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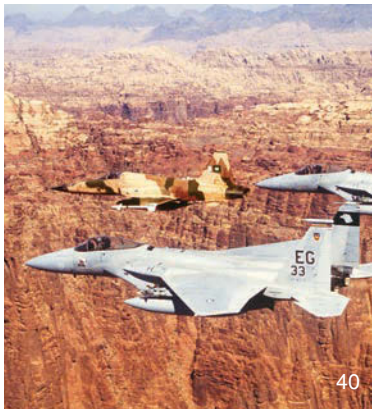

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Editorial

By Adam J. Hebert, Editor in Chief

Keeping Secrets the American Way

The Defense Department seemed to do little when WikiLeaks indiscriminately dumped thousands of classified intelligence reports from Iraq and Afghanistan, and a quarter-million confidential cables from US embassies worldwide, into the public domain.

The response? The Pentagon focused on repairing the faulty procedures that allowed the massive intelligence breach to occur in the first place.

DOD is turning off the ability to copy data from classified networks onto removable storage devices such as CDs or flash drives. Two people will be required to download classified data, to stymie lone actors. The department is also stepping up the automated monitoring of its classified networks and putting procedures in place to detect suspicious behavior.

The net result of these changes, said a DOD spokesman, is that "it is now much more difficult for a determined actor to get access to and move information outside of authorized channels."

One of the key findings after the 9/11 terror attacks was that various intelligence agencies needlessly hindered themselves by not sharing information. The government made a concerted effort to break down unnecessary restrictions on sharing intelligence, so that people such as lower-level battlefield commanders would have access to the information they needed to perform their jobs and protect their troops.

"Obviously that aperture went too wide," said Defense Secretary Robert M. Gates. "There's no reason for a young officer at a forward operating post in Afghanistan to get [State Department] cables having to do with the START negotiations." Nor, for that matter, was there any need for a young enlisted soldier in Iraq to have access to any classified information his heart desired.

The government is therefore also reviewing who needs access to what information, to control access even among those with security clearances.

Taken together, these safeguards would likely have prevented the original data theft. An Army private, Bradley Manning, is in custody. He is suspected of copying the vast troves of classified data onto re-recordable CDs while stationed in Baghdad. He allegedly walked out with the discs and later fed the electronic documents to WikiLeaks.

The release of the documents has been damaging, and certainly jeopardized the lives of intelligence sources in Iraq and Afghanistan. But the revelations have not been nearly as damaging to the US as some, including WikiLeaks founder Julian Assange, clearly hoped.

WikiLeaks released an edited video of an Apache helicopter operation that tragically killed two Reuters journalists

Though damaging, the scandal has shown that the US has little to hide.

and other noncombatants under the title "Collateral Murder." It has revealed the names of secret foreign sources, and personal information such as Social Security numbers of troops.

"Disabling secrecy in the name of transparency would be a sensible goal—if it were true that all secrecy were wrong," wrote the Federation of American Scientists' Steven Aftergood, a longtime critic of unnecessary government secrecy and author of the Secrecy News blog. "But if there is a legitimate role for secrecy in military operations, in intelligence gathering, or in diplomatic negotiations, as seems self-evident, then a different approach is called for."

When the State Department refused to cooperate with the WikiLeaks cabal and tell it what "specific names" should not be released, Assange said State's refusal to cooperate "leads me to conclude that the supposed risks are entirely fanciful and [the government is] instead concerned to suppress evidence of human rights abuse and other criminal behavior."

But the "revelations" in the releases have largely confirmed what was already known. The battles in Iraq and Afghanistan are confusing, chaotic, often terrifying, and US troops are constantly called on to make split-second life or death decisions with imperfect information. No surprise there.

In many cases, the "revelations" cast the US in a positive light. Uniformed troops are shown persevering under difficult conditions, while civilian diplomats are seen to generally behave professionally, and with American interests in mind.

Most importantly, as Gates noted, there is a "lack of any significant difference between what the US government says publicly and what these things show privately." The conspiracy theorists must be disappointed, and a stronger reaction may not be necessary.

Consider what a possible stronger response might look like:

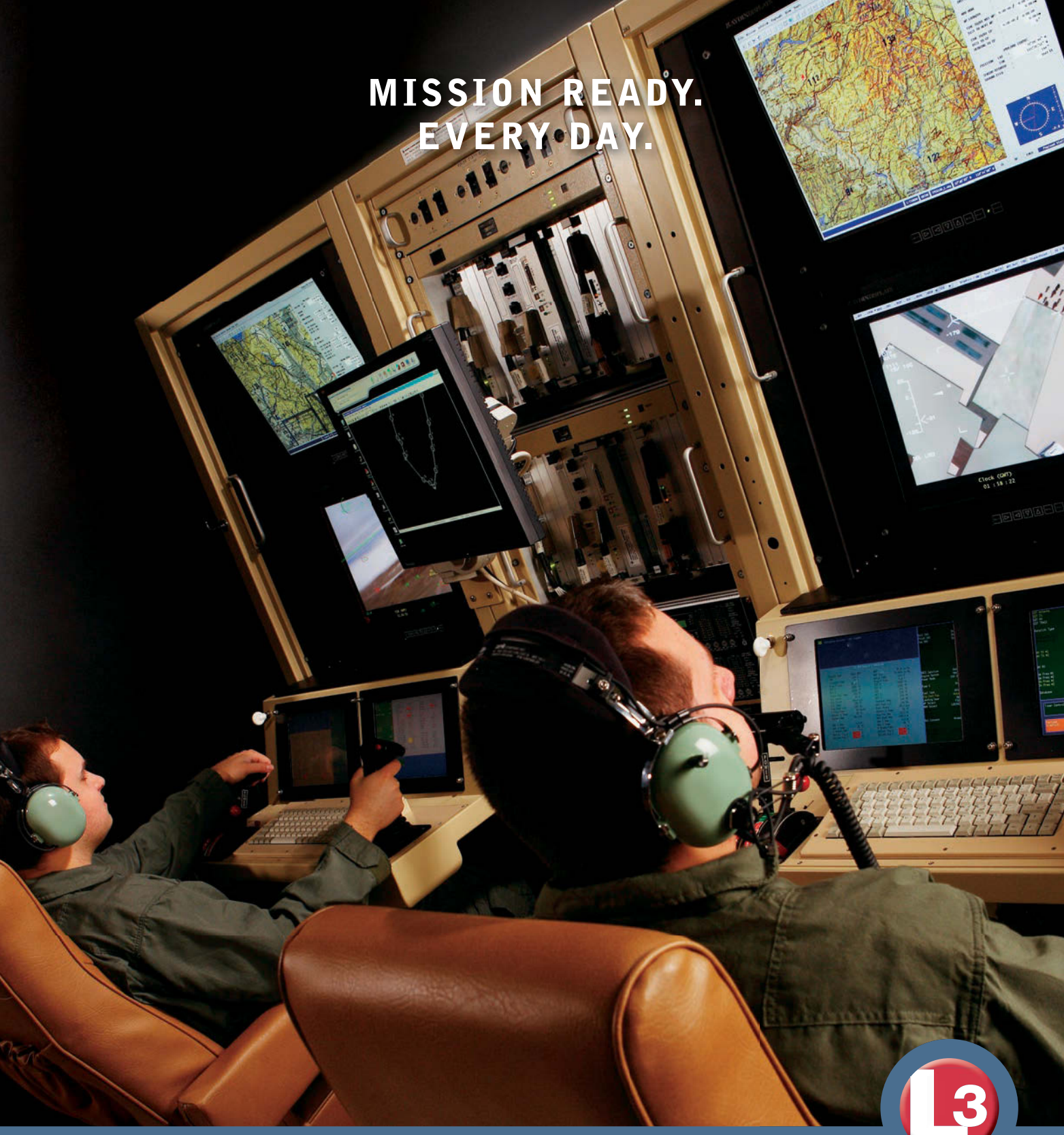
The US could place Assange's associates and family members under house arrest. The government might ban the media from referencing or quoting the stolen documents. It could shut down independent websites and jam news channels that mentioned Assange without condemning him.

The above sounds like an absurd overreaction, but is based in reality. It is, in fact, exactly how the Chinese government responded when faced with a situation it found similarly embarrassing last month: when Liu Xiaobo won the Nobel Peace Prize.

Liu is one year into an 11-year prison sentence for advocating democracy. China's government barred relatives and supporters from traveling to Norway for the Nobel ceremony, placing many of them under house arrest. The government blocked access to the independent websites and news channels, such as CNN and the BBC, which showed the event. China's "Great Internet Firewall" went so far as to temporarily shut down blogs that mentioned an "empty chair"—a reference to the fact that Liu's chair at the awards ceremony sat empty.

If that is what authoritarian information control looks like, we'll take the American way.

Technical and procedural changes may seem akin to shutting the barn door after the horse has fled, but in reality, the Pentagon has had the appropriate reaction. Though damaging, the scandal has shown that the US has little to hide. Authoritarian regimes (including WikiLeaks itself) are the ones having the most to fear from disclosures. ■



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Letters

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Suicide in the Ranks

I read with interest "A Scourge of Suicide in the Ranks" (p. 41, November), and found it both enlightening and concerning. Let me explain.

The extraordinary high quality of our Air Force recruits is heartening—the best in our history. As someone concerned with the health and vitality of the force, I am delighted to know that we are attracting capable and competent young men and women to serve our country.

My concern focuses on your framing of the suicide problem. This is hugely consequential. I was in Bethesda (14 July 2010) when the DOD Task Force on the Prevention of Suicide by Members of the Armed Forces report was presented to the Defense Health Board. The way I heard and read this draft report, suicide in the ranks was framed as a public health problem, not a clinical problem. Problem definition has significant consequences for problem solution.

If it is a clinical problem, then treatment interventions for victims and survivors becomes a key. We can even engage fitness training for individuals, building resilience within individuals and the force, but these interventions, while good, fall short if suicide is not a clinical problem. I agree with the DOD task force in defining the suicide problem as a public health problem.

To define suicide as a public health problem of a chronic nature in our current military context means that we must look at life history of the problem and start with the preferred point of intervention to get at the root cause. Primary prevention is the preferred point of intervention. Primary prevention means to do something about the cause of the problem, the health risk factor, or the demands and stressors to which men and women are exposed.

The profession of arms is an inherently dangerous and risky profession with an unlimited liability clause. However, as a four-star alumnus of our college once said, he never gambled young American lives. Yes, he put them at risk in combat, but always minimized American risks [while] escalating enemy risk. Primary prevention in this context means to manage the risk and stress exposures. To do this requires a serious national look at force structure. We've been in the longest war in our national history and I'm not convinced that we've correctly sized the force for the fights. That is where we must look first at the scourge of suicide in the ranks.

You can ask good young men and women to walk in harm's way only so many times before bad things happen. Suicide is the worst case. There are no quick fixes for this tragic rising tide.

Col. James Campbell Quick,
USAFR (Ret.)
University of Texas, Arlington
Arlington, Tex.

Leadership Lacking

This article *["Etchberger, Medal of Honor," November, p. 42]* points up the lack of leadership, both military and civilian, in a political war that resulted in this tragedy and others. What type of true leader would place these men into a no-win situation without any means to adequately defend themselves, let alone plan for their expeditious extraction? It is obvious that these leaders did not expect the unexpected. Their failure to properly defend and arm these men verges on gross incompetence and dereliction of duty.

It appears that we do not learn from our past mistakes. The saga of Chief Master Sergeant Etchberger and his fellow airmen should be required reading

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Charles Miller
Davie, Fla.

It Was a Quip

Thank you for an excellent article on Brigadier General Howard's exploits in World War II *["One-Man Air Force," November, p. 60].* St. Pete-Clearwater Arpt. (Fla.), to its credit, maintains a public display of Howard's memorabilia, on loan from the Howard family. Howard's joking remark to an undiscerning reporter ("I seen my duty and I done it.") made headlines in World War II, but would be greeted with derision by today's media. Fortunately, it typifies the American fighting spirit, then and now.

Douglas A. Walker
Gainesville, Fla.

Cost-Cutting Recommendations

So Robert Gates and the Obama Administration want to save $100 billion *["The Two Wars of the Air Force," November, p. 28]*? I can enlighten them on how they [could] save that money and more.

We have the Marine Corps [operating] fighters; that's aircraft. Why do they need F-35s? They can get CAS (close air support) from the Navy and the Air Force, any time of the day and night. Why don't they stick to fighting, which they do very well?

Now we have the Army, which, I think is trying to revert to the 1930s and become the Army Air Corps. They're getting into the remotely piloted aircraft business, which they need like I need a hole in my head. They also should stick to what they do best—fighting.

Gates should also look to his own civilian troops. They called us contract administrators when I retired from DOD. My boss used to get on our arse because we weren't writing up the contractor enough to warrant more then 300 bureaucrats working there. I told him that the only writeup that I deemed important was "safety of flight." We could've done the same job with less than 50 people.

Fred Cavaiuolo
Las Vegas

Hail November

The November 2010 issue was especially good. The issue includes good information on the huge and critical problems the Air Force and the Nation face in the most alarming socio-economic-security crises we face. They are momentous and require short-term tactics as well as long-term strategy. We need all the unadulterated information we can get, to understand and take our stand. The numbers say we cannot afford the defense we need for the security of the US, and it looks like they are right.

It is good to lay out these issues, not only for us old-timers to lament, but more importantly for those to whom we pass these heavy and slippery batons. They really do have their work cut out for them. And they need to know the facts.

And it does give us old-timers some good grist to grind before we go to D.C. in early January to put in our two cents' worth of experience, if not wisdom, for the current Air Staff to consider.

Of equal value in the November issue are the tales that make up the heritage of the United States Air Force. You are so right to get on public record the legend of James Howard, the "One-Man Air Force" in World War II, and Richard Etchberger, the Air Force noncommissioned officer who earned the Medal of Honor in Vietnam.

G. J. Eade
Healdsburg, Calif.

It is certainly with some trepidation that I offer a correction to anything written by Walter Boyne, who is in my opinion the finest historian of airpower in the world today, but I fear that Colonel Boyne is in error when he claims in "Airpower Classics: B-26 Marauder" *[November, p. 96]* that the B-26 was the only USAAF bomber to drop torpedoes in World War II. In fact, one of the very last medium bomber attacks during World War II was flown from Okinawa by B-25Js of the 41st Bombardment Group (M). Between 28 July and 1 Aug. 1945, these B-25s flew three missions carrying the Glide Torpedo 1 (GT-1), which was a combination glide bomb and standard Mk XIII torpedo. On 29 July 1945, nine B-25Js of the 47th Bombardment Squadron headed out on a mission to attack two fleet aircraft carriers reported to be in Sasebo Harbor. Because the fighters rendezvoused late with the bombers, they only had enough fuel to hit the secondary target at Kagoshima, where three of the six GT-1 torpedoes dropped were seen to enter the harbor and detonate. Two days later, 13 B-25Js of the 41st Bombardment Group made it to Sasebo where one fleet carrier (CV) and one light carrier (CVL) were riding at anchor. Of the 13 GT-1 torpedoes dropped, one stalled and spun in, a second was shot down before entering the water. Of the 11 that entered the water, three were seen to detonate—one near the CV, the other near the CVL, and a third against a small freighter. The final GT-1 mission of the war was flown on 1 Aug. against Nagasaki, though heavy smoke from Task Force 38 air attacks made any bomb damage assessment impossible for the three GT-1s that successfully entered the harbor.

Lt. Col. Donald J. Hanle,
USAF (Ret.)
Alexandria, Va.

Washington Watch

By John A. Tirpak, Executive Editor

Precision airpower in Afghanistan; F-35A looking good; $100 billion at risk .....

AIRPOWER FOR BEST EFFECT

The application of airpower in Afghanistan has been largely discrete and precise, but the enemy has skillfully exploited those rare occasions where it has not been, and blunted a key aspect of American power, said Air Force Chief of Staff Gen. Norton A. Schwartz.

Speaking with defense reporters Nov. 23, Schwartz asserted that USAF understands the intent of Gen. David H. Petraeus, commander of US forces in Afghanistan.

"That is to apply airpower for best effect while minimizing the potential for collateral damage and civilian casualties," Schwartz said.

"While I'm not suggesting we're perfect, I think it's important to recognize" that of the civilian casualties reported, "80 percent or more … are produced by enemy action." Only about eight percent of Afghanistan's civilian casualties are "produced by air-to-ground munitions. So it gives you a sense of scale," the Chief said.

Asked why he thinks air-inflicted civilian casualties get the most attention, Schwartz said, "The adversary is extremely skillful, recognizes the advantage that we have in that respect, and is doing all he can to limit that capability through suggestions that somehow we're indiscriminate." The outcry, which also frequently arises after air strikes kill legitimate military targets, often results in demands to limit the use of airpower. That can constrain a key US advantage, Schwartz said.

"I'm not asking you to accept my assertions of what the facts are," he added. "Look at the human rights data. Look at other sources of credible information. I think it will confirm it for you."

The Air Force, Schwartz said, is applying "the most precise application of force, I would argue, in history. We understand what the unique aspects of this fight are about."

F-35 PROSPECTS

Schwartz said the test performance of the F-35A—the conventional takeoff version to be used by the Air Force—is "best of the lot" when compared with the Marine Corps F-35B short takeoff and vertical landing model and F-35C carrier version. He has confidence it will yield what the Air Force wants from the fighter.

