the admirals circled the ships. There were two reactions in the Army. First, there was the idea that Total Force was innocuous and could be ignored—a not unusual reaction to 'civilian control.' Second, there was a strong feeling that Total Force was some sort of camouflaged assault against the citadel on the Hudson."

The Army and Navy lost their campaigns to block the Total Force, Marrs later recalled. Laird signed the paper making Total Force into policy. The basic argument was that it had worked in the Air Force. If "fly-boy generals" would make it work, then certainly the "brilliant admirals," the "mature Army generals," and Marine generals could do the same, Marrs noted.

Laird declared the "Total Force concept" in an Aug. 21, 1970, memorandum to military departments, the Joint Chiefs of Staff, and defense agencies. Reduced expenditures would require reductions in overall strengths and capabilities of active forces and

Secretary of Defense Melvin Laird signed Total Force into policy.



Secretary of Defense James Schlesinger supported the Total Force concept.

increased reliance on combat and combat support units of the Guard and Reserves.

"In many instances the lower peacetime sustaining costs of reserve forces units, compared to similar active units, can result in a larger total force for a given budget or the same size force for a lesser budget," he said.

Laird's declaration had two main provisions. First, "emphasis will be given to the concurrent consideration of the total forces, active and reserve, to determine the most advantageous mix to support national strategy and meet the threat. A total force concept will be applied to all aspects of planning, programming, manning, equipping, and employing Guard and Reserve forces," he stated. Second, "Guard and Reserve units and individuals of the Selected Reserves will be prepared to be the initial and primary source of augmentation of the active forces in any future emergency requiring a rapid and substantial expansion of the active forces."

The Total Force concept was official policy, but was not prescribed by statute and did not have the force of law. Laird could and did move out on the integration of all available forces, including better-trained and -equipped Guard and Reserve forces, to achieve "the most advantageous mix."

However, the second provision—relying on the reserve components instead of the draft as the "initial and primary source of augmentation" in wars and emergencies—was not binding on a President who chose to do otherwise. This part of Total Force remained a matter of DOD opinion until the draft was zeroed out in June 1973. Unless the draft was reinstated by Congress, there was no alternative to mobilization of the reserves to expand the armed forces in wartime.

Cuts and adjustments proceeded apace. "By FY 1973, defense spending was at its lowest level in dollars of constant buying power since 1951," Laird said. "Manpower—military, civilian, and industry—was at its lowest level since 1950." Meanwhile, the budgets of the National Guard and Reserves almost doubled from their 1968 levels.

In August 1973, Secretary of Defense James R. Schlesinger declared that "Total Force is no longer a 'concept.' It is now the Total Force Policy which integrates the active, Guard, and Reserve forces into a homogeneous whole." His statement was essentially an expression of support rather than a change of substance.

The "initial and primary" provision of Laird's Total Force memo was nailed down in 1974 by the "Abrams Doctrine." Gen. Creighton W. Abrams, who followed Westmoreland at MACV in 1968, became Army Chief of Staff in 1972. He had experienced the devastating effect of Johnson's failure to mobilize and said often the US should never again go to war without calling up the Guard and Reserve.

More Than Ever

Abrams wanted to increase the Army from 13 divisions to 16. The bad news from the Army staff was there were resources for only 10 good divisions rather than the 13 in nominal existence, and 16 divisions were out of the question. Abrams solved the problem by two actions. He created "roundout" brigades and battalions in the reserve forces, and made them affiliates of active divisions, to be mobilized and deployed along with them in the event of war. He also transferred some combat support functions in their entirety to the Guard and Reserve.

In August 1974, Abrams announced the Army force structure would increase to 16 combat-ready divisions by Fiscal 1978. The catch was integral brigades and battalions of those divisions and essential combat support would be in the Guard and Reserve. As a practical matter, it would be impossible to send the Army into anything more than a limited contingency without calling up the reserves.