"It is ahead on test points; it's ahead on flying hours," Schwartz said of the F-35A in November. "Software stability has been good. … We've experienced no failures or surprises with respect to the A model structure. That part of the program looks pretty good." However, there have been "some issues with respect to timing on software development, and we don't have complete understanding yet of whether or not that will affect the IOC," or initial operational capability, which for the Air Force is slated for April 2016.

He declined to offer any insight into a Defense Acquisition Board review of the F-35 held in late November, but admitted he is "concerned on schedule, primarily. A little less, to date, on technical matters."

Lockheed Martin photo

The Air Force version of the F-35 is the best of the lot.

THE NEXT FIGHTER

In November, the Air Force started the process of seeking a next generation fighter to replace the F-22, with the publication of a request for information that went out to industry.

Schwartz said the eventual resulting aircraft will arrive in the 2030 timeframe or later, so it has progressed "little beyond conceptual." The process has started because "we need to think ahead, we need to be thinking in these terms," but a program of record is still a long way off.

Although it has been somewhat cumbersome to manage the F-35 as a three-service project, Schwartz said it is probable the next generation Air Force fighter will at least in some ways be a cooperative effort with the Navy.

"Collaboration between the Navy and the Air Force on air kinds of platforms and capabilities is absolutely the thing we should be doing," Schwartz asserted. He noted that the two services have agreed to share training and logistics support for the Global Hawk aircraft both will use.

"I think there is lots of opportunity here for both of us to do smart things that will make us more capable, not less, and make better use of resources along the way."

DON'T ASK

Defense Secretary Robert M. Gates called on Congress in late November to repeal the "Don't Ask, Don't Tell" rules that have governed homosexuals serving in the US military for the last 17 years, saying it "can be done and should be done without posing a serious risk to military readiness." He wanted the lame-duck Congress to change the law before the end of the year.

Legislation in the House of Representatives, which Gates endorsed, would allow homosexuals to serve in the military without having to conceal their sexual orientation. Under DADT, homosexuals can be separated from the military if they reveal their orientation, but commanders are not permitted to investigate their status.

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Gates based his recommendation on the findings of various working groups and a survey of troops to determine how disruptive the change would be. He announced his advice at a Pentagon press conference.

Although he insisted that the survey was not a referendum—the military, Gates noted emphatically, is not a democracy—"more than two-thirds" of the "tens of thousands" who answered the survey "do not object to gays and lesbians serving openly in uniform."

However, Gates noted that the combat arms specialties—which are predominantly male—have a "higher level of discontent" with the idea than the rest of the military population.

In later testimony before the Senate Armed Services Committee on the subject, Gates allowed that the survey found that if DADT were repealed more than 260,000 troops said they might leave the service, but he didn't believe that would happen.

In Britain and Canada, he said, similar surveys found similar results, but after the change was enacted, the number of people who left was "far smaller" than previously indicated.

In his Pentagon announcement, Gates said he believes existing laws and regulations can handle most of the issues—such as "sexual conduct, fraternization, billeting arrangements, marital or survivor benefits"—that might attend a change in the law.

He urged quick action by Congress to adopt the new legislation because a failure to do so could have sharply negative consequences. "I believe this is a matter of some urgency because, as we have seen in the past year, the federal courts are increasingly becoming involved in this issue," Gates noted. There is a "very real possibility that this change would be imposed immediately by judicial fiat—by far the most disruptive and damaging scenario I can imagine, and one of the most hazardous to military morale, readiness, and battlefield performance."

By contrast, Gates said, legislation would allow the change to be accomplished as "a number of steps" are met, providing time critical to conduct the training and education essential to making the policy shift work. The military needs time to make "thorough preparation" with "an abundance of care" to see it done in a logical and orderly way.

Gates admitted that the majority of the Joint Chiefs of Staff is "less sanguine" about the potential effect on readiness than he is.

THE CHIEFS WEIGH IN

Air Force Chief of Staff Gen. Norton A. Schwartz told the SASC that he doesn't agree with the Pentagon studies indicating "the short-term risk to military effectiveness is low" from repealing Don't Ask, Don't Tell. He is worried about "military effectiveness in Afghanistan" and the wisdom of piling yet one more headache on field commanders whose troops are in close-quarters combat.

If the legislation overturning DADT is to pass, Schwartz asked that it not be implemented until 2012 so the service could have time to prepare airmen with "training and education" programs.

Joint Chiefs Chairman Adm. Michael G. Mullen, speaking at the Pentagon, said the surveys of the troops and the findings of the working groups indicated three things.

First, he said, "leadership [will] be the single most important factor" in making the repeal work. Second, "we've heard loud and clear that our troops also expect us to maintain high standards of conduct and professionalism. … We treat people with dignity and respect in the armed forces, or we don't last long. No special cases, no special treatment, … and hold ourselves ... to impeccably high standards."

Lastly, "however low the overall risk of repeal may be with respect to readiness, cohesion, and retention, it is not without its challenges," Mullen said, and the best way for the military to deal with those is "having it within our power and our prerogative to manage the implementation process ourselves."

USAF photo by Scott M. Ash

Schwartz (right) wants time for education and training.

DIVERTED SAVINGS

The $100 billion in overhead savings demanded from the services by Defense Secretary Robert M. Gates last year was supposed to be plowed back into hardware, but now it looks like at least some of that money may be diverted to deficit reduction, creating a net cut in defense procurement.

The warning came at a Credit Suisse and *Aviation Week* investor's conference held in New York in early December. There, Vice Chairman of the Joint Chiefs of Staff Marine Gen. James E. Cartwright said it's "just logical" that "as the pressure comes on the budget," the amount of savings diverted from the Pentagon to overall federal deficit reduction will occur at "a greater rate."

The harvest of funds was to be cumulative over five years, and the big incentive for the services to slash overhead was that they could keep the savings and apply them to force structure, which has been hit with the double whammy of combat losses and reduced procurement funding over the last decade.

Cartwright said that, at least at first, "I don't think it will be in the large portions," but he couldn't say whether the Office of Management and Budget would target specific programs or the Pentagon's whole budget at "a macro level."

There are "realities out there" with respect to the burgeoning federal budget deficit that mean the Pentagon's budget will inevitably take a hit, Cartwright said.

One of the most tempting targets is the F-35 fighter, to be built in three variants: one each for the Air Force, Navy, and Marine Corps. In late autumn, a variety of think tanks, panels, and commissions nominated the F-35 for cuts, mainly because it has the largest price tag of any single defense program. The Joint Strike Fighter has also seen the cost growth and schedule delays typical of combat aircraft development programs.

At the conference, Pentagon acquisition, technology and logistics chief Ashton B. Carter said there are no in-house plans to cut the F-35 buy, however.

"We want the number of planes. We just don't want them for the costs we're getting," Carter said. He noted the 2002 baseline price of an F-35 at program completion has risen from $50 million a copy to $92 million. Because "there isn't going to be, ever, more money" for the F-35, Carter said the Pentagon and Lockheed Martin simply must find ways to stop cost growth and "reverse it." He also said that preserving the F-35's low cost was essential to keeping foreign partners committed to the program.

Carter allowed that all three variants have "issues." He did say, though, that increased scrutiny of the F-35 in the last year has resulted in the best high-level understanding the program has ever had. ■

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Air Force World

By Aaron Church, Associate Editor

Airman Dies in Afghanistan

SrA. Andrew S. Bubacz, 23, of Dalzell, S.C., died Nov. 12 from head injuries sustained while maintaining a communications tower at a forward operating base in Nuristan, Afghanistan. Assigned to the 97th Communications Squadron at Altus AFB, Okla., Bubacz was deployed as a member of a provincial reconstruction team.

He had been selected for promotion to the rank of staff sergeant before his death.

Elmendorf Pilot Dies in F-22 Crash

Capt. Jeffrey A. Haney, a pilot with the 525th Fighter Squadron at JB Elmendorf, Alaska, died in the crash of an F-22 during nighttime training Nov.16. Haney was flying as part of a two-ship F-22 mission when contact was lost about 100 miles north of Anchorage.

Air Force units mounted a search operation including HH-60 rescue helicopters, an HC-130 rescue tanker, and Global Hawk remotely piloted surveillance aircraft. The crash site was located Nov. 17, but due to the remoteness of the location, rough terrain, and deep snow, rescuers were unable to reach the site and recover Haney's remains until the following day.

The crash marks the second time an F-22 pilot has died in a crash since the type reached initial operational capability in 2005. The previous incident involved an F-22 at Edwards AFB, Calif., in March 2009. Another Raptor was destroyed in December 2004, when it crashed on takeoff from Nellis AFB, Nev., but its pilot ejected safely.

Initial evidence suggested Haney did not eject from the aircraft, and USAF has launched a safety investigation board to determine the cause of the mishap.

Mystery Spaceplane Lands

The X-37B, USAF's first unmanned reusable space vehicle, landed at Vandenberg AFB, Calif., on Dec. 3, after more than 224 days conducting secretive experiments on orbit.

The Orbital Test Vehicle 1 (OTV-1) fired its engines in low Earth orbit to perform an autonomous re-entry and landing, according to officials at Vandenberg.

On its maiden voyage, the spacecraft was tasked to perform risk-reduction, experimentation, and concept development for reusable space vehicle technology, the service said, without divulging details of the mission.

All on-orbit objectives for the X-37's initial flight were met, said Lt. Col. Troy Giese, X-37B program manager for the Air Force Rapid Capabilities Office.

In the spring, USAF plans to launch another X-37, OTV-2, also aboard an Atlas V booster.

JSTARS Sent to Korea

The Air Force dispatched an E-8C JSTARS ground-surveillance aircraft to monitor North Korean military movement amid rising tensions on the Korean Peninsula in late November.

Defense Secretary Robert M. Gates approved the Republic of Korea's request for the E-8C surveillance aircraft following an unprovoked North Korean artillery barrage on Nov. 23 against a South Korean island, known as Yeonpyeong, in the Yellow Sea.

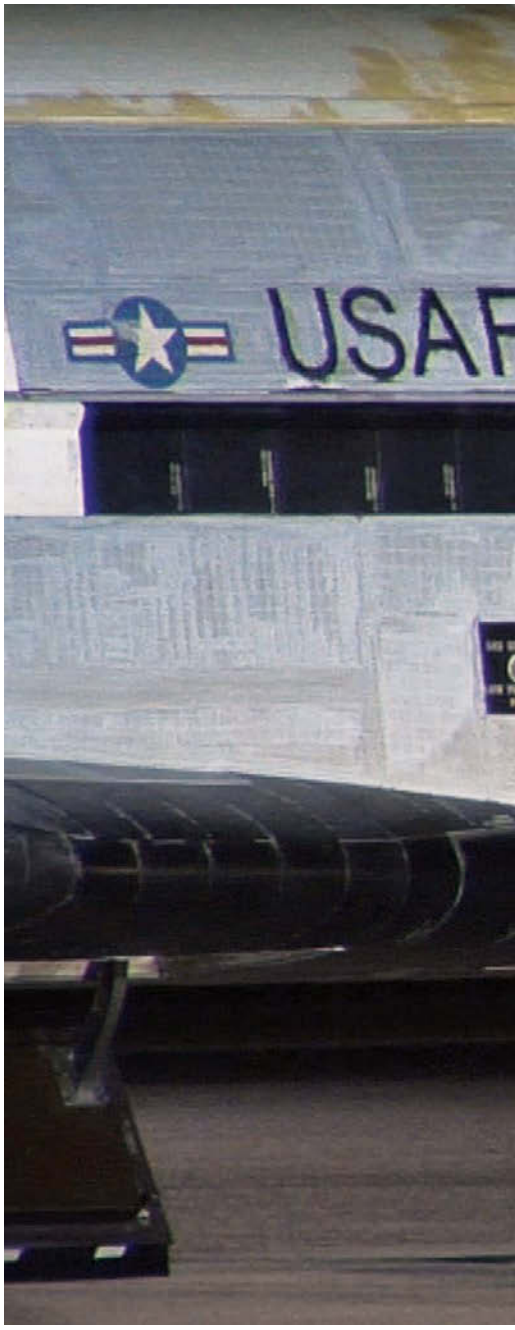
The indiscriminate attack, which killed both South Korean civilians and military personnel, elicited harsh condemnation from South Korea. South Korean President Lee Myung-bak vowed to confront "any provocations by the North from now on, ... without fail, ... with strong responses."

The incident also prompted US deployment of the USS *George Washington* carrier battle group to participate in a joint exercise with the South Korean naval forces in the Yellow Sea.

Air Force Chief of Staff Gen. Norton A. Schwartz told reporters in Washington that both South Korea and its allies have considerable airpower in the northern Pacific, a fact North Korea would do well to respect.

T-38s Headed to Tyndall

The Air Force plans to base a detachment of 10 T-38 trainer aircraft at Tyndall



USAF photo by Michael Stonecypher

AFB, Fla., Sen. George LeMieux (R-Fla.) announced Nov. 30.

The T-38s will serve there in a "dedicated adversary" role in support of Tyndall's F-22s, he said. Tyndall is currently home to F-22 training but is also slated to receive a squadron of combat-ready F-22s under the Air Force's Raptor consolidation plan.

LeMieux said the first T-38s would arrive by the end of September, with all 10 expected to be in place by March 2012.

Old Law May Aid Huey Replacement

The Air Force is considering a law known as the Economy Act of 1932 to speed procurement of helicopters needed to replace its Vietnam-era UH-1s. The Hueys are currently used primarily to secure US ICBM fields.

The rarely used law would allow the Air Force to procure up to 93 new-build Sikorsky UH-60 Black Hawks, worth at least $1 billion, without competitive bidding.

Under the statute, federal agencies are permitted to acquire equipment from one another. In this case, the Army would buy Black Hawks from Sikorsky as part of a larger, longstanding contract, and the Air Force would then buy them from the Army.

Air Force officials say the UH-1 has served well, but no longer meets service needs. The Air Force's plan calls for the first Black Hawk to be available for use in 2015.

F-15 AESAs Arrive at Kadena

The 18th Wing at Kadena AB, Japan, recently received its first four F-15Cs upgraded with Raytheon's APG-63(V)3 active electronically scanned array radar system.

The aircraft will be assigned to the 44th and 67th Fighter Squadrons, which already operate several F-15s fitted with the APG-63(V)1 and (V)2 AESA.

Technicians wearing self-contained atmospheric protective suits conduct tests on the X-37B Orbital Test Vehicle at Vandenberg AFB, Calif., on Dec. 3. The unmanned orbital spaceplane was lofted into space on April 22 by an Atlas V rocket from Cape Canaveral, Fla. The X-37B is intended to serve as a platform for future experiments.

12.03.2010

In a release from F-15 primecontractor Boeing, Brig. Gen. Kenneth S. Wilsbach, 18th Wing commander, stated that the (V)3 "improves our capabilities and lethality" as a combat force, equipped with "the world's most powerful air-to-air radar."

The (V)3 is reportedly 50 times more reliable than legacy mechanically scanned antenna arrangements.

Boeing is under contract to upgrade 27 active duty and 18 Air National Guard F-15C/Ds with the (V)3 system. Kadena is slated to receive 54 AESA-equipped F-15s by September 2013.

Rice Takes Over at AETC

Gen. Edward A. Rice Jr. is the new head of Air Education and Training Command, taking over from Gen. Stephen R. Lorenz, who retires this month. The change of command took place at Randolph AFB, Tex., on Nov. 17. It was presided over by Air Force Chief of Staff Gen. Norton A. Schwartz.

Rice, a distinguished graduate of the US Air Force Academy, previously commanded US Forces Japan and 5th Air Force at Yokota AB, Japan, where he served since February of 2008. He has logged over 3,900 hours in bomber, tanker, transport, AWACS, and training aircraft.

Lorenz led AETC from July 2008, serving more than 37 years of commissioned service. His retirement took effect Jan. 1.

Marine Corps F-35 Comes Under Fire

The Pentagon last fall contemplated terminating production of the F-35B short takeoff and vertical landing version of the Lightning II, currently on order for the Marine Corps.

The idea was driven in part by Britain's decision to switch from the F-35B to the carrier-capable F-35C. Reduced quantities of F-35Bs were expected to drive up unit costs.

Marine Corps briefing slides made available to the press noted that the F-35B can operate from that service's amphibious aircraft carriers, increasing from 11 to 22 the number of carriers on which the US can deploy "fifth generation fighters." The Marine slides also noted that the STOVL model makes thousands more airfields available to the US than would be available with strictly an F-35A and C inventory.

Separately, in its draft report released Nov. 10, the Presidentially chartered National Commission on Fiscal Responsibility and Reform recommended that the Pentagon cancel the F-35B "because of its technical problems, cost overruns, schedule delays, and the adoption by the services of joint combat support in current wartime operations."

Canceling the F-35B could accelerate delivery of the F-35A and F-35C versions, the panel said. DOD has planned to buy 311 F-35Bs at a cost of $41 billion, according to the commission, which would also reduce the F-35A and F-35C buys.

The increasing accuracy of tactical ballistic missiles in the hands of potential adversaries could make it increasingly risky for the Marines to use the F-35B as originally envisioned, either from amphibious ships offshore or directly behind battle lines to provide quick close air support.

Britain's defection from the variant leaves the Marines and Italy as the only currently planned F-35B operators. In a tradeoff for operational flexibility, the F-35B has less range and payload than the Air Force A and Navy C variants due to the internal volume consumed by the aircraft's lift fan.

The Marine Corps' top requirements officer declined to say whether the service has developed an alternative plan to fill any fighter shortfall that would arise if the Pentagon axes the F-35 STOVL variant.

USAF photo by SSgt. Andy M. Kin

***Tanks for Everything:** A C-17 Globemaster III delivers a Marine Corps M1A1 Abrams tank to Afghanistan on Nov. 28. This was the first of what will be a company of Abrams tanks in the theater. The Marine Corps plans on using the fast, deadly tanks in the restive Helmand province.*

New START Inspections "Intrusive"

Inspection and verification of nuclear delivery platforms, particularly strategic bombers, would become "more intrusive in some ways" under the new Strategic Arms Reduction Treaty with Russia than under the old one, Rose Gottemoeller, assistant secretary of state for arms control said Nov. 8.

Under New START, "the verification regime for bombers is very intrusive and allows for objects inside the bomb bays to be checked with radiation detection equipment," stated Gottemoeller, previously the chief negotiator for New START. She spoke at an Arms Control Association event in Washington, D.C.

The new regime would bring the rigor of bomber inspections much closer to that of missile re-entry vehicles. Gottemoeller added that it would allow inspectors to confirm that "Russian bombers are not carrying nuclear objects," while offering Russians inspectors similar assurance regarding the US fleet.

Lightnings Over Japan?

Japan's Defense Ministry announced it will consider procurement of the F-35

strike fighter as part of its Fiscal 2012 budget request.

The F-35 would provide the Japan Air Self Defense Force with a fifth generation fighter in lieu of the F-22, which Japan wished to buy but which, by law, the US is prohibited from exporting.

Japan is reportedly seeking to acquire 40 aircraft, choosing from among the F/A-18 Super Hornet, F-15FX, and Eurofighter Typhoon.

Although Japan decided against additional procurement of the indigenously developed Mitsubishi F-2 (based on the F-16) as a stopgap to F-35 delays, the Defense Ministry has not ruled out upgrading JASDF's fleet of F-15Js in the interim, according to Japanese press reports.

JSTARS Unit Now an Associate

The unique E-8C JSTARS ground-surveillance unit at Robins AFB, Ga., has become an active associate organization.

The blended 116th Air Control Wing, combining active duty and Air National Guard personnel under a unified chain of command unique within the Air Force, has been replaced with an associate unit structure to make it more standard.

Under the new arrangement, the ANG 116th ACW becomes host unit, with active duty airmen of the newly established 461st ACW working side by side with Guardsmen to operate the E-8C.

In 2002, the Air Force designated the 116th ACW a blended unit, the first of its type. Since then, integration of active duty and reserve component units within USAF has been standardized under the association construct.

Despite the administrative changes, personnel distribution remains unchanged, according to USAF.

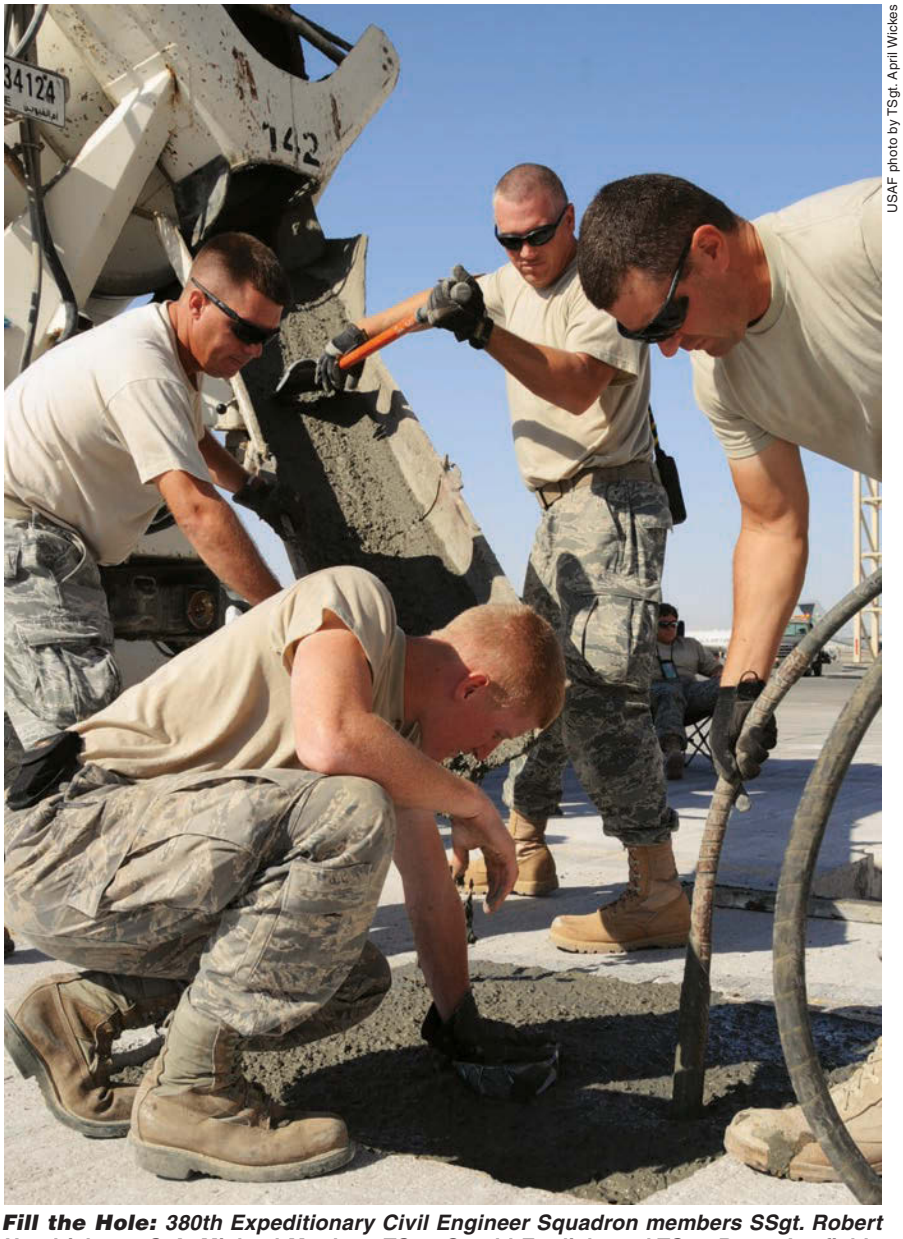
F-35 Lot Four Contract Let

The Defense Department awarded Lockheed Martin a $3.5 billion contract for 31 F-35 strike fighters and associated equipment Nov. 19. The contract was for Lot Four low rate initial production, and marks the first fixed-price-incentive fee arrangement for F-35 production, which requires the company to share the burden of any cost overruns.

The Pentagon and the company both have said the cost of Lot Four came in below expectations.

Lockheed Martin is slated to produce 10 Air Force F-35As, 16 Marine Corps F-35Bs, four Navy F-35Cs, and one British F-35B in Lot Four. Although the UK has recently decided to buy only the F-35C carrier-capable version and terminate its plans to buy the F-35B short takeoff and vertical landing model, it will take delivery of the STOVL model in Lot Four. The aircraft can still be used for operational test and evaluation because of the similarities between the two types, a company spokesman asserted.

The Netherlands also has an option to procure a single F-35A in Lot Four, for possible delivery in March 2013. The total contract value for LRIP four is $3.9 billion, including previously awarded funds for long-lead-time materials.



USAF photo by TSgt. April Wickes

Fill the Hole: *380th Expeditionary Civil Engineer Squadron members SSgt. Robert Hendrickson, SrA. Michael Moulton, TSgt. Gerald English, and TSgt. Bryan Layfield (l-r) pour concrete to build an aircraft tie down at a forward operating location in Southwest Asia. Military civil engineers have served in every major conflict since before World War I.*

World War II Airman Buried

The remains of AAF Capt. George W. Grismore, an airman missing in action since 1945, were identified and returned to his family.

Grismore was buried at sea with full military honors off the coast of Newport Beach, Calif., Nov. 17, following a memorial service in Salt Lake City, his hometown.

Grismore was one of six crewmen of a C-47 Skytrain lost on a mission to resupply guerilla troops in the Philippines on March 12, 1945.

Philippine National Police notified the US government in 1989 that the aircraft parts and human remains at the crash site were discovered. Forensic DNA testing of recovered remains in 2009 led to the identification of Grismore, who was 30 years old at the time of his death.

Prop Evaluated for Arctic C-130

The Air Force is evaluating a new eight-bladed propeller on a C-130H3 aircraft at Edwards AFB, Calif. The program is aimed at adding some power to C-130s that operate in and out of bases in Antarctica.

NATO Nuclear Deterrence and Missile Defense Roles

NATO has renewed its commitment to maintaining a "nuclear alliance," agreeing as well to develop a defensive shield to protect Europe from ballistic missile attack.

Following a Nov. 19 member summit, NATO issued a statement that as long as nuclear weapons remain in the arsenal of potential adversaries, "deterrence, based on an appropriate mix of nuclear and conventional capabilities, remains a core element of our overall strategy."

The 28 NATO members said, "NATO seeks its security at the lowest possible level of forces," stipulating that the alliance will continue to pursue arms control, "promoting disarmament." The agreement also committed European allies to "the broadest possible participation" in nuclear planning and "peacetime basing" of nuclear forces.

Faced with "real and growing" missile proliferation, identified as threatening the "Euro-Atlantic area," the allies committed for the first time to developing "capability to defend [their] populations and territories" from missile attack.

To that end, members will expand NATO's existing missile defense command, control, and communications capabilities beyond just protecting the alliances' deployed forces. They also will "actively seek cooperation" with Russia, according to the document, welcoming the US phased adaptive approach as a valuable national contribution to the alliance's architecture.

The concept document, adopted in Lisbon, Portugal, explicitly states that NATO regards no country as an adversary, but calls on Russia to discuss relocating tactical nuclear weapons "away from the territory of NATO members." It also highlights the threat posed by proliferation in "volatile regions." Members overcame Turkish objections by avoiding specific mention of the threat posed by Iran.

On a test aircraft, the new props have flown maximum-power takeoff, landing, and minimum-velocity handling tests with promising results.

The upgrade is specifically targeted at the New York Air National Guard's ski-equipped LC-130s, tasked with supporting US scientific research in Antarctica.

The propeller blades' scimitar shape simultaneously reduces drag while increasing performance, notably during takeoff and climb-out, potentially eliminating the need for the Jet-Assisted Takeoff system currently used on Arctic support missions.

The NP 2000 propeller is already fitted to the US Navy's carrier-based E-2 Hawkeye and C-2 Greyhound fleet, representing the next iteration beyond the C-130J's six-bladed design.

Cruisin': ***A USAF F-16, French Rafael, Brazilian AMX, a Chilean F-16, and A-37 from Uruguay (l-r) form up as part of Cruzeiro do Sul, a multinational combined exercise held in Brazil utilizing more than 80 aircraft and nearly 3,000 personnel. This year's event was the first time the US Air Force participated in the exercise.***

USAF photo by SMSgt. John Rohrer

The War on Terrorism

Operation Enduring Freedom—Afghanistan

Casualties

By Dec. 15, a total of 1,425 Americans had died in Operation Enduring Freedom. The total includes 1,423 troops and two Department of Defense civilians. Of these deaths, 1,105 were killed in action with the enemy while 320 died in noncombat incidents.

There have been 9,771 troops wounded in action during OEF.

Afghan Aircrew Trained in Rescue Signaling

Afghan aircrew received training for the first time Nov. 3 on how to use ground-to-air signaling equipment to alert help if their aircraft go down. It was part of broader survival skills being taught by NATO Air Training Command-Afghanistan advisors.

During the training, which took place at the Blackwater Training Range in Afghanistan, Afghans fired several types of signaling flares, learned how to effectively employ handheld mirrors, and fluorescent panels to attract the attention of aircraft, alerting rescuers as to the aircrew's position.

Though NATO has advised some of the crews for four to five years, airmen only received equipment such as survival vests, kits, and expendables "within the past seven months," said MSgt. Jeremy Raymond, advisor with the NATC-A's 438th Air Expeditionary Advisory Group.

Afghan aircrews currently receive no training in survival, evasion, resistance, and escape, heightening the importance of basic rescue enablement and crash preparedness.

Afghan Air Force Receives New Helos

Shindand AB, Afghanistan, has officially received its first two aircraft, a pair of Mi-17 helicopters.

From this humble beginning, the burgeoning Afghan Air Force plans to grow the Soviet-era base into the "crown jewel" of Afghan operations for helicopter and close air support training, with plans for 40 aircraft and more than 900 personnel by 2015.

To support this growth, $184 million is earmarked for infrastructure improvements through 2015.

"NATO will not be here forever, so everything we build, we are building to make sure Afghanistan has the best air force possible," explained Brig. Gen. David W. Allvin, commanding general of NATO Air Training Command-Afghanistan.

Initially, Afghan flight instructors will train at Shindand, so the AAF may move away from dependence on NATO to train aircrews.

JTACs Use New Simulator

The 6th Combat Training Squadron at Nellis AFB, Nev., has opened a state-of-the-art facility to train joint terminal attack controllers through simulated combat scenarios.

The facility provides JTAC trainees the opportunity to practice skills in a realistic environment, without the danger of live-fire exercises. This allows the JTACs to "demonstrate an ability to operate [with] live aircraft before they actually do it," according to 6th CTS training instructor TSgt. James Spreter.

Simulation ensures the JTACs will react instinctively in combat by preparing them "before they go in the field and have to deal with fatigue and weather," he said.

USAF Fills New Energy Post

Kevin T. Geiss has been named the deputy assistant secretary of the Air Force for energy, a new position meant to reinforce the service's commitment to energy efficiency.

Geiss will oversee the 11 staff members currently responsible for all Air Force energy matters at the Air Force's Energy Office, supporting Undersecretary Erin C. Conaton, the service's senior energy official.

He spent two years as the Army's program director for energy security and served as assistant director for national defense in the Office of the President. He has been a senior researcher at the Air Force Research Laboratory, Wright-Patterson AFB, Ohio.

USAF Takes Over Satellite

The Missile Defense Agency announced Nov. 8 the transfer of operational control of a small experimental satellite known as Space Tracking and Surveillance System Advanced Technology Risk Reduction to Air Force Space Command.

MDA placed the satellite into orbit in May 2009 to evaluate prototype missile tracking technology, and reported it a success. AFSPC will now use the satellite for space surveillance.

MDA also launched two larger STSS satellites in 2009. They will continue to track ballistic missiles tests in order to refine space-based missile tracking concepts.

C-12 Tests Missiles

The Air Force has been testing missiles carried by the C-12 aircraft.

Members of the 586th Flight Test Squadron at Holloman AFB, N.M., recently completed a series of missile tests using a C-12J regional airliner transport modified with a ventral pylon for carriage of external weapons. "This is a … unique test capability ... because you usually don't find missiles underneath a transport aircraft," said Capt. Reid Larson, the squadron's chief flight test engineer.

A Raytheon AGM-65E2/L Laser Maverick was recently carried on the platform. The aircraft doesn't launch weapons, but carries systems aloft for test purposes.

Squadron officials said the aircraft helps fill the Air Force's need for an affordable means of risk-reduction flight testing of the missiles before they are used by fighter aircraft. The total certification process clearing the unit's stretched C-12J for flight with under-fuselage strakes required three years.

F-35C Arrives at Pax River

The first F-35C version of the Joint Strike Fighter, configured for carrier operations, arrived at NAS Patuxent River, Md., for flight testing on Nov. 6, Lockheed Martin announced.

The C model has larger wings and tail surfaces than the Air Force version, with strengthened landing gear for catapult launch and recovery from large-deck aircraft carriers, as well as a Navy-style refueling probe.

While at Pax River, the aircraft designated CF-01 will undergo air-to-air refueling tests with the probe-and-drogue system and complete overall performance testing.

The aircraft joins several F-35B short takeoff and vertical landing test aircraft already at Pax. It flew to the facility directly from NAS JRB Fort Worth, Tex., adjacent to Lockheed Martin's F-35 production facility.

JASSM-ER Racks Up Successes

The Joint Air-to-Surface Standoff Missile-Extended Range performed well on recent test flights at White Sands Missile Range, N.M., according to Lockheed Martin.