The Total Force policy was a return to a standing military envisioned by the founding fathers, Marrs said, one which could not enter a full-scale conflict without public consensus. In fact, it was considerably more than that. In ensuing years, the Guard and Reserve achieved stature and capabilities they never had before. The air reserve forces took on large portions of the Air Force mission. In both the Army and the Air Force, the distinction between active and reserve forces faded almost to the point of disappearance. In the limited conflicts and expeditionary operations to come, the Guard and Reserve provided an extraordinary share of the forces deployed.

There were problems. As force reductions and base realignments and closures bit deeper, Air Force leaders clashed with state governors and adjutants general on the transfer and consolidation of flying units. At a different level of concern, Secretary of Defense Donald H. Rumsfeld complained at a press conference in December 2002 the Total Force policy was hampering his ability to deploy combat units to war because he had to concurrently activate Guard and Reserve elements, without which the active components could not conduct operations.

Laird rejected Rumsfeld's critique. "Some have argued that the Total Force concept no longer 'fits' our nation's military strategy," Laird said in February 2006. "Reflecting on all the reasons that the country adopted this concept in the 1970s, one must conclude that, to the contrary, it fits now more than ever. We shouldn't forget that the Total Force concept was based on the hard lessons of the Vietnam War and fiscal realities. The Guard and Reserve were not mobilized during that conflict because President Lyndon B. Johnson preferred to use the draft rather than risk the political fallout of activating units in America's heartland."

When Guard or Reserve units are called, you call out America, he noted. "Governors and members of Congress are stakeholders in the defense of America. The Defense Department would be wise to work with them." He concluded that "the National Guard and Reserves are—along with a properly configured regular force—the cost-effective solution for an uncertain future." ■

John T. Correll was editor in chief of Air Force *Magazine for 18 years and is now a contributing editor. His most recent article, "The Real 12 O'Clock High," appeared in the January issue.*

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AFA National Report

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By Frances McKenney, Assistant Managing Editor

Praising Alabama

Air Force Association Chairman of the Board S. Sanford Schlitt traveled in December to Montgomery, Ala., home of Maxwell Air Force Base, Civil Air Patrol headquarters, and the **Montgomery Chapter.**

At Maxwell, Schlitt made office calls on Air University Commander Lt. Gen. Allen G. Peck, Vice Commander Maj. Gen. David S. Fadok, and Col. Roger Watkins, commander of the Jeanne M. Holm Center for Officer Accessions and Citizen Development.

As part of his work as a newly appointed member of CAP's Board of Governors, Schlitt toured a hangar where Cessnas are refurbished for service and met with Susan Mallett. She is the CAP Youth Development Program coordinator and a new AFA national director.

Schlitt spoke to the Montgomery Chapter's Executive Council, telling them that the chapter produces meetings of the caliber of those organized for entire AFA regions. He had particular praise for the chapter's strategic planning and budgeting process. Led by Lawrence E. Boese, it involves deliberately aligning the chapter and its activities with AFA's national-level goals and objectives.

Schlitt also updated the chapter on AFA programs such as *CyberPatriot* competitions for high school students.

The cyber defense contest now has teams from public, private, parochial, and home schools in an open division and JROTC and CAP units in an all-service division. Several rounds of competition determined which teams head to Washington, D.C., for the championship March 31 to April 2 at the Gaylord National Convention Center at National Harbor, Md.

Dropping of the Roses

Four survivors of the Dec. 7, 1941, attack on Pearl Harbor received honors at the **Long Island Chapter's** annual Dropping of the Roses ceremony this past December in Farmingdale, N.Y.

Special proclamations from President Obama were presented to Gerard Barbosa, 17 years old and a gunner's mate on USS *Raleigh* when it came under attack; Bernard Berner, who served in the Army's chemical warfare division; Seymour Blutt, a veteran of the 11th Bomb Group; and William Halleran, now age 92.