Senior Staff Changes

RETIREMENTS: Gen. Stephen R. **Lorenz,** Maj. Gen. Marke F. **Gibson,** Maj. Gen. Mark T. **Matthews,** Maj. Gen. Richard E. **Perraut Jr.,** Maj. Gen. Polly A. **Peyer,** Maj. Gen. Kip L. **Self,** Maj. Gen. Robert P. **Steel,** Brig. Gen. David E. **Price.**

NOMINATIONS: To be ANG Major General: James M. **Holmes,** Michelle D. **Johnson,** Brett T. **Williams. To be ANG Brigadier General:** Wayne E. **Lee.**

CHANGES: Maj. Gen. Susan Y. **Desjardins,** from Dir., Strat. P&R & Prgms., AMC, Scott AFB, Ill., to Dir., Plans & Policy, STRATCOM, Offutt AFB, Neb. ... Brig. Gen. Sandra E. **Finan,** from IG, AFGSC, Barksdale AFB, La., to Principal Asst. Dep. Administrator for Mil. Application, Office of Defense Prgms., Natl. Nuclear Security Administration, Dept. of Energy, Washington, D.C. ... Maj. Gen. Craig A. **Franklin,** from Cmdr., 332nd AEW, ACC, JB Balad, Iraq, to Vice Dir., Jt. Staff, Pentagon ... Brig. Gen. Garrett **Harencak,** from Principal Asst. Dep. Administrator for Mil. Application, Office of Defense Prgms., Natl. Nuclear Security Administration, Dept. of Energy, Washington, D.C., to Cmdr., AF Nuclear Weapons Ctr., AFMC, Kirtland AFB, N.M. ... Brig. Gen. John W. **Raymond**, from Dir., P&P & Analyses, AFSPC, Peterson AFB, Colo., to Vice Cmdr., 5th AF, PACAF, Yokota AB, Japan ... Brig. Gen. Rowayne A. **Schatz Jr.,** from Dep. Dir., Global Ops., Jt. Staff, Pentagon, to Dir., Strat. P&R & Prgms., AMC, Scott AFB, Ill. ... Brig. Gen. John N. T. **Shanahan,** from Cmdr., 55th Wg., ACC, Offutt AFB, Neb., to Dep. Dir., Global Ops., Jt. Staff, Pentagon ... Brig. Gen. Everett H. **Thomas,** from Cmdr., AF Nuclear Weapons Ctr., AFMC, Kirtland AFB, N.M., to Vice Cmdr., AFGSC, Barksdale AFB, La. ... Maj. Gen. Suzanne M. **Vautrinot,** from Spec. Asst. to the Vice C/S, USAF, Pentagon, to Cmdr., 24th AF, AFSPC, Lackland AFB, Tex. ... Maj. Gen. (sel.) Brett T. **Williams,** from Dir., C4 Sys., PACOM, Camp H. M. Smith, Hawaii, to Dir., Ops., DCS, Ops., P&R, USAF, Pentagon.

COMMAND CHIEF MASTER SERGEANT CHANGE: William W. **Turner,** to Command Chief Master Sergeant, AFSOC, Hurlburt Field, Fla.

SENIOR EXECUTIVE CHANGES: George R. **Gagnon,** to Dir., Intl. Tng. & Eduation, AETC, Randolph AFB, Tex. ... John L. **Hudson,** to Dir., Natl. Museum of the USAF, AFMC, Wright-Patterson AFB, Ohio ... Maureen A. **Quinlan,** to Exec. Dir., AF Global Log. Supt. Ctr., AFMC, Scott AFB, Ill. ... Jeffrey R. **Shelton,** to Dep. Dir., Resource Integration, DCS, Log., Instl., & Mission Spt., USAF, Pentagon. ■

The missiles were launched by B-1B bombers at different altitudes during the tests; each missile effectively navigated to and destroyed its intended target, the company said. The tests demonstrated JASSM-ER's ability to adjust its flight time to strike time-critical targets.

Lockheed Martin claimed that JASSM-ER was successful in 10 of 11 developmental flight tests.

The Defense Acquisition Board was scheduled to review the JASSM-ER program in early December, deciding whether to advance to low-rate production.

While the Government Accountability Office in October called on the Defense Department to defer making a decision, Col. Steve Demers, the Air Force's JASSM program manager, stated in the company's release that he was "confident JASSM-ER is ready for production."

USAF photo by 1st Lt. Cammie Quinn

***Check Six:** Capt. Matt Hepp performs a preflight inspection on his F-16 before a mission over the Sea of Japan on Dec. 7 as part of Exercise Keen Sword 2011. Keen Sword is a bilateral training exercise designed to practice defending Japan against outside threats.*

AWACS Upgrading Begins

The first Air Force E-3 Sentry slated for upgrade to the Block 40/45 standard entered Oklahoma City Air Logistics Center at Tinker AFB, Okla., in mid-November.

"This modification replaces a mission computer system originally installed in the 1970s," said Maj. Brett Johnson, Block 40/45 production chief. Technicians at Tinker will install new equipment during the aircraft's programmed depot maintenance, with full modifications of the aircraft scheduled for completion in September.

The aircraft is the first of six AWACS due for the upgrade by 2014 under low rate initial production. USAF plans to upgrade the entire 33-aircraft E-3 fleet, returning them to full operational capability by 2020.

New computer equipment will improve information sharing, target tracking and identification, and integration of sensory inputs both on and off the aircraft.

Boeing is the Block 40/45 prime contractor.

USAF Debuts in Brazilian Exercise

More than 150 airmen, six F-16s, and one KC-135 tanker deployed to Brazil for Exercise CRUZEX V, Oct. 28 to Nov. 19, marking the first time USAF has participated in the multinational air exercise.

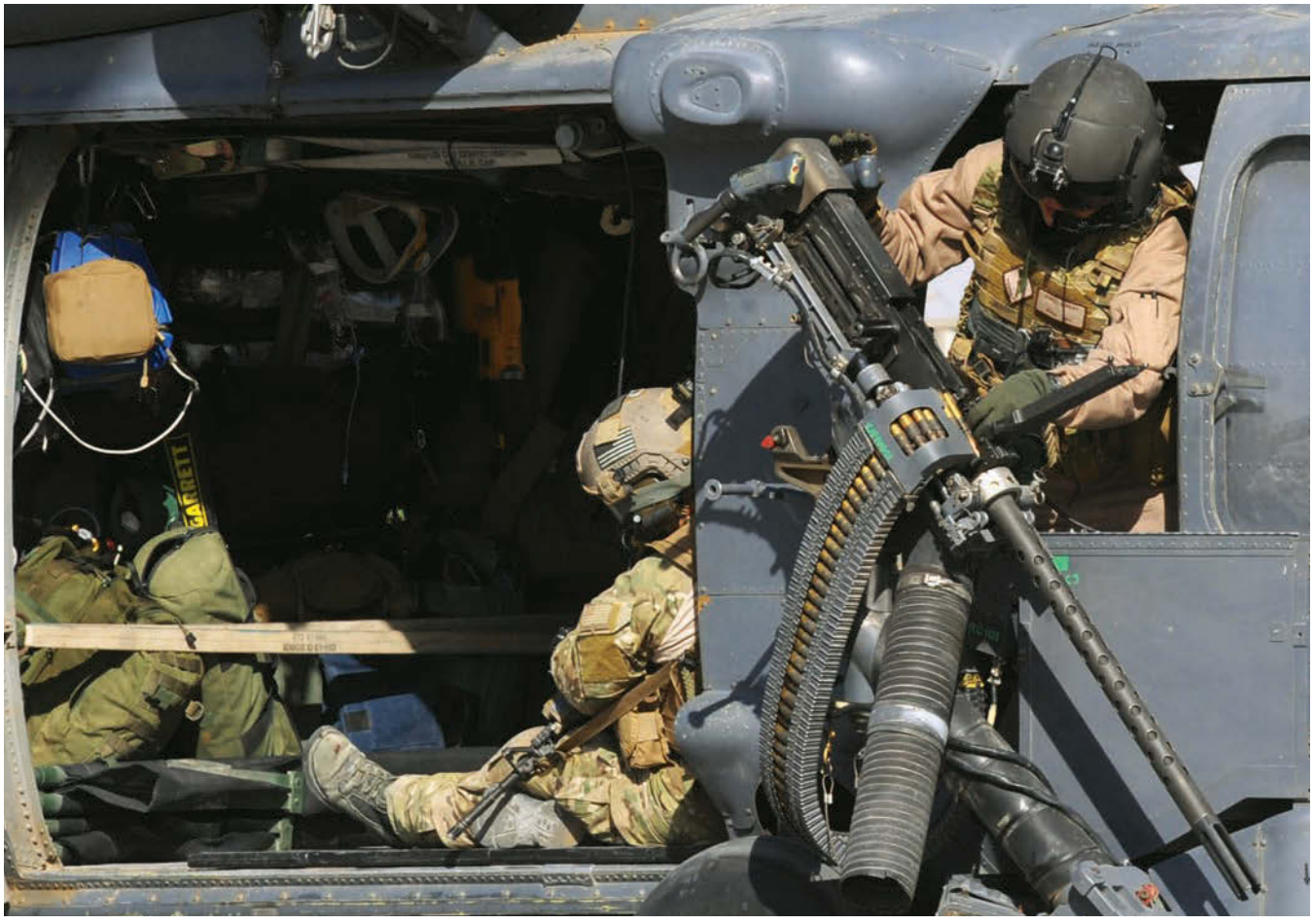
US airmen joined counterparts from Argentina, Brazil, Chile, France, and Uruguay, totaling 82 aircraft and nearly 3,000 personnel operating from Natal Air Base and Recife AB, Brazil.

The exercise is built around a simulated coalition air campaign, and US forces conducted "training as coalition members in a peacekeeping air campaign exercise" practicing "air-to-air, refueling, and planning operations," according to Col. Edward Kostelnik, director of operations for 12th Air Force (Air Forces Southern) Davis-Monthan AFB, Ariz.

Air Traffic Control Upgraded

RAF Lakenheath, England, has become the first US Air Force installation in US Air Forces in Europe to receive the new Digital Airport Surveillance Radar system for air traffic control.

Lakenheath also pioneered installation of Standard Terminal Automation



USAF photo by TSgt. Chad Chisholm

Check it Out: ***SSgt. Jewell Shirley, a flight engineer assigned to the 26th Expeditionary Rescue Squadron, checks out the readiness of a .50 caliber machine gun during an alert mission on an HH-60G Pave Hawk on Nov. 6 from Camp Bastion, Afghanistan. The 26th uses Pave Hawks to conduct combat search and rescue missions as well as for transporting injured servicemembers and Afghan civilians for medical treatment.***

Replacement System ATC consoles. Both systems became operational Nov. 18.

"This improvement is about safety and will make our ability to go to war safer and more reliable," said Col. John Quintas, commander of Lakenheath's 48th Fighter Wing.

DASR replaces the Generalized Proportional Navigation system previously used to track aircraft and weather conditions.

The STARS consoles supplant the Automated Radar Terminal Systems in Lakenheath's radar approach control facility. MSgt. Klane Pierce, 48th Operations Squadron assistant chief controller, said the new equipment allows the controllers to see "smaller aircraft and gliders that in the past may have not been detected."

B-2 Tops Global Strike Challenge

The 509th Bomb Wing at Whiteman AFB, Mo., took the Fairchild Trophy for top bomb wing in Global Strike Challenge, a competitive exercise that concluded Nov. 17 at Barksdale AFB, La. The 509th also won the Charlie Fire Team Trophy for best security forces in the competition.

The 90th Missile Wing at F. E. Warren AFB, Wyo., took the Blanchard Trophy for best ICBM wing.

Air Force Global Strike Command hosted the competition, reminiscent of the Strategic Air Command competitions held throughout the Cold War. Participating were its own six wings, as well as units from Air Combat Command, the Air National Guard, and Air Force Reserve Command.

The competition consisted of three parts: bombing and weapon loading; ICBM operations and maintenance; and security forces tactical operations. The competition stretched over seven months.

Kodiak Launches First Minotaur IV

The Air Force and industry partners successfully launched a series of scientific payloads into space from Kodiak Island, Alaska, aboard a Minotaur IV booster on Nov. 19.

The rocket carried seven small satellites with 16 total science experiments for the Air Force, NASA, several universities—including the US Air Force Academy—and other organizations.

Mission firsts included the inaugural Minotaur IV launch from Kodiak and the first use of a special propulsion system to deliver payloads onto two different orbits.

Among the satellites carried aloft was the Air Force Academy's FalconSAT-5, designed, built, and tested by Class of 2010 cadets.

FalconSAT-5 carries experiments to study Earth's ionosphere and its effect on radio frequency communications.

Exercise Notes 50th Anniversary

Exercise Keen Sword, a simulated defense of Japan, was held between US and Japanese forces Dec. 3-10, with USAF units from air bases in Japan and Andersen AFB, Guam, deploying to Japan Air Self Defense Force base Komatsu.

Combined training included scenarios in air and missile defense, ground support, maritime interdiction, search and rescue, and force protection.

Keen Sword's goal was to provide a realistic training environment. Enhancing bilateral interoperability allows the Japan Self Defense Force and US forces "to respond to a wide range of situations," according to Maj. William Vause, exercise planning chief.

Keen Sword has taken place since 1986. Nearly 10,500 US service personnel from the Air Force, Navy, Marine Corps, and Army joined 34,000 Japanese personnel, under Japanese coordination.

This year's week-long exercise marks the 50th year since the US and Japan signed the joint Treaty of Mutual Cooperation and Security.

USAF Considers RPA Shift

Air Combat Command is considering shifting some remotely piloted aircraft operations away from Creech AFB, Nev., where controllers currently operate the lion's share of RPA missions over Afghanistan and Iraq.

Creech is "getting saturated, so we need to break out the capacity," stated ACC Commander Gen. William M. Fraser III at an Air Force Association-sponsored Breakfast Series in Arlington, Va., Nov. 9.

Creech is the Air Force's major hub for operating RPAs such as the MQ-1 Predators and MQ-9 Reapers on combat air patrol, via satellite linkages, to provide invaluable intelligence-surveillance-reconnaissance and attack capability in theater.

Fraser said the Air Force was well on the way to standing up the required 50 remotely piloted combat air patrols by this year, with an eventual goal of 65 orbits, though he did not reveal which sites are under consideration to absorb some of the load from Creech. ■

NORAD's Importance Is Growing

With Arctic sea-lanes becoming increasingly navigable to commercial and military traffic, US and Canadian cooperation through NORAD is growing in importance, said Canada's Chief of Air Staff Lt. Gen. Andre Deschamps.

"Awareness of sovereignty in the Arctic is certainly high in our government and they have great faith in NORAD," he said in an interview.

Formally established by the US and Canada in 1958, NORAD remains "the primary tool for that binational defense," said Deschamps.

"As we see things trending right now, I see that growing and not diminishing," he said. For example, he highlighted the recent addition of "maritime awareness" to NORAD's continuing mandate.

"The next horizon for NORAD," he said, "is to look at DEW line replacement in the next decade," given that today's Distant Early Warning network of radars—now dubbed the North Warning System—dates to the 1980s.

"There are different options," including any combination of satellites and high-altitude aerostats, combined with the current ground-based radar chain, explained Deschamps. He warned that although the notional timeline for fielding the replacement may "seem like a far horizon ... for this kind of change in technology, it's almost tomorrow."

News Notes

■ Call Field Aviation Museum opened at Kickapoo Airport in Wichita Falls, Tex., chronicling military aviation training that took place at the field during World War I. Among highlights is a Curtiss JN4-D Jenny, one of only five remaining airworthy examples.

■ Fisher House for Families of the Fallen opened at Dover AFB, Del., Nov. 10. Air Force Secretary Michael B. Donley and Chief of Staff Gen. Norton A. Schwartz were on hand to dedicate the 8,462 square-foot facility, which is the first to provide short-term lodging and comfort to families awaiting arrival at Dover of loved ones fallen in combat.

■ The Air Force's first two F-35A low rate production aircraft, initially slated to join F-35 training at Eglin AFB, Fla., will instead join the test fleet at Edwards AFB, Calif. They will likely undertake Block 1 mission avionics tests next summer. Following testing, the aircraft may yet join the training fleet slated for Eglin.

■ Airmen at Little Rock AFB, Ark., have completed restoration of a C-47 Skytrain, repainted in its original D-Day colors. The aircraft was dedicated for display at the base's Heritage Park on Nov. 10. Seven squadrons now at Little Rock flew C-47s.

■ B-52s from the 69th Bomb Squadron at Minot AFB, N.D., the Air Force's newest operational B-52 squadron, deployed for the first time mid-November, replacing the 23rd BS at Andersen AFB, Guam. The unit was reactivated in 2009.

■ The Air Force launched its newest enlisted cyber career field, Air Force Specialty Code 1B4X1 on Nov. 1, to retrain airmen for network-based operations. The first class will begin at Keesler AFB, Miss., this month, drawing competitively from intelligence and cyberspace backgrounds.

■ Stewart Air National Guard Base in upstate New York is the Air Force's preferred Air Guard basing location for eight C-17 transports, pending environmental studies, officials announced Nov. 16. If plans move ahead, Stewart's C-5s would be retired under Air Force plans to divest 22 older C-5As.

■ Britain's Royal Air Force took delivery of its seventh and final C-17 transport from Boeing Nov. 16. at Long Beach, Calif. The aircraft will be based at RAF Brize Norton, England. RAF Globemasters have logged 60,000 hours to date. The C-17 is Boeing's 224th delivered worldwide.

■ The Ugandan Air Force Chief, Maj. Gen. Jim Owoyesigire, visited 17th Air Force (Air Forces Africa) at Ramstein AB, Germany, becoming the first African Air Chief to do so. AFAFRICA is actively assisting Uganda in developing airlift capacity to contribute to peacekeeping activities such as the African Union Mission to Somalia.