Nearly 600 people gathered for the ceremony at the American Airpower Museum, reported Chapter President Fred Di Fabio, who organized the event with Chapter Secretary Catherine Ward. In a hangar at the museum, the audience listened to remarks from Col. Thomas J. Owens II, commander of the ANG's 106th Rescue Wing at Francis S. Gabreski Arpt., N.Y. Navy and Coast Guard representatives also spoke.

A contingent of sailors helped conduct the blessing of 69 red roses, one for each year that has passed since 1941. The audience then went outside to watch a vintage AT-6 aircraft take off and head for the Statue of Liberty. The pilots in the two-seater airplane dropped the roses into the waters surrounding the statue at 12:55 p.m., the exact East Coast time of the Pearl Harbor attack.

The Dropping of the Roses originated with Navy veteran Joseph S. Hydrusko, from Massapequa, N.Y. He was aboard the hospital ship USS *Solace* at anchor in Pearl Harbor and after the bombing helped rescue sailors from the battleship *Oklahoma.* In 1970, Hydrusko began flying a vintage aircraft around the Statue of Liberty on Dec. 7 to commemorate those who died. The chapter took over organizing the event after he died.

Di Fabio said this year's Dropping of the Roses was transmitted live to a TV news program in New York.

AFA Chairman of the Board Sandy Schlitt (left) pays an office call on Maj. Gen. David Fadok, Air University vice commander at Maxwell AFB, Ala. At right is AFA South Central Region President Thomas Gwaltney.

More photos at http://www.airforce-magazine.com, in "AFA National Report"

Representing

Not everyone can make it to the AFA Air Warfare symposium held in Orlando, Fla., every February, so Arizona's **Frank Luke Chapter** came up with a way to fly its flag: Send an official chapter representative.

This year, the chapter selected Capt. Steven Shallenberger, an instructor pilot from the 309th Fighter Squadron at Luke AFB, Ariz.

So what does a chapter representative do? Take in the symposium information and "become smart," said Chapter President Joseph W. Marvin. "Shake the hand of the AFA chairman and tell him you're there for the chapter." Then return to Luke and share what you learned about the Air Force and AFA.

Last year's selectee, TSgt. Mark J. Adams from the 56th Component Repair Squadron, was the first chosen as the rep to Orlando. Marvin said the airman stepped forward to ask questions at symposium presentations. Back at Luke, Adams spoke to the chapter's March meeting and went on to deliver a briefing to his unit as well as at a base commander's call.

Adams is now the chapter's VP.

Marvin pointed out that by paying for airfare, hotel, and meals so the representative can attend a symposium, the chapter contributes to an airman's professional development. It is a chance to reward top active duty performers, he said, and it is "a good way for us to get a presence at the national symposium."

Her Father's Footsteps

At their October meeting, New York's **Chautauqua Chapter** members learned about the World War II experiences of a B-17 gunner who endured 15 months as a POW in Europe.

Even Sgt. John R. Kyler's own family didn't know his wartime story until after he died, at age 81, in 2004. Like many veterans, he didn't talk about those years, but in sorting through his belongings after his death, his daughter, Candy Kyler Brown, found notebooks of poems, sketches, and fragments of information he had compiled during the war.

Inspired to learn more, Brown visited the places where her father had served. He was inducted into the Army Air Forces at Fort Niagara, N.Y., in February 1943. A year later, he was with the 407th Bomb Squadron, RAF Podington, UK, flying on his fourth bombing mission. The target was Frankfurt, Germany. Flak hit the B-17 and the crew bailed out over Belgium. Kyler was moved from stalag to stalag in Lithuania, Poland, and Germany, living for weeks in a box car, jammed in the hold of a boat, sometimes shackled to other prisoners. He had just turned 21 years old. The Russians liberated his final POW camp, Stalag Luft I, in May 1945.

In retracing her father's footsteps—including a visit to the B-17's crash site—author Brown spoke to several chapter members who were former B-17 crewmen, among them Joe Leo. He told her what it was like to be a gunner on an Eighth Air Force Flying Fortress.