■ C-130s from the 36th Wing at Andersen AFB, Guam, air-dropped 60 palletized containers to roughly 50 remote Pacific islands and atolls Dec. 13-17, during Operation Christmas Drop. The airdrop is the only connection many inhabitants have to the wider world, depending on the annual operation for essential supplies and provisions. ■

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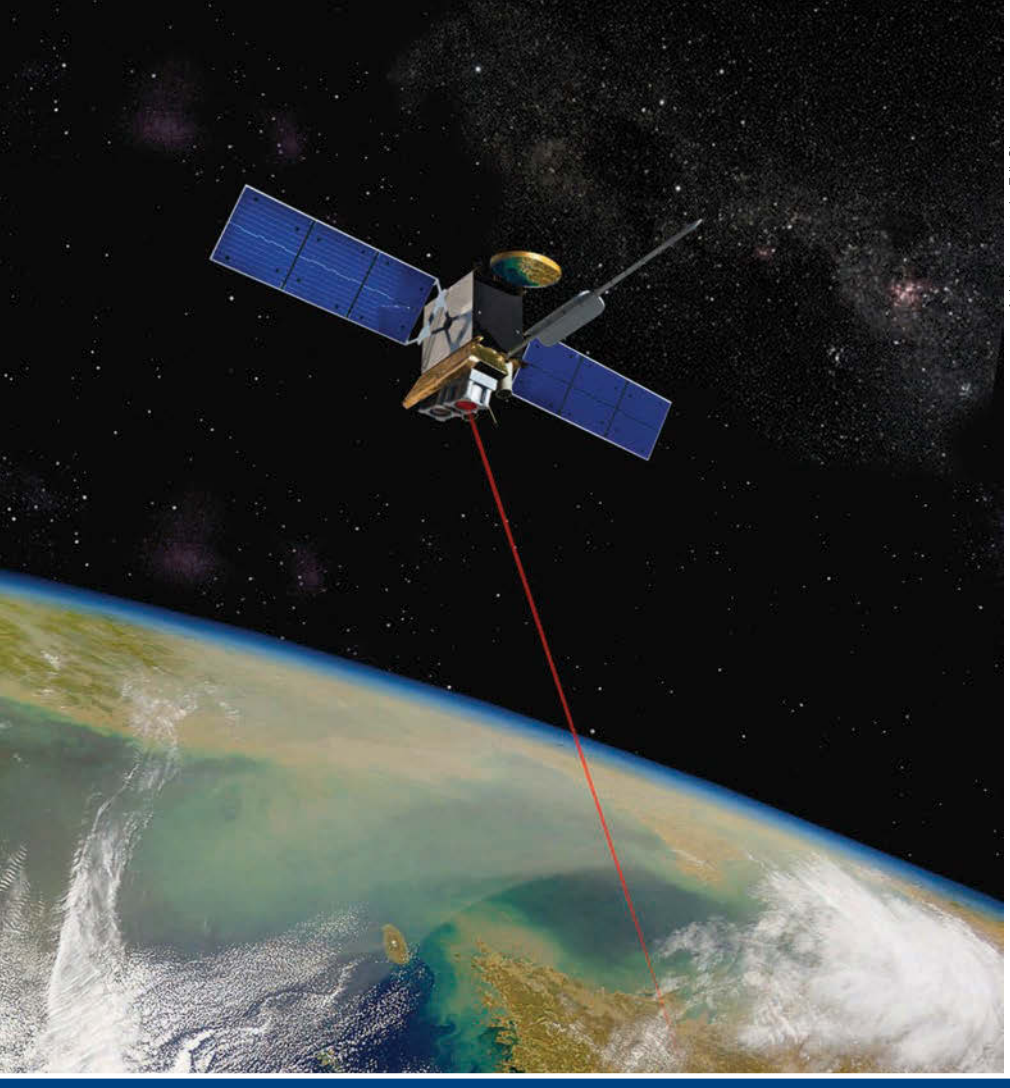


Artist's concepts by Erik Simonsen

Top officials at AFA's LA symposium lauded a renewed focus on military space capabilities and organizations.

Cooperation and Collaboration in Space

By Amy McCullough, Senior Editor

Although more than 60 nations or consortia now operate in space, the United States is significantly more dependent on space-based capabilities than any of its likely adversaries, Air Force Chief of Staff Gen. Norton A. Schwartz said in November at the Air Force Association's Global Warfare Symposium in Los Angeles.

National security space assets have recently undergone perhaps their most significant recapitalization in history. What some refer to as a decade-long "development binge" has led to a host of new technologies about to come online, such as enhanced signals on the Global Positioning System constellation to make it more resistant to jamming and to provide enhanced commercial aviation safety.

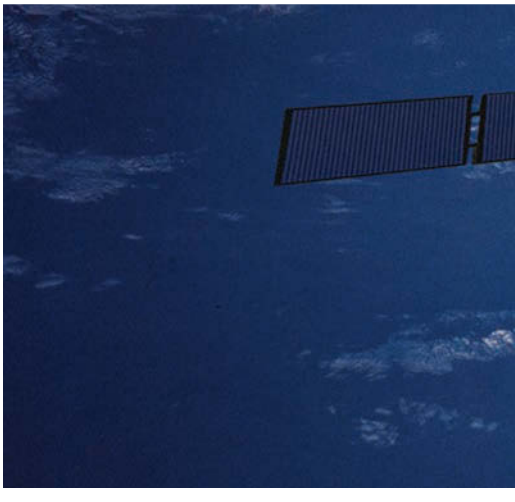
The Air Force certified the first GPS Block IIF satellite earlier this year. It's also in the process of moving three GPS satellites into new orbital slots, to increase accuracy for troops fighting in Afghanistan's mountainous terrain. Civilian users worldwide will still benefit from the new GPS capabilities.

New Advanced Extremely High Frequency communications satellites, meanwhile, will provide 10 times the capability of the systems they are replacing. Although AEHF-1 suffered a setback in August when its liquid apogee engine failed, the satellite now is expected to arrive at its on-orbit test slot in August. The engine failure forced officials to execute an alternative orbital plan to get the satellite to its proper operational location, but they are confident the program is back on track.

The Air Force also is within a year of launching the first Space Based Infrared System geosynchronous satellite, known as SBIRS GEO-1. And five more national security satellites are set to launch in the next 15 months.

All of those advancements in space technology have given the US military

Left: In an artist's conception, a laser on Earth paints an enemy satellite. Below right: An artist's conception of the TacSat in orbit.



unprecedented advantages on the battlefield, but unprotected satellites also leave the country's national security capability more vulnerable to attack.

Space is a domain that was unchallenged a few decades ago, but today officials have little time to revel in their accomplishments. Instead, they must keep a keen eye on the future as they look to shave costs while striving to maintain the country's technological advantage.

"What might be a relatively minor disruption for a less space-dependent adversary could be a consequential setback for our nation," said Schwartz. "As technology continues to effectively lower the barrier to entry, and enable more actors in this vital and increasingly competitive domain, both the capability and the vulnerability gaps might narrow. But for the foreseeable future, we will face the possibility of cunning or aggressive acts by adversaries to leverage this current reliance, and exploit our potential loss of wide-ranging capabilities."

USAF photo by SSgt. Sarah Beasley

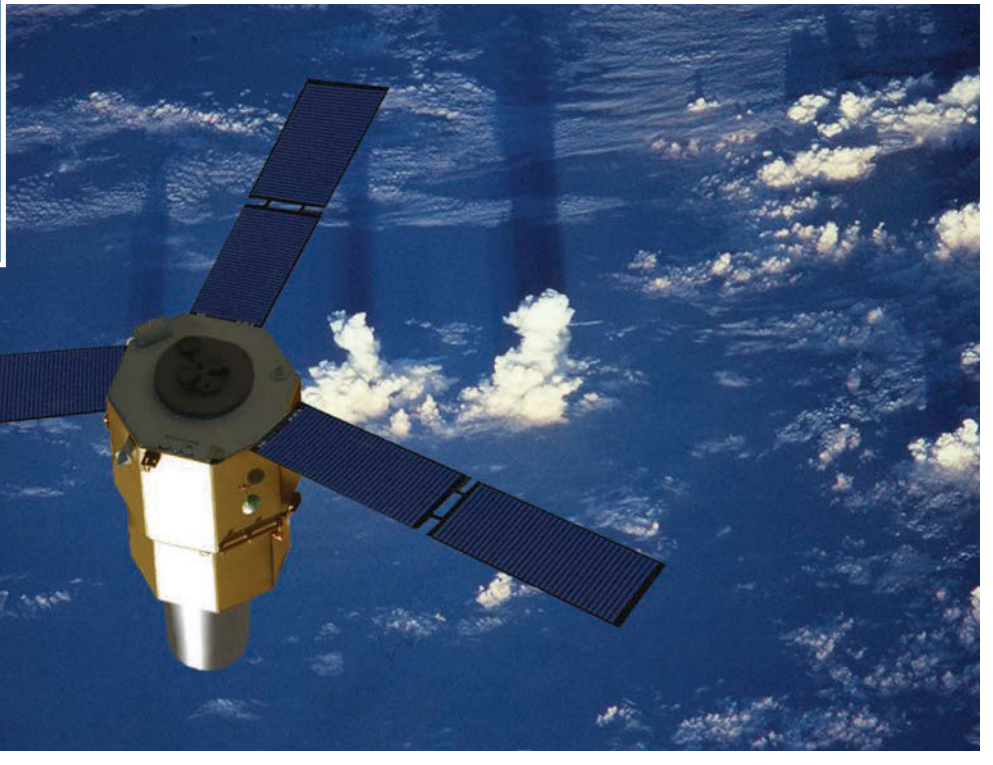
USAF Chief of Staff Gen. Norton Schwartz (r) watches 1st Lt. Kenneth Bowman (seated) and 2nd Lt. Neil Bockus work with the Ballistic Missile Early Warning System at Thule AB, Greenland. Both airmen are with the 12th Space Warning Squadron, which maintains, operates, and secures the BMEWS.

Daunting Tasks

The ongoing fiscal crisis does not help.

Future defense budgets are unclear as high unemployment rates, a trillion dollar deficit, an aging population, large federal entitlement programs, and the prospect of only a mild economic recovery threaten to diminish purchasing power despite demand for ever more sophisticated military capabilities.

The Congressional Budget Office estimates that the interest payments alone on the national debt in 2020 will nearly equal what the Pentagon spends today for defense. Defense Secretary Robert M. Gates has urged officials to rein in costs and has directed the Defense Department to find $100 billion in efficiencies from Fiscal 2012 to 2016, including $28 billion from the Air Force.



Despite the doom and gloom fiscal forecasts, officials say space will remain a top priority. In fact, three of the Air Force's top eight investments in terms of pure dollars are space programs. The Space Based Infrared System, GPS, and Evolved Expendable Launch Vehicle program have joined the KC-X, F-35 Joint Strike Fighter, F-22, and MQ-1 Predators/MQ-9 Reapers as top Air Force acquisition priorities, Schwartz said.

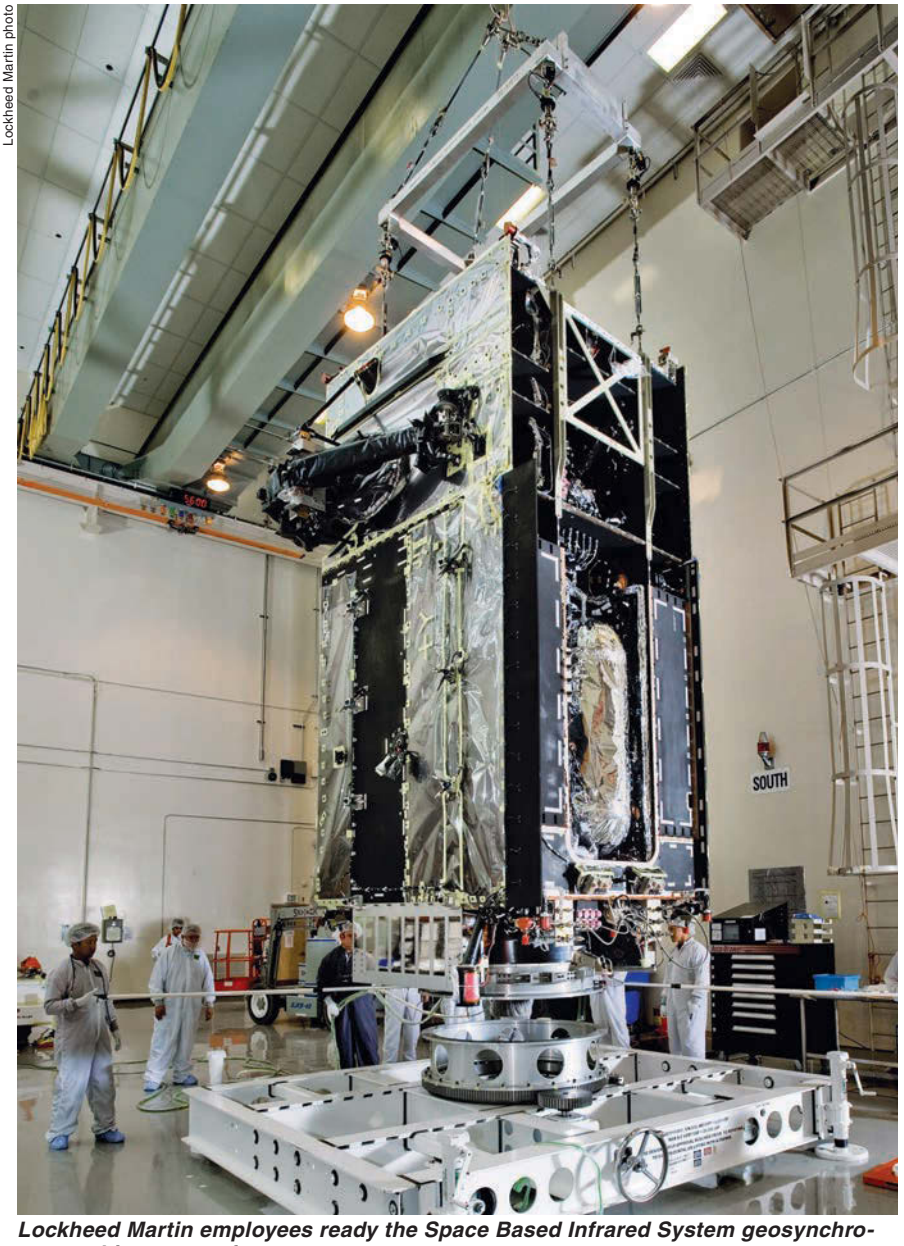
The effort to simultaneously upgrade nearly all of the service's mission areas is yet another "daunting task" that will no doubt prove even more challenging in the fiscally austere environment, said Air Force Undersecretary Erin C. Conaton, who serves as the Air Force's lead for space policy.

For example, USAF's fleet of remotely piloted aircraft was expected to reach one million combat hours in December. And the service is on track to hit 50 combat air patrols, up from 45 today, by the end of Fiscal 2011, Air Force Secretary Michael B. Donley said at the symposium. The strenuous operational tempo for RPAs no doubt will lead to a need for even more space-supplied bandwidth.

Although joint interest can help ease the financial burden of new space programs, many of those programs also face technical, cost, and schedule challenges, said Donley.

"So to support this work, we have also made achieving acquisition excel-

Lockheed Martin photo



Lockheed Martin employees ready the Space Based Infrared System geosynchronous orbit spacecraft.

lence a top priority—this will be even more critical in the months and years ahead, as we fight to retain technological advantage, adapt to rapid changes, and work to do this acquisition work within a strategically relevant time frame and tight budgets," he said.

Beyond the formalized efficiencies program, the Air Force has other ideas to deliver more efficiency and space-related opportunity. The EELV program, which has a 100 percent launch success rate, has greatly improved US access to space, but its reliability does not outweigh the need to tackle affordability, Conaton said.

Air Force Space Command boss Gen. C. Robert Kehler said the command intends to keep "multiple contenders" in individual launch spots in an effort to keep program delays from holding back already busy launch schedules. "Launch opportunities will not go by the wayside if the satellite is not ready. We will set the satellite aside and go on to the next one," Kehler said. "The days of playing schedule roulette are over."

The plan will not only improve the command's ability to get to orbit, it should also save a significant amount of money.

Schwartz commended such efforts to capitalize on existing capabilities, but said it's also critical to take advantage of commercial aspects of space.

"As we move forward, fiscal constraints will affect our ability to meet our challenges in space. We will require greater innovation in the design, testing, evaluation, and fielding of payloads and spacecraft alike," he said. "Innovation can be the linchpin. As it pertains to space, innovation can engender increased versatility in the form of satellite buses that can accommodate multiple payloads, payloads that can be integrated on board different satellite buses, and spacecraft that can be launched on different spacelift vehicles."

The Recommendations

But Bran Ferren, co-chairman of Applied Minds Inc. and a member of numerous defense and national security advisory boards, said the Air Force is thus far failing in this effort. Ferren said USAF needs to invest in "big, bold ideas" attuned to the out-of-the-box thinking that enabled America to put a man on the moon.

"While I applaud the efforts to gain efficiency, ... it's necessary, but completely inefficient, to give this country what it needs for its future," Ferren said, adding that the path to efficiencies could ultimately prove destructive. Ferren noted that the US completed the Apollo, Gemini, and Mercury programs in eight years. "Now, if we began a proposal and got a significant bid on it in eight years, we pat ourselves on the back as if we did something great. I think it's ridiculous, and we are becoming obsolete in the technology arenas of space."

He suggested taking a small portion of the Air Force's space budget and allocating it to extremely high-risk programs that potentially could reap big rewards. He said the service should then set aside an even smaller portion for programs that will excite the next generation of airmen in the fields of math and science.

AFSPC is looking to do just that. Kehler said the command recently "took a hard look at the function of the space development center" and adjusted its priorities, setting aside "a little bit more money in the way of acquisition, so that we are not losing this edge."

Donley recognized the need for an internal review of the Air Force's space structure in 2009 as the service worked to shape its portion of the nation's long-term space strategy through the Space Posture Review and the Quadrennial Defense Review. Once all the changes are put in place, it will be the first time in eight years the space governance structure is reorganized.