Brown wrote about the odyssey into her father's past in the book *What I Never Told You.* Chautauqua Chapter President Stephen J. Kockler said her presentation to the chapter about this book was "compelling."

The Shooting Star's Namesake

With its name, the **Shooting Star Chapter** in New Jersey pays tribute to a World War I ace, 2nd Lt. Arthur Raymond Brooks, who had a shooting star emblem painted on the fuselage of his SPAD airplane.

This past September, the chapter, which is led by Howard Leach, learned more about Brooks' life through a presentation by historian and author John Whitcomb of Basking Ridge, N.J.

Brooks was born in Framingham, Mass., in 1895 and graduated from MIT in 1917. He enlisted in the Army Signal Corps' Aviation Section and took flight training in Canada. In March 1918, he completed training with the American Expeditionary Force in Issoudun, France. That summer, he became flight commander of the 22nd Aero Squadron, 2nd Pursuit Group. His squadron flew the SPAD XIII pursuit aircraft.

By the end of the war, Brooks had six confirmed kills and had completed 120 missions in four aircraft. The last one is displayed at the Smithsonian's National Air and Space Museum.

In his civilian career, Brooks helped establish Florida Airways, which eventually became Eastern Airlines. He later became a Bell Telephone Laboratories scientist in New Jersey. He is credited with developing innovations in navigation and ground-to-air communications. Brooks belonged to the Shooting Star Chapter until his death in 1991.

Chapter guest speaker Whitcomb's own credentials include World War II service as a B-25 navigator-bomber. He is a former high school teacher and has had several books published, notably *Real Life at the White House.*

At the end of his chapter talk, Whitcomb revealed his personal tie to Brooks: His uncle, Philip E. Hassinger, was Brooks' wingman.

Beyond the Yellow Ribbon

In Minnesota, the **Richard I. Bong Chapter's** December holiday gathering spotlighted a community support program aimed at helping military families cope with a deployment.

Jennifer Kuhlman, the 148th Fighter Wing's Airman and Family Readiness program manager, spoke about the Minnesota National Guard's Beyond the Yellow Ribbon initiative. The program started last April with a group of more than 40 community members identifying volunteer services, developing a military resource guide, and creating a relocation package for military families moving into the area.

Kuhlman told the chapter that items for the families now include what Chapter Secretary Keith M. Bischoff called "a youngster packet"—a teddy bear and book, among other things.

In an earlier news release about the Yellow Ribbon program, Lt. Col. John Safstrom, 148th Fighter Wing vice commander, said the program lets airmen "know that when they are deployed, their families will be taken care of, and then when they get home, they will be taken care of."

At the chapter's holiday dinner meeting, members donated $300 to the program.

Air Force Week in Cocoa Beach

The **Cape Canaveral Chapter** helped Air Force Week in Cocoa Beach, Fla., in October carry out its theme, "Honoring Hometown Heroes."

The chapter rounded up Community Partners to sponsor active duty Air Force personnel—the hometown heroes—so they could attend a formal banquet. Held at the Atlantic Grill on Cocoa Beach Pier, the Senior Leadership Dinner was the culmination of seven days of USAF-oriented activities in the area. Air Force Chief of Staff Gen. Norton A. Schwartz; Gen. C. Robert Kehler, head of Air Force Space Command; and Brig. Gen. Burke E. Wilson, commander of 45th Space Wing at Patrick AFB, Fla., attended the dinner.

It was not hard to persuade the Community Partners to pitch in to sponsor airmen, said Chapter President Chris G. Bailey. For this and other chapter fund-raising in the past, he said the local business people have actually telephoned him to ask, "What do you need from us?"

Bailey was a member of the 45th Space Wing's planning group for Air Force Week. As part of the festivities, the chapter helped sponsor a golf tournament at Patrick, with proceeds benefitting the chapter's aerospace education fund.

High points of the week were concerts, static displays, and demonstrations: The USAF Thunderbirds performed at Disney's Magic Kingdom. The Air Force Academy's Wings of Blue team parachuted from a C-130 Hercules and landed on the beach.

Chief of Staff Gen. T. Michael Moseley established Air Force Weeks in 2006 to spotlight the USAF mission and way of life.

More Chapter News

■ News reports said donations for the Marine Corps Reserves' Toys for Tots drive lagged this year, but in New Jersey, **Mercer County Chapter** members proved to be generous donors. Chapter President Stewart Zitzner reported that the chapter collected more than $400 to benefit the annual gift program for needy children. A group headed by Norman Mathews, former chapter president, shopped for the toys and delivered them to the Marine Corps Reserve facility at Mercer County Airport. Helping Mathews were Charles Johnson, Marcy L. Johnson, Pearl E. Lipski, Harry Williams, and Joan Judson.

■ In New York City, the **Iron Gate Chapter's** December reception demonstrated an "outpouring of patriotism," said Chapter President Frank T. Hayes. The event, held at the Soldiers', Sailors', Marines', Coast Guard, and Airmen's Club, involved a silent auction. Hayes reported that "the hot item" was aviation artist John D. Shaw's SR-71 print, bought by former Marine F-4B reconnaissance systems officer Paul Mulvihill. Special guests were New York State President Maxine Rauch; Col. Thomas J. Owens II, commander of the 106th Rescue Wing at Francis S. Gabreski Airport; and Capt. Mark Jansen, AFROTC commandant of cadets at Manhattan College.

■ The **Hawaii Chapter's** SMSgt. Jean Fontenot received an AFA Medal of Merit in December. Gen. Gary L. North, Pacific Air Forces commander, made the presentation, with Hawaii Chapter President Nora Ruebrook and Jack Murphy, chapter VP for awards. Fontenot has helped with the continued expansion of the Atterbury Circle Legacy Pathway Project at JB Pearl Harbor-Hickam, Hawaii. The memorial commemorates airmen who were or are serving in the Air Force in the Pacific. ■

Reunions

reunions@afa.org

20th & 81st Wgs, RAF Woodbridge, UK. Sept. 1-3 in Altus, OK. **Contact:** Danny King, 1705 Crain Dr., Altus, OK 73521 (580-482-3114) (580-471-4212) (2kings6@sbcglobal.net).

63rd Army Air Forces Flying Tng Det. Oct. 16-21, in Douglas, GA. **Contacts:** John Hermann, 3562 West Fork Rd., Cincinnati, OH 45211 (513-481-0130) or Bill Manchester, 35499 Richland St., Livonia, MI 48150 (734-421-6624).

305th BW, 45th MMS, May 5-8 in Dayton, OH. **Contact:** Richard Hoffman, 10610 W. 115th Ct., Cedar Lake, IN 46303 (219-374-9264) (hoffie12@comcast.net).

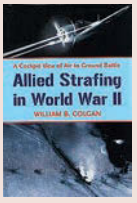
Pilot Tng Class 58-G, Marana AB. Sept. 13-15, in Cody, WY. **Contact:** Rob Orchard, 4203 Rd. 82, Ten Sleep, WY 82442 (307-366-2450). ■

E-mail unit reunion notices four months ahead of the event to reunions@afa.org, or mail notices to "Reunions," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information. We reserve the right to condense notices.

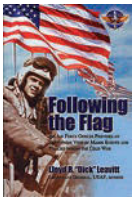
Books

Compiled by Chequita Wood, Media Research Editor

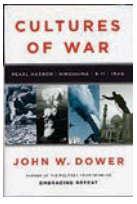
Allied Strafing in World War II: A Cockpit View of Air to Ground Battle. William B. Colgan. McFarland, Jefferson, NC (800-253-2187). 263 pages. $38.00.