The Space Management Review was intended to figure out how Air Force space acquisition could become more

efficient and less confusing for all parties involved.

At the time, there were five separate offices responsible for space—all reporting to the undersecretary. And space acquisition programs were separated from all other Air Force acquisition programs.

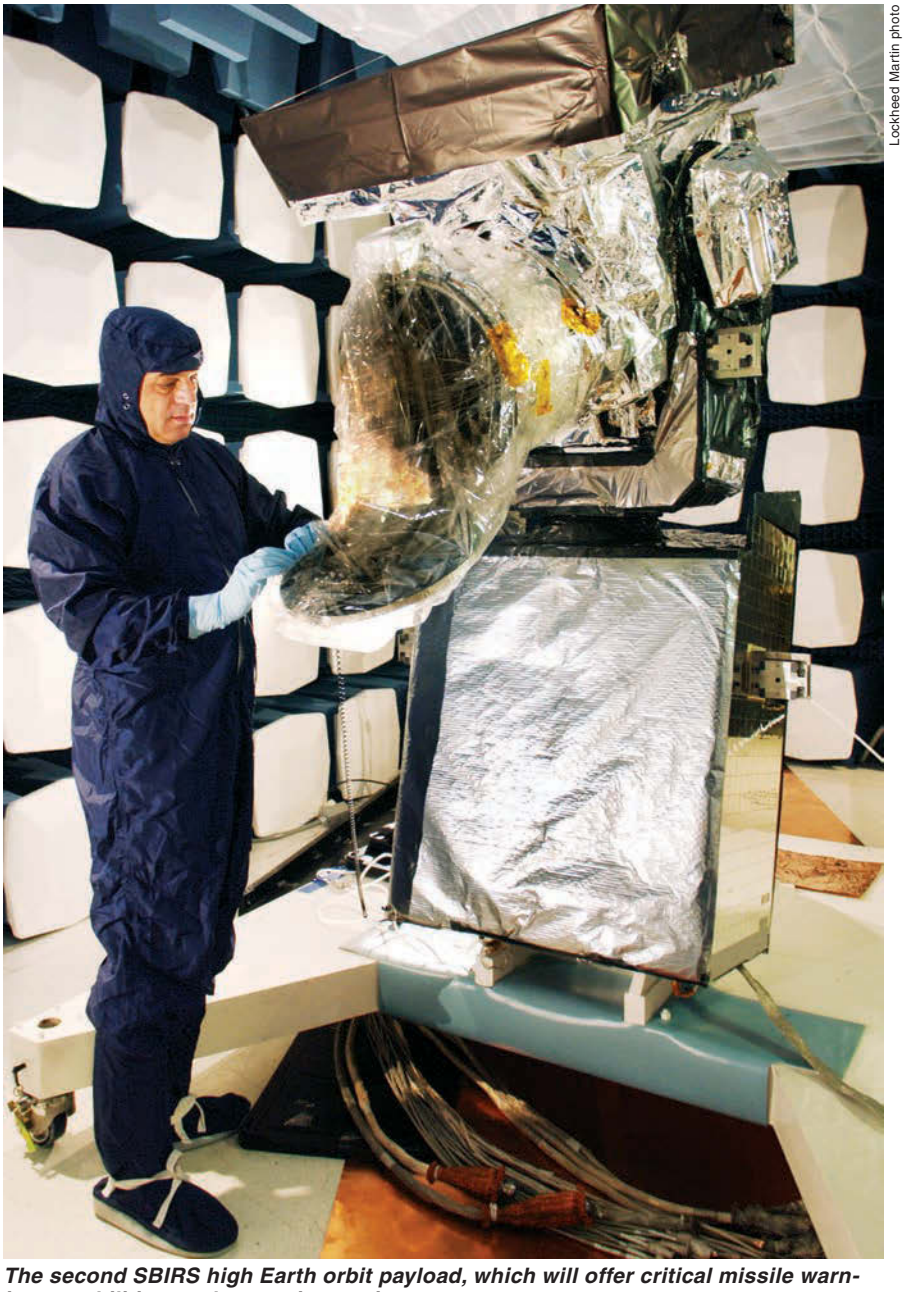
Of the nine recommendations that came out of the review, the biggest change dealt with streamlining that process, said Conaton. David M. Van Buren, serving as the acting assistant secretary of the Air Force for acquisition, took on an additional role overseeing the service's space acquisition programs as well. The five separate space acquisition offices were consolidated into one, designated SAF/AQS, now led by Maj. Gen. John E. Hyten, Air Force director of space acquisition.

The review also confirmed the role of undersecretary of the Air Force as the service's chief space policy and strategy boss. Conaton is charged with overseeing the planning, policy, strategy, international relations, and space interagency relations. She coordinates those functions across the Air Force and serves as the primary interface to the Office of the Secretary of Defense for space matters.

In addition, officials created an Air Force Space Board, co-chaired by Conaton and Gen. Carrol H. Chandler, vice chief of staff. The board met for the first time in November, and Conaton said it "is clearly going to be a great asset as the Air Force considers a wide range of decisions, from international partnerships, ... to operations, to our acquisition programs."

In addition to the internal realignment, William J. Lynn III, deputy secretary of defense, "recently made a series of decisions aimed at better positioning DOD to implement the policies and tasks outlined in the [National Space Policy] and soon-to-be-completed National Security Space Strategy," said Donley.

They include redesignating the Air Force Secretary as the executive agent for space and establishing the jointly manned space office under the Secretary of the Air Force, to replace the current National Security Space Office. As the EA for space, Donley is charged with integrating and assessing DOD's overall space program, overseeing long-term space planning and architecture development, and facilitating increased space cooperation with the Intelligence Community.



Lockheed Martin photo

The second SBIRS high Earth orbit payload, which will offer critical missile warning capabilities, undergoes inspection.

But acquisition success can't be achieved without help from industry and allied partners.

"Space has been described … as increasingly congested, contested, and competitive. I would offer that increased cooperation and collaboration is a solid beginning to address this trend," said Schwartz.

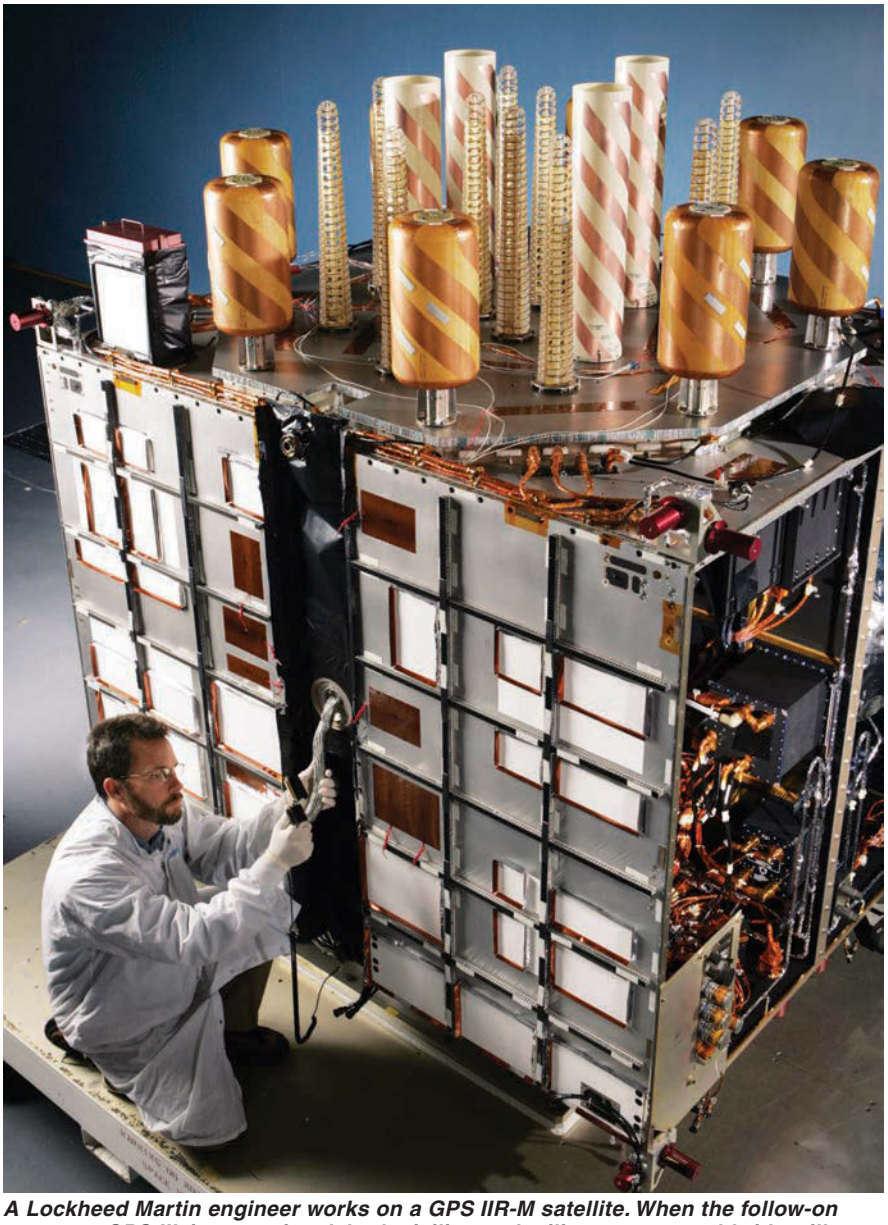
A Code of Conduct

The National Space Policy calls for expanding global and interagency cooperation to broaden the benefits of space. To that end, the Air Force, NASA, and National Reconnaissance Office recently signed a letter of intent, committing all three organizations to "closer coordination in the acquisition of launch vehicles, liquid fueled engines for boosters and upper stages, and development of launch bases and ranges, in ways that will help us share costs and address common challenges associated with the space industrial base," said Donley.

Gates and Australian Minister of Defense Stephen Smith also signed a statement of principles in November regarding space situational awareness. And the European Union is working to develop a "code of conduct" for space, which Donley said "holds promise for a more cooperative and transparent domain" in the future.

"On the global technology front, rapid advancement in communication ... has spread knowledge around the world,

Lockheed Martin photo



A Lockheed Martin engineer works on a GPS IIR-M satellite. When the follow-on program, GPS III, is operational, both civilian and military users worldwide will benefit from new capabilities.

leveling competition and causing us, the United States, to work harder to maintain US advantages, making us more interdependent with international partners," he added.

The fiscal environment also will make partnerships at home between the government and industry more important than ever. If the acquisition overhaul is to be successful, it will require both the government and industry to readjust their mindsets and figure out a way to do more without spending more—and possibly while spending less.

The renewed emphasis on affordability will require stability in both funding and requirements, plus predictability in buying practices, said Joanne M. Maguire, executive vice president of Lockheed Martin Space Systems, during an industry panel conducted at the Los Angeles symposium.

"All of us, government and industry, need to become much more disciplined in saying no to scope creep," Maguire said, adding that progress already has been made in attacking "requirements creep." She cited GPS III as the perfect example, saying so far there only have been two requirements changes since the contract was awarded—and both were to do away with requirements deemed unnecessary. The ability to keep requirements from ballooning out of control has enabled Lockheed to take the program to critical design review two months early and proceed on to the budgeting process. GPS III, she said, "is showing all signs of being a very successful development program."

However, to keep that kind of momentum going, government and industry both will have to resist the urge to add "just a little bit more testing" or to "ratchet up the specs" on certain parts for even more mission assurance, Maguire said.

David W. Thompson, chairman and chief executive officer of Orbital Sciences Corp., echoed Gates' philosophy that the 75 percent solution is often the smartest approach. Typically the "last 10 percent of performance in defense generates about one-third of its cost and about two-thirds of its problems," Thompson said, "so if we can architect our future systems to be perfectly fine at about 80 [percent] to 90 percent of the level that technology might allow, I think we could be better off."

Multiple satellite buys are another option. Maguire said the Air Force is giving "serious consideration" to this idea, but at a billion dollars a copy, purchasing three satellites in one budget cycle often is not possible. In an effort to still reap the benefits of multiple buys, the Air Force is considering whether it could incrementally fund such purchases—an idea Maguire wholeheartedly supports. Once again, funding stability is necessary if the service is to see the desired savings of multiple buys.

"I think the benefits are absolutely there, and we should vigorously pursue them, ... [but] it will take real discipline on the part of the government to ensure that the funding flows in a timely fashion, or you could end up, potentially, at an even higher cost than if you bought them one at a time," Maguire said.

As the Air Force continues to address the challenges and opportunities in the space arena, Donley said the one constant will be change. He cited ongoing leadership changes, changes in funding levels, changes to the governance structure, and changes to space acquisition as prime examples.

"However, change in these areas presents the Air Force and the nation with opportunities … to strengthen existing partnerships and enter into new ones; opportunities to increase flexibility and resiliency in space operations; and ultimately, opportunities to create more transparency and confidence in collaboration, which may lead to a safer and more stable world in the future. While these are not easy undertakings, they are necessary, all the same," he said. ■

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The Air Force has big plans for its legacy bombers.

On the edge of the tarmac at Barksdale AFB, La., on an overcast November morning, Capt. Jonathan Ard pointed out the numbers just to the side of the nose art of a B-52H nicknamed *Deuces Wild.* The -0022 indicated the Air Force placed its order for the bomber in 1960, the year John F. Kennedy was elected President.

Nearly 50 years old, the B-52s at Barksdale's 2nd Bomb Wing are remarkably resilient, capable of flying missions ranging from close air support to dropping nuclear bombs. The bomber can drop or launch the widest array of weapons in the US air inventory, wing officials point out, one of the many reasons the iconic bomber remains on duty for the foreseeable future.

"We are a 'full doc' aircraft, which means we are employed in a range of nuclear and conventional missions," said Ard, a veteran electronic warfare officer in the B-52 and instructor with Barksdale's 11th Bomb Squadron. "We are obviously focusing on conventional missions at the moment, but we have the ability and the expertise to deploy in the nuclear mission," Ard said. "We just have to maintain it."

The B-52's current state is representative of USAF's overall bomber fleet. The Air Force's venerable B-52s, B-2 stealth bombers, and conventional-only B-1Bs have all performed a variety of missions since coming into the inventory. And all three are expected to continue flying for decades to come.

To maintain these capabilities, USAF will invest a great deal of time and money to modernize the legacy bomber fleet. Improvements include radar programs, command and control tools, and software upgrades for both the B-52 and B-2.

Air Force Global Strike Command boss Lt. Gen. Frank G. Klotz believes the Air Force's newly activated major command must now move forward in three activity areas: developing human capital, solidifying doctrinal guidance for its forces, and securing resources to modernize USAF's nuclear systems for the long term.

In the current Future Years Defense Program, the Air Force will see a "significant amount" of investment in its nuclear-capable platforms, Klotz said at the Air Force Association's Global Warfare Symposium in Los Angeles in November. Per Presidential direction, the US will invest more than $100 billion over the next decade to modernize and sustain the nation's nuclear triad. About $40.5 billion of this total is destined for investment in AFGSC's fleet of nuclear-capable bombers and intercontinental ballistic missiles, he added.

USAF would like to allocate some of those funds to upgrade and modernize components in the legacy bomber fleet that directly affect the nuclear mission. On the wish list are a new 1760 data bus for the bomb bays of the B-52H fleet (to expand the number and types of weapons the BUFF could hold), modernized radar (to improve ground and aerial surveillance capabilities and

The B-52 bomber can deliver the widest variety of weapons—conventional or nuclear—in the Air Force inventory. Along with the B-2 and B-1, it will remain in service for decades to come.

ued Bombers

By Marc V. Schanz, Senior Editor

aid in identifying targets at long range), and additional communications tools.

New radars could assist with low-level flight patterns and reduce maintenance costs, Klotz said, as the fleet's current APQ-166 radars are facing rolling obsolescence issues. USAF plans a radar replacement program for the B-52 by 2013.

The Combat Network Communications Technology (CONECT) upgrade is another multiyear upgrade under way for the B-52 fleet, AFGSC officials noted. It will improve connectivity with other Air Force communications networks and platforms. BUFFs will be able to receive mission data in flight and retarget weapons.

The CONECT program is a big step forward, said Maj. Gen. Floyd L. Carpenter, commander of 8th Air Force, but AFGSC wants to emphasize parallel development of command and control tools for the B-52 and B-2 fleets. This would leverage existing communications systems and help the two very different aircraft share information ranging from tactical targeting pod data to secure communications in the nuclear role.

"Any future capability has got to be a data-gathering and -sharing platform," Carpenter added, especially as threats such as anti-access and area-denial weapons proliferate. "In our bombers right now, data links are an issue we need to work on. … If you're not a sharing platform, your utility will be limited."

Personnel Guidance

The Air Force announced an $11.9 billion modernization contract in September for the B-52 fleet. Spread out over the next eight years, and based on estimates from current activities and projections for future modernization, the contract will pay Boeing for efforts such as the Evolutionary Data Link, extremely high frequency communications development, and other programs to extend the B-52's life.

The B-2 is also undergoing extensive modernization.

"It's very hard to convince people that the B-2 is not a new airplane," said Maj. Gen. William A. Chambers, head of strategic deterrence and nuclear integration on the Air Staff, during a speech at an AFGSC symposium in Shreveport, La., in November. The B-2 is packed with 1980s-era network gear and software and needs a new "digital backbone," he noted. The stealth bombers need to carry some of the most advanced weapons in USAF's arsenal, such as the Massive Ordnance Penetrator conventional weapon now in operational testing.