Following the Flag: An Air Officer Provides an Eyewitness View of Major Events and Policies During the Cold War. Lt. Gen. Lloyd R. "Dick" Leavitt, USAF (Ret.). Air University Press, Maxwell AFB, AL (334-953-2773). 659 pages. $24.95.



NASA's First 50 Years: Historical Perspectives. Steven J. Dick, ed. GPO, Supt. of Documents, Washington, DC (866-512-1800). 759 pages. $79.00.

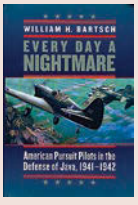


Cultures of War: Pearl Harbor, Hiroshima, 9-11, Iraq. John W. Dower. W. W. Norton, New York (800-233-4830). 596 pages. $29.95.

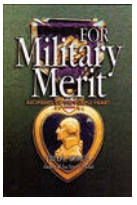
The Forgotten Barnstormer: The Story of the Standard J-1 in War and in Peace. Chet Peek. Order from: Three Peaks Publishing, c/o Chet Peek, 1861 Danfield Dr., Norman, OK 73072 (405-364-7351). 148 pages. $29.95.

Rethinking Violence: States and Non-State Actors in Conflict. Erica Chenoweth and Adria Lawrence, eds. The MIT Press, Cambridge, MA (800-405-1619). 275 pages. $25.00.

Every Day a Nightmare: American Pursuit Pilots in the Defense of Java, 1941-1942. William H. Bartsch. Texas A&M University Press, College Station, TX (800-826-8911). 506 pages. $40.00.

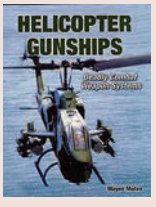


For Military Merit: Recipients of the Purple Heart. Fred L. Borch. Naval Institute Press, Annapolis, MD (800-233-8764). 351 pages. $34.95.

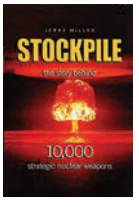


Shot Down Over Italy: A True Story of Courage and Survival in Nazi-occupied Italy During World War II. John W. Lanza. Order from: Bright Spot Books, Caldwell, NJ (973-226-8602). 354 pages. $24.95.

Fire Bombers in Action: Videobook. Frederick A. Johnsen. Specialty Press, North Branch, MN (800-895-4585). 143 pages. $34.95.



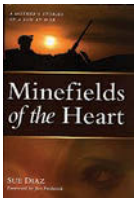
Helicopter Gunships: Deadly Combat Weapon Systems. Wayne Mutza. Specialty Press, North Branch, MN (800-895-4585). 207 pages. $39.95.



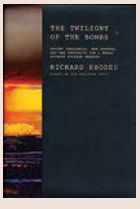
Stockpile: The Story Behind 10,000 Strategic Nuclear Weapons. Jerry Miller. Naval Institute Press, Annapolis, MD (800-233-8764). 273 pages. $37.95.

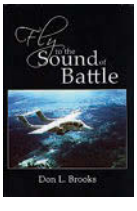
The Flight of the Century: Charles Lindbergh and the Rise of American Aviation. Thomas Kessner. Oxford University Press, New York (800-451-7556). 313 pages. $27.95.

Minefields of the Heart: A Mother's Stories of a Son at War. Sue Diaz. Potomac Books, Sterling, VA (800-775-2518). 160 pages. $24.95.

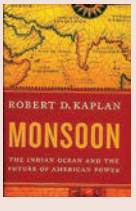


The Twilight of the Bombs: Recent Challenges, New Dangers, and the Prospects for a World Without Nuclear Weapons. Richard Rhodes. Alfred A. Knopf, New York (800-733-3000). 366 pages. $27.95.

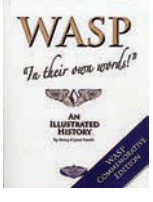




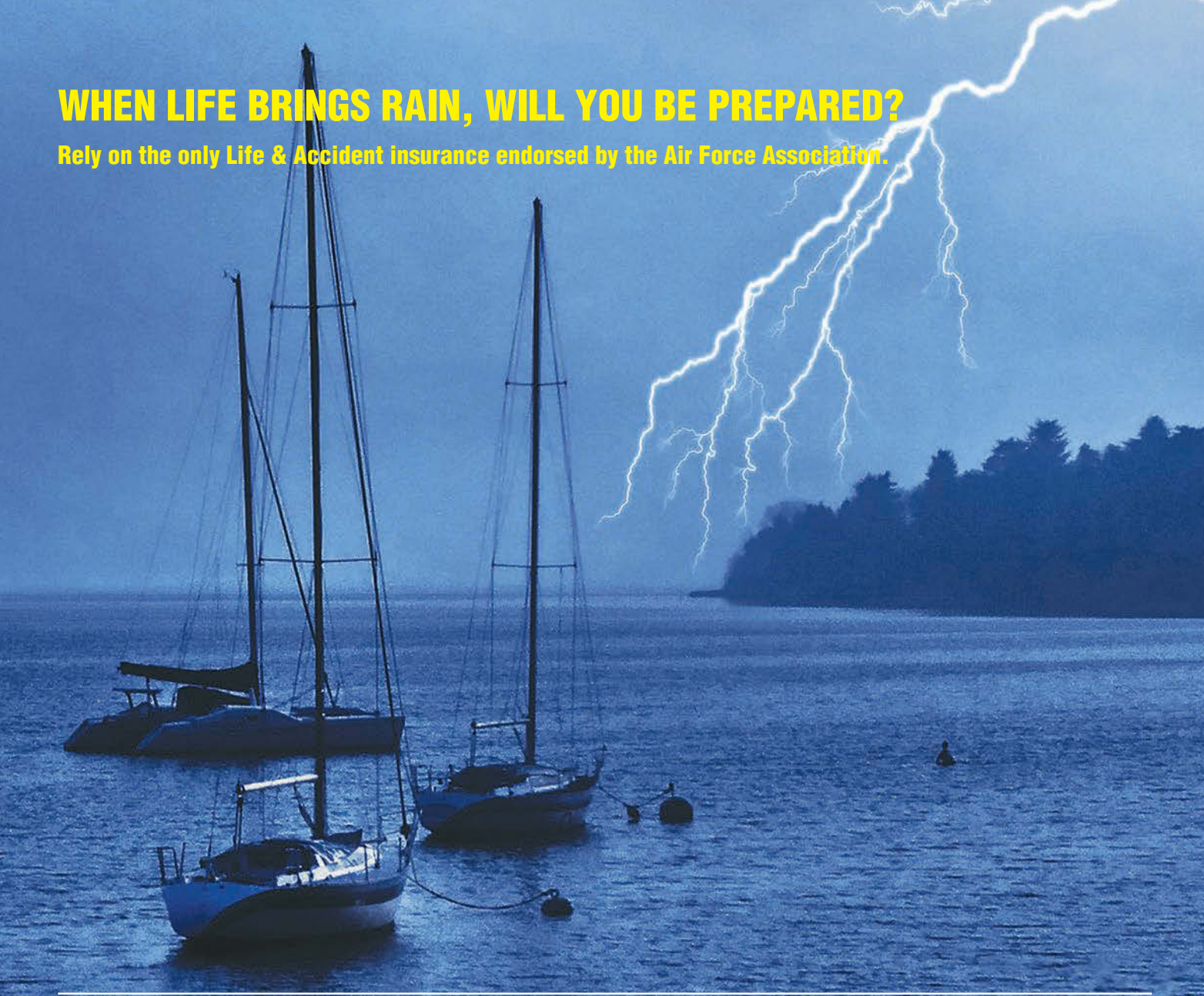
Fly to the Sound of Battle. Don L. Brooks. Order from: Lulu Publishing, www.lulu.com. 265 pages. $35.00.