Don't make the mistake of thinking that nuclear bomber and missile advocates are fixated on technology, however. Personnel guidance is particularly important in the new command. Klotz said units came to Strike Command from other commands with different practices and priorities.

The integration process is not merely a "cut and paste" effort, as AFGSC has issued more than 200 mission guidance documents since August 2009—particu-

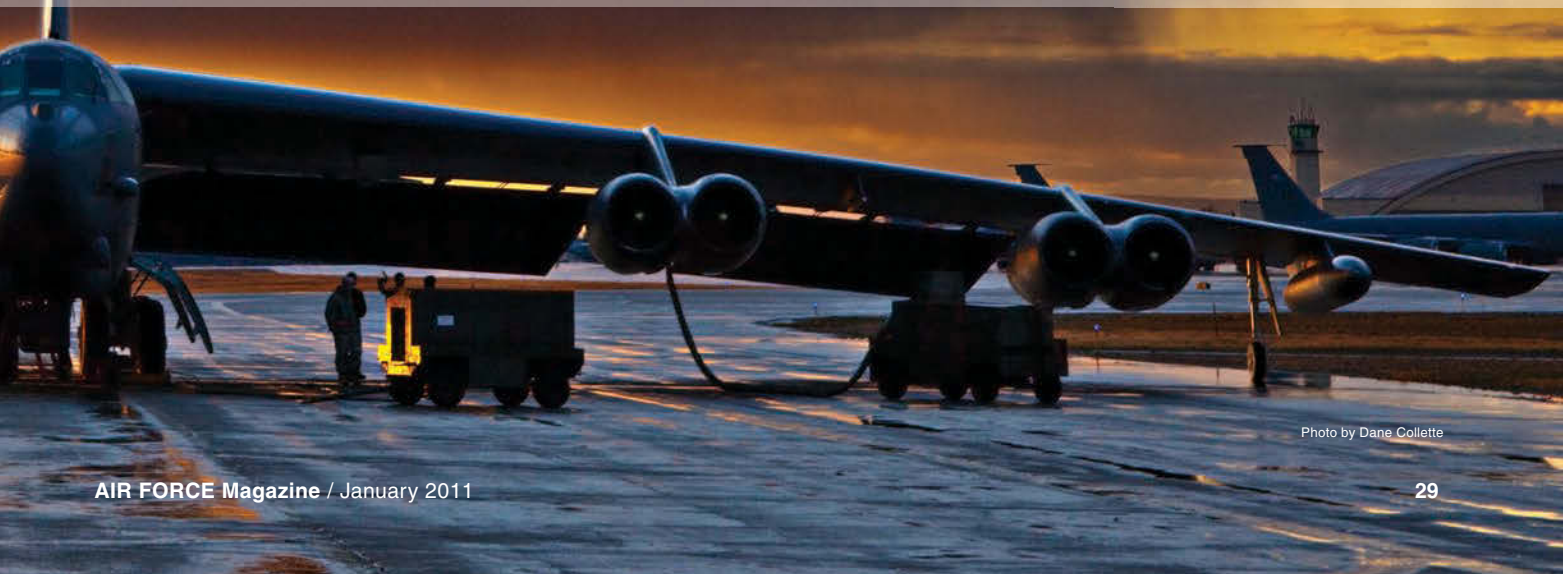
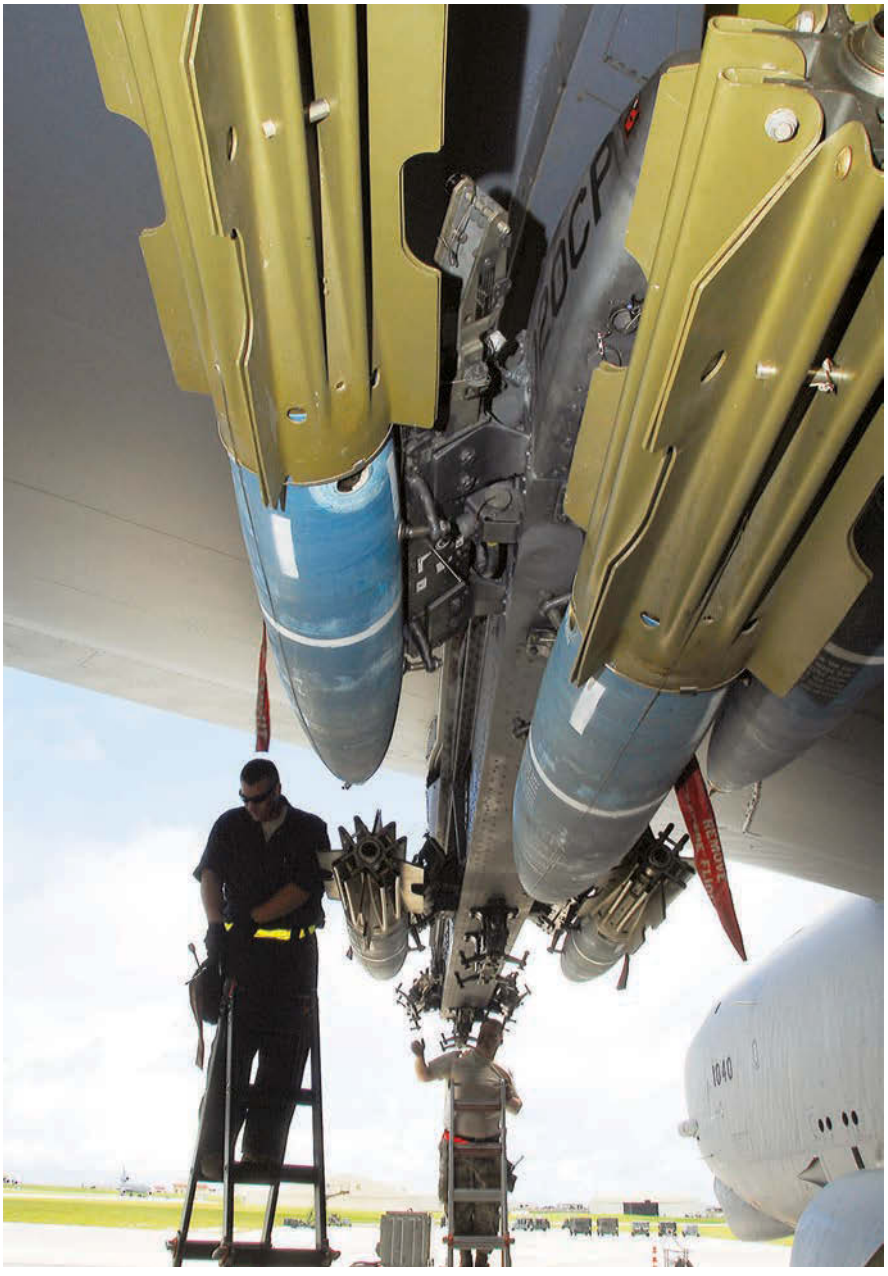


Photo by Dane Collette

USAF photo by SSgt. Jamie Powell



SSgt. Dustin Hyden (l) and SSgt. Doyle Atkinson load weapons onto a B-52. In the next decade, $40.5 billion will be spent on modernizing and sustaining nuclear-capable bombers and ICBMs, and their infrastructure.

larly from the inspector general's office, which has conducted rigorous updates for nuclear operational readiness and surety inspection regimes.

Bomber and missile squadrons were relatively "minor stakeholders" in their previous homes at Air Combat Command and Air Force Space Command, Klotz said. A missileer himself, Klotz said he spent lots of time dealing with satellite programs in a previous post as vice commander of AFSPC, while the strategic deterrent Minuteman III mission "kind of got pushed over to the side."

The same could be said for dual-role bombers at ACC, a command that was until recently responsible for the service's fighter modifications and upgrades, intelligence-surveillance-reconnaissance programs, and nuclear and conventional strike assets. While the B-2 and B-52 were transferred to Global Strike Command, the non-nuclear B-1B remained with ACC.

"I think the big cultural change is we now have a [major command] focused solely on what they do every day," Klotz said of AFGSC's nuclear-capable bomber fleet. "If there's a problem or a question, someone can call headquarters at Barksdale and talk to an expert who can focus [on] and solve the problem."

Initially, Klotz said he wasn't sure he could attract appropriate talent to come to work, as the nuclear and global strike business hadn't had a dedicated home since Strategic Air Command stood down in 1992. "I've been pleased it's been just the opposite," Klotz said during his Los Angeles speech. Eighth Air Force has stepped up to become the "institutional focal point" for global bomber operations and innovations, he said, to organize within and advocate on behalf of the bomber community for operational focus and resources to ensure the force can meet future missions and taskings.

Carpenter, a career B-52 pilot, noted that USAF's fleet of BUFFs is sturdy, but can be difficult to modernize. "The digital world doesn't always necessarily fit with the analog world of the aircraft," Carpenter said. It is one of the reasons why putting a new digital interphone in the B-52 has proved a bit tough.

Historically, crews have worked around these problems on a crew-by-crew basis, in many cases adding communications gear, installing GPS devices, and using light sticks to help pilots use night vision goggles. Capt. Dane Collette, an instructor pilot with Barksdale's 11th BS, notes many B-52 crews network their own laptops with GPS devices in the cockpit, to work around the lack of a modernized data link. "We take advantage of every opportunity we find," he said.

"The first combat mission I ever flew, we had a strapped-in satellite radio," Carpenter said, recalling his B-52 crew's participation in 1996's Operation Desert Strike, a series of air strikes on Iraqi military targets. "Now, it's all part of the infrastructure, but back then, that was all innovation from the crews," he said.

B-2 crews have developed some of the same innovations, but due to the stealth bomber's networked and integrated design, there are limits to what they can do.

Keeping bombers combat ready is also tricky, as both the B-52 and B-2 have their own unique parts issues. SMSgt. William Cromartie, head production superintendent at the 2nd Aircraft Maintenance Squadron at Barksdale, said the B-52's mission capable rate hovers around 75 percent, but as time goes on, parts obsolescence becomes more of an issue.

"We are keeping track of tech orders, because some of [these parts are] not being made anymore," he said, noting

trips to the "Boneyard" in Arizona to get components—such as replacement panes for the bomber's windows—are fairly common.

For the B-2, supply is a concern due to the small size of the fleet; it is challenging to get vendors to sign on because of small quantities of production, said Carpenter. "To get a contractor to build four of a part—it's tough," he said. "Contractors want to build in bulk."

"Our current fleet is small and aging," Carpenter bluntly said.

A Core Mission

Over the past decade, the Air Force's strategic bomber fleet has been pressed into duty like never before. Just since 9/11, B-52s have performed armed overwatch and close air support combat missions over Afghanistan, while both BUFFs and B-2s have taken turns deploying to Andersen AFB, Guam, since 2004 as part of the US continuous bomber presence in the Pacific. With the standup of Air Force Global Strike Command in August 2009, the B-52s and B-2s have also increasingly exercised and refined their nuclear training.

"Each aircraft has its own set of sustainment and modernization challenges, and demand for their capabilities exceeds our ability to meet the need," Carpenter said at the conference in Shreveport.

AFGSC has to balance investments and emphasis in conventional and nuclear strike, as there is little excess capability to put toward any one of the missions in isolation, said Brig. Gen. Timothy W. Ray, AFGSC operations director. "We are a much smaller force, and we have to leverage all our capabilities. ... If you get smaller, if you don't integrate, you won't be effective."

The B-52H fleet, as old as it is, is a fairly fit fleet, with most aircraft having 17,000 to 18,000 flight hours, Carpenter noted in an interview. USAF planners anticipate the bomber will remain in the inventory through 2040.

The younger B-2 will stay in the inventory into the 2040s, according to current USAF projections. Both will serve as a bridge to USAF's next generation "family of systems" long-range strike concept.

The bomber discussion, focused on defining future requirements, highlights a core mission for USAF some feel was neglected for a number of years: strategic long-range strike operations—specifically, LRS in regional scenarios. The point has often been obscured in nearly 10 years of operating as a tactical force, said retired Lt. Gen. Robert J. Elder Jr., former 8th Air Force commander, at AFA's LA symposium. The ability to hold a range of targets at risk from long distances—as during the no-fly-zone enforcement period over Iraq, Operation Allied Force in 1999, and in the early days of Operation Enduring Freedom—lies at the heart of USAF's role as an independent service.

New START and the Bomber Force

If the Senate ratifies the New START arms control agreement with Russia—far from a sure thing at press time—Air Force Global Strike Command will likely reduce the number of nuclear-capable B-52s from 94 to 60. This is a big change, but not as dramatic as it first sounds.

Lt. Gen. Frank G. Klotz, AFGSC commander, and other Global Strike officials say the command is comfortable with the possible change and is prepared to carry it out. Much as the B-1B was denuclearized in the 1990s, a segment of the B-52 fleet could be modified to perform conventional missions only. The affected aircraft would not be retired or destroyed, as was required under some previous arms control agreements.

"We have studied this very carefully, we have coordinated with the depot and the [system program office], and we think we have an approach which would be very easy to implement and will preserve all of the conventional capabilities on the aircraft," Klotz said.

Treaty negotiators did their due diligence, Klotz said, and came out to AFGSC bases to talk with B-52 operators and maintainers about the specific provisions under discussion and to develop reasonable "conversion options."

While possible force structure changes, like New START itself, were still being deliberated in late November, several officials within AFGSC confirmed that the most sensible way to meet targets would be by moving some aircraft into the B-52 formal training unit, Air Force Reserve Command's 93rd Bomb Squadron and its active associate 11th BS, at Barksdale AFB, La. Crews could continue to use these aircraft to train for nuclear missions, but the aircraft themselves would be strictly conventional only.

The 20-aircraft B-2 stealth bomber fleet will stay in its dual role, Klotz said, due to its small size.

"There are going to be some workarounds," Maj. Gen. Floyd L. Carpenter admitted, though the treaty language also favors the bomber force in some ways. Under New START, bombers will offer the nation greater strategic flexibility because each aircraft will "count" as only one warhead.

"It is truly a force-multiplier and gives [US Strategic Command] a hedge," said Carpenter, the commander of 8th Air Force. This is increasing the importance of the bomber in the nuclear role, "even though we come down in numbers."

USAF photo by SrA. Kenny Holston

At Whiteman AFB, Mo., 509th Aircraft Maintenance Squadron crew chiefs move away from a B-2. Even 1980s-era B-2s need updated electronics for a "digital backbone."

USAF photo by SrA. Alexandra M. Sandoval

A weapons load team moves JDAMs onto a B-52 at Barksdale AFB, La. One upgrade for the bomber will allow for retargeting of weapons during flight.

The reinvigoration of nuclear operations at AFGSC has raised long-range strike's importance. "I can tell you, we've had a nuclear exercise every month since January," said Capt. Brian Nickerson, a copilot with Barksdale's 20th Bomb Squadron. "We will practice [checklists], get objectives, and practice them" some more, said Capt. Mike Maginness, an instructor pilot and EWO with the 20th BS. "Sometimes [we try] to make folks fail. ... The breadth of our mission sets us apart. We have to be nuclear experts, all the time, and meet other missions."

With flat budgets and creeping requirements, USAF leadership appears ready to embrace the historical innovation of bomber crews in order to get to its next generation family-of-systems strike concept.

Speaking in Shreveport at the AFGSC symposium, Lt. Gen. Christopher D. Miller, the USAF deputy chief of staff for strategic plans and programs, said any future long-range strike capabilities will have to integrate new and old platforms together in future missions.

An Intentional Approach

"Notice I did not say it must be explicitly capable or that it must be fielded from Day 1 with every capability we can imagine it will need," he added. He pointed to the B-1 and B-52 as examples of innovation in the bomber force, noting they were both fielded with "substantial but incomplete capabilities" when they entered the force and have since undergone tremendous modification over the years to meet evolving threats. Early B-52 models were modified to become low-level penetrators of Soviet air defenses, Miller noted, and have since received new weapons and avionics.

Noting his own early career experience in fielding the B-1B, Miller said he was stationed at McConnell AFB, Kan., when the base was home to the nuclear-armed "Bone." "I never saw a conventional bomb or a conventional bomb rack on a B-1 at that time," he said. "It was purely focused on the nuclear mission."

Just a few years ago, he saw the same aircraft flying over Afghanistan providing close air support and integrating their Sniper targeting pods to aid ISR efforts—"a mission that we could not have imagined when we first fielded the airplane."

An "intentional approach" to upgrading and maintaining bombers over a long time is an essential part of how the Air Force thinks about a future family of strike systems, Miller added.

Col. John Vitacca, commander of the 2nd Operations Group at Barksdale, was saying aircrews have seen a steadily increasing operations tempo— when he

USAF photo by Lance Cheung

Need a window pane for a 50-year-old B-52? It could mean cannibalizing one from a Stratofortress already retired to the Boneyard at Davis-Monthan AFB, Ariz.

USN photo by Lt. Marques Jackson

USAF photo by SrA. Christopher Bush

A B-1B is escorted by a Navy F/A-18 Super Hornet after a close air support mission in Afghanistan. At right, a Barksdale B-52 lands at Andersen AFB, Guam, as part of the continuous bomber presence in the Pacific.

paused to key his handset so he could speak with an aircrew taking off. "This place is very busy now," he said after clearing the aircraft. Bomber crews are working hard to balance strategic strike requirements with training and scenarios dedicated to real-world missions.