Monsoon: The Indian Ocean and the Future of American Power. Robert D. Kaplan. Random House, New York (800-733-3000). 366 pages. $28.00.



WASP—"In Their Own Words!": An Illustrated History. Nancy Allyson Parrish. Order from: Nancy Parrish, 2911 Wooded Acres, Waco, TX 76710 (254-366-1436). 239 pages. $60.00.



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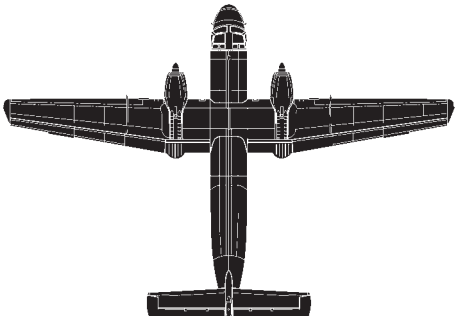
Artwork by Zaur Eylanbekov

C-7 Caribou



The C-7 Caribou was a twin-engine, short takeoff and landing (STOL) transport that saw extensive service in Vietnam, where it proved invaluable. The Caribou, built by de Havilland in Canada, started its US service in the Army, where it was known as AC-1 and then CV-2. On Jan. 1, 1967, a USAF-Army interservice agreement transferred the tactical airlifter into the Air Force inventory, where it was a star performer. USAF originally formed six C-7A squadrons, two each at Vung Tau, Cam Ranh Bay, and Phu Cat. By war's end, it was down to five squadrons.

The Caribou was de Havilland's third STOL design, and built on lessons learned in the operation of the Beaver and Otter. One was the need for two engines, which Caribou was given. The Caribou was a high-wing utility transport designed for operation from primitive fields. It was used primarily for tactical airlift from short, unimproved airstrips in forward battle areas. It could carry 32 passengers, 26 fully equipped combat troops, or more than 8,000 pounds in cargo.

In the war, it hauled everything from troops and howitzer shells to live pigs, ducks, and eels to feed Vietnamese troops. Capable of taking off and landing from very short runways, the Caribou demanded a high level of pilot skill in its operations. Perhaps its most famous mission came on Aug. 25, 1968; Maj. Hunter Hackney flew several aerial resupply missions at low altitude through intense enemy fire, incurring heavy damage. The airplane was a true workhorse.

—Walter J. Boyne

This aircraft: C-7 Caribou—*#61-2391*—as it looked in 1967 when assigned to USAF's 459th Tactical Airlift Sq., Phu Cat, South Vietnam.

A USAF C-7 Caribou on a mission over Vietnam in January 1967.

In Brief

Designed, built by de Havilland ★ first flight July 30, 1958 ★ crew of two or three ★ number built 307 ★ two Pratt & Whitney R-2000-7M2 radial engines ★ armament none ★ load 32 troops or two light vehicles ★ **Specific to C-7A:** max speed 216 mph ★ cruise speed 152 mph ★ max range 1,175 mi ★ weight (loaded) 28,500 lb ★ span 95 ft 7 in ★ length 72 ft 7 in ★ height 31 ft 8 in.

Famous Fliers

Air Force Cross: George Finck, Hunter Hackney. **Notables:** Eugene Habiger (former commander USSTRATCOM), John Handy (former commander USTRANSCOM), John Jumper (former CSAF), Steve Pisanos (World War II ace), Francis Scobee (astronaut).

Interesting Facts

Carried out many operations in Laos and Cambodia, serving Army's Special Forces ★ captured models flown in North Vietnamese Air Force in the 1970s ★ featured inward-opening rear doors ★ required takeoff run of only 1,200 feet ★ shorn of de-icing, cabin heating, and crew oxygen systems when operated in Vietnam ★ used extensively by CIA proprietary Air America ★ supported Army's Golden Knights demonstration team ★ served in 26 air forces and more than 20 civilian airlines ★ still in use as "bush" airplane.

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