He noted a 36-hour November sortie by two B-52s to and from Jordan. The bombers flew round-trip from Louisiana to participate in a live aerial bombing demonstration with both Joint Direct Attack Munitions and Mk 82 iron bombs on a test range—also using the aircraft's targeting pod in the strike to gather and share information.

Long-range power projection missions are one of the B-52's core roles, he said, and should the President require it, "we need to be able to spin up, fly out, drop weapons, and come home."

At the same time, crews are balancing nuclear training and deployments to locations such as Guam to practice other mission profiles.

The Guam deployments have "done several things," Ray said. They give bomber crews the chance to focus on flying in the Pacific, both conventional and nuclear strike profiles, support Pacific Air Forces, and integrate with other services such as the Navy and coalition partners.

While projecting power in the Western Pacific, bomber crews also exercise certain nuclear skills during a deployment. They are teaching basic procedures to younger crew members and taking advantage of distances afforded over the Pacific Ocean. They can ingrain certain aspects of the nuclear mission while deployed, so when crews come back, "they don't require more spin up time," Ray said. Though the sorties are mere simulations, the tactics and procedures practiced have great overlap between conventional and nuclear roles.

Away from home, crews can focus on flying without having to think about home station nuclear inspections, for example. "We are trying very hard with PACAF to make this a readiness bounce," Ray said. "You are not flying combat missions, like you would in [US Central Command], which means you can't train. ... Here [on Guam], you can train."

USAF's strategic bombers need to be ready for anything. At the command level, "to a large extent, we've been focused down," looking at establishing a command, "hiring people, establishing expectations, ... and putting our operating style into play," Klotz said. "However, we are the major command in the Air Force that has responsibility for deterrence and global strike operations." Global Strike Command must play its role in the larger corporate Air Force as the advocate for modernization and sustainment of global strike forces.

"We have created this command and focus on day-to-day operations," Klotz said. "Now we need to focus on the larger role, as a center of expertise on strategic deterrence." ■

USAF photo by SrA. Ryan Whitney

A B-2 undergoes maintenance after flying from Whiteman to Andersen. AFGSC's focus on the nuclear mission has raised long-range strike's profile.

USAF's look ahead to the technology of 2030 envisions a stunningly different force.

Over the Horizons

By John A. Tirpak, Executive Editor

USAF photo by SSgt. Derrick C. Goode

The Air Force budget to be released this winter will likely see a substantial increase in science and technology funding. The increase is driven in part by the findings of the service's most recent technology vision paper, completed last summer. It calls for the Air Force to master a broad new set of technologies, aimed less at faster, higher-flying, or more agile aerospace vehicles and more toward generic, "must have" innovations that will enable quicker and more certain action. These technologies will have wide, cross-cutting application among the other military services.

The 150-page report, called "Technology Horizons," forecasts a smaller, more capable Air Force in 2030. Many of the advances seem straight from the pages of science fiction: genetically enhanced airmen given over largely to supervising seemingly conscious, self-directed machines conducting operations at blinding speeds, manipulating the electromagnetic spectrum, controlling hypersonic vehicles and the instantaneous action of directed energy weapons.

Werner J. A. Dahm, USAF's former chief scientist and director of the study, said the Air Force's science and technology program is "expected to get a large plus-up" from the Office of the Secretary of Defense in 2012 in the areas of the budget known by their designators 6.1 (basic research), 6.2 (applied research), and 6.3 (advanced technology development).

"The current plan is for all of that plus-up … to go into Technology Horizons investment areas," he said. He declined to say how big the increase will be, except to say that "the amount is substantial."

Maj. Gen. Ellen M. Pawlikowski, head of the Air Force Research Laboratory, said, "We already have efforts under way in many of the areas highlighted by the study." While some of the Air Force's S&T efforts may receive "decreased emphasis" given the priorities spelled out in Technology Horizons, she doesn't think anything now in progress will be terminated by virtue of being a lower priority; rather, "we … will refocus them to be more responsive to Technology Horizons' recommendations," she said.

Left, top: An artist's conception of a future "enhanced" airman. Left: Coalition troops watch an ongoing mission unfold at a combined air operations center in Southwest Asia.

As Technology Horizons gets translated in budget priorities—which was the intent of Air Force Secretary Michael B. Donley and Chief of Staff Gen. Norton A. Schwartz in directing Dahm to do the study—it will be reviewed by the Air Force Scientific Advisory Board and will have to pass muster with OSD as well.

Senior Pentagon leaders have said in recent years that they want technology programs to be far less risky when transitioning into weapon systems, specifying a higher technology readiness level—specifically, TRL-6—before they'll give programs a green light.

Pawlikowski noted that TRL-6 is the point at which AFRL hands off technologies to development organizations, but getting there requires "a different style of management" for each, depending on its idiosyncrasies and the difficulty involved.

Visions of the Future

Air-breathing hypersonic vehicles, she noted, are an example of a technology that takes "decades of effort, and [we] are just reaching a point of maturity where application to military needs makes sense." Technologies have to make progress against "clearly stated milestones," she said, and have to be weighed against potential benefits. Anything that doesn't have "sufficient promise may be deferred" in order to build the best all-around technology portfolio.

As futuristic as some of the innovations in Technology Horizons seem, the track record for USAF's previous technology visions suggests that they will, in fact, appear as predicted. The very first such vision document—prepared by Theodore von Karman for Gen. Henry H. "Hap" Arnold in 1945—detailed a long list of innovations such as gas turbine engines, heat-seeking and radar missiles, new materials, solid-fuel rocket motors, new fuels, and ballistic missiles that were then in their infancy but became standard tools to ensure air dominance through 1965. Over the years, subsequent vision iterations have anticipated things such as spy satellites, supercomputers, stealth, and cruise missiles. The last report, produced in 1995, predicted a surge in the use of remotely piloted aircraft and cyber weapons, among other things.

Dahm noted that in briefing the study to an OSD-level organization last summer, one official "said to me, 'You know, … this doesn't look like a "blue" document.' It didn't have a lot of what that individual expected in an Air Force-focused document."

USAF is "not the National Science Foundation" and is not in the business of developing technologies for the whole nation, he noted, but it develops technologies needed to carry out its assigned missions.

A number of key technology developments emerged as "critical" to the Air Force's future, Dahm said. One of the chief ones will be automation, which will have a profound effect both in reducing USAF's manpower costs by reducing the number of airmen needed, and by enhancing the service's speed of action through operational knowledge.

Autonomous machines will sift through intelligence, surveillance, and reconnaissance data looking for patterns and doing the tedious work of watching the movements of units and individuals. Autonomous air vehicles will find their own way to a target, and react swiftly, on their own, to the various threats and conditions they'll encounter, supervised in most cases by a single airman, who will also be simultaneously directing the actions of many other such aircraft. In most cases, his job will be "restating the operator's intent when that is appropriate," Dahm said. Autonomous machines will search through signals, juggle the use or jamming of various parts of the spectrum, and recommend the best course of action for commanders to take.

Hand-in-hand with automation will be validation and verification, the science of assuring the automated systems properly interpret their sensory data and render predictable, correct decisions on what to do about it.

While automation will come fairly quickly and easily, Dahm said—and adversaries will readily adopt it to keep up with the US—the "V&V" task is far more difficult, but is essential to making automated systems trustworthy.

Here in the US, "our regulatory environment is not going to let us field [or] fly systems that are highly adaptable, highly autonomous unless we can prove that they will function as they are supposed to," he observed. A good example is the high bar the FAA sets for the operation of remotely piloted aircraft in civil airspace, to ensure they observe the rules of the sky consistently and reliably.

"That's a very high barrier," Dahm acknowledged.

Moreover, as automated systems suck up larger and larger amounts of sen-

Northrop Grumman illustration by Peter A. Barnett

Directed energy and long-endurance unmanned aircraft come together in this Northrop Grumman concept of a future ballistic missile defense aircraft.

sor information, with a corresponding increase in their potential responses, so many degrees of freedom makes it "exponentially more difficult to test," he said. The number of individual action-reaction possibilities becomes "near infinite."

GPS Still Needed

Testing each possibility, which Dahm called the "brute force" method, is "out of the question. … It doesn't work." Software will have to be designed from the outset to test itself, quickly and comprehensively. It will also be necessary to "redefine what we mean by 'an adequately verified system.'" He added that "if we're willing to take on a tiny amount of risk, then the V&V challenge becomes much more manageable."

Another key capability will be the development of tiny, chip-size devices that can measure precisely movement and time. These will be critical, he said, because the Air Force expects that in any future conflict, enemies will attempt to jam the Global Positioning System, and it's "very, very easy to jam."

Tiny inertial measurement and atomic clock units in all manner of vehicles will kick in once a GPS signal is lost, using the last certain position as a reference point. Although there will be some drift, the small inertial measurement units will offer near-GPS position accuracy for a "very operationally relevant length of time." Early results "look incredibly good," Dahm said, and the technology will preserve not only Air Force but other services' abilities to navigate and hit targets precisely even if GPS is blocked.

The availability of such systems won't signal the Air Force's departure from maintaining the GPS constellation, though. In a non-denied GPS environment, the system will still be extremely valuable, Dahm noted.

We're "augmenting GPS, not saying we don't need it anymore," he explained. "In fact, it's likely that GPS will stay our reference point certainly for the 20-year time horizon of the report."

Technology Horizons offers a number of cross-referenced graphs showing how 110 specific technologies will be applicable across the Air Force's 12 core functions, such as nuclear deterrence; global mobility; air and space superiority; and global intelligence, surveillance, and reconnaissance.

While 110 technologies seems like a lot, Dahm said, the Air Force is already pursuing about 1,000 different technologies, spread among some 7,000 individual projects. So in Technology Horizons, "we're highlighting maybe 20 percent of what the Air Force is currently working on," Dahm noted.

These are not the only things deserving of S&T funding, Dahm said, but rather "we're saying that these are the things you have to make sure that you advance." Automation, for example, is one where "we have almost no choice," because there will never be enough manpower to do all the things an information-saturated force will have to do.

None of the technologies called out in Technology Horizons is a "clean sheet" initiative. To make the cut, all of them had to be in at least some stage of early investigation with credible evidence that they would yield useful capabilities inside 20 years.

Dahm said the study walked "a fine line" to balance the need for an unconstrained, what-if assessment of future capabilities and one that recognized the Air Force will likely be working with austere budgets through the rest of this decade and maybe well into the next—what he called "enduring realities" for the service. Consequently, the

Photo by David Housch

Werner Dahm (right), then Air Force chief scientist, observes an engine instrumentation test with Capt. Chuck McNiel at Arnold Engineering Development Center, Tenn. Dahm led USAF's "Technology Horizons" study.

study put greater focus on technologies promising to cut manpower costs, reduce energy consumption, and generally slash basic operating expenses—things the previous technology vision studies largely ignored.

The 110 enabling technologies the study examined were further grouped into "potential capability areas," or PCAs, that would allow them to be mapped against the Air Force's core functions. The ones applicable to the most core functions will likely get the highest priority for funding.

The top PCA was inherently intrusion-resistant cyber systems. This technology will shift USAF away from a futile attempt to keep all intruders out of its computer networks and instead make it so hard to create mischief once inside the network that hackers will be deterred and won't even bother to try. This will be accomplished by reconfiguring the networks semi-randomly, hundreds of times per second. A hacker gaining entry wouldn't have enough time to exploit his success, and would leave bigger footprints for investigators to track.

Another key PCA is augmenting the performance of airmen themselves. Dahm said airmen might be screened for their natural, genetic suitability to certain kinds of tasks, and might be enhanced with embedded chips to create a better human-machine link to make the airman quicker, stronger, or more agile. Such systems will be necessary because processing power will eventually make it impossible for humans to keep up with what their machines are doing.

Screening for natural ability could be a huge cost-saver, given the high cost of initial and recurrent training of airmen, Dahm said, the aggregate cost of which is "enormous."

"People want to be good at something, so using genetic makeup to discover what they would be good at—I think that will become acceptable," he said.

Dahm noted that autonomous systems themselves "are human performance augmenting technology," and don't necessarily involve anything invasive.

However, "we're going to move away from screens and keyboard-and-computer mouse," and instead interact with machines through the use of eye readers and devices that measure activities in certain parts of the brain—"brainwave coupling"—to speed up the interaction of man and machine. Computers will be able to know what the operator subconsciously wants to see or do, probably before he even realizes it himself.

Lockheed Martin artist's illustration

An artist's concept of the Lockheed Martin unmanned aircraft called "Various," which can take off and land vertically, using lift fans in the wings.

That's still in the early stages, but there is already impressive science in this area. Toys that capitalize on a primitive version of the technology are already being sold nationwide.

Subsecond to Subsecond

Dahm said people will probably accept chip implants, noting that such devices already enable injured soldiers to better control their prosthetic limbs. Genetic enhancement is likely to raise more questions, though. Adversaries, however, will no doubt quickly embrace such technology as soon as it's available.

Concerns will inevitably be raised about human enhancement, Dahm said, but "in the broader debate, the desire to get the advantages is outweighing" the concerns.

Stealth as we know it today—achieved through materials, shaping, and a limited amount of spectrum manipulation—won't become obsolete in the next 20 to 30 years, Dahm said.

However, low observable technology "will be augmented with a much more active set of things" to enable aircraft to penetrate enemy airspace and persist there in the face of formidable air defenses.

A common bottleneck in military capabilities over the past two decades has been bandwidth. With so many systems talking over ground, air, and satellite lines, frequencies have become crowded, and USAF frequently rations use—especially with the explosive growth of civil communications devices.

"The demand for spectrum is growing even faster," Dahm said. As a result, Technology Horizons calls for new ways to more efficiently utilize existing spectrum. Some of these are called "dynamic spectrum access" and involve devices that sense the spectral environment and "look for gaps" either in frequency or in the time-spacing between impulses, "on a subsecond to subsecond basis," and change frequencies to take advantage of it. Part of any transmission would then be "what my next frequency move is going to be," he said.

Besides getting more traffic on the same frequencies, this technology would have benefits in secure communications and jamming.

Looking at a chart of how spectrum is used, it looks "really crowded," Dahm noted. "But it tells a false story because the vast majority of that spectrum is being used maybe one or two percent of the time."

Dynamic access has been tried before, but it turns out that it's "not as easy as the early advocates of this have said."

Artist's concept by Erik Simonsen

An artist's concept of a hypersonic aircraft that will be able to traverse the globe in hours, providing all-seeing, persistent global surveillance.

Dahm said the Air Force needs to be "very closely involved in the regulatory process," regarding bandwidth use. That's because the service has developed means to use frequencies "in ways that you cannot detect them," and civilian agencies might assign frequencies to commercial entities not knowing USAF was already on them.

"A system that says, 'OK, if I can't detect a user there, there must be open space'—that can have tremendous negative implications."

Working collaboratively with civilian agencies and taking advantage of unused spectrum "could buy ourselves maybe a couple of decades of spectrum use."

The actual flying aspects of Technology Horizons are not surprising to those who have followed aerospace developments closely. They call for large airships to serve as ISR collection platforms—some at very high altitude, persisting for weeks or even permanently, like satellites but in a near-space environment. Some initiatives see use for "partially buoyant" aircraft that could transport very heavy gear by air, but do it in a much more cost- and fuel-efficient way.

Faster airlift would be accomplished by hybrid flying-wing-type aircraft similar to Boeing's X-48. It would have greater fuel efficiency, greater range, and greater internal volume compared with today's airlifters.

The study does call for a push toward "fractionated" systems, an approach being taken with the new long-range strike "family" of capabilities. This approach requires use of a large constellation of machines that collectively performs a function. The loss of any one part of the constellation wouldn't knock it out, but instead cause a graceful degradation in overall performance. Thus, penetrating enemy airspace, for example, might involve a stealthy air vehicle supported by separate jamming aircraft, defense-suppression aircraft, off-board sensor systems, and the like, most of them flexibly autonomous vehicles.

Getting Traction

Air-breathing hypersonic vehicles—at least in the form of missiles—may be available within 20 years, able to operate at speeds of up to Mach 6. A 79-foot vehicle with a range of 5,750 miles and a 2,000-pound payload could shuttle back and forth between Diego Garcia and Guam, and put within range targets that "might otherwise be immune," according to the report. The vehicle's speed would give it survivability.

A related technology could combine the kinetic power of a hypersonic vehicle with warheads that could make it highly useful against deeply buried, hardened targets. The penetration sequence would use a series of explosive- and electromagnetic-produced waves of destruction that the ultimate warhead could ride to the desired depth, counting the voids it encounters to explode at the desired level.

At the other end of the flight regime, the Air Force will need extremely small munitions able to kill very precise targets with no collateral damage. Because of new precision guidance with far finer resolution than is now possible, Technology Horizons anticipates a circular error probable of "near zero" in the next generation small munitions. The weapons could harmlessly self-destruct if the target moved or was already destroyed.

As enemy cruise missiles, ballistic missiles, and remotely piloted vehicles advance, the Air Force will have to do more to protect its bases. Technology Horizons anticipates use of tactical lasers for this role. Chemical lasers have given way to solid-state lasers and soon will be eclipsed by "even more efficient fiber laser systems." Their smaller size, weight, and power requirements will allow them to be deployed on fighters or ground vehicles, and flexible autonomy would mean an operator or pilot might not even have to participate in the targeting and firing sequence. In ground vehicles, the magazine of shots could be "near infinite."

A two-stage-to-orbit capability has been called for numerous times, but Technology Horizons thinks it might finally arrive by 2030. A rocket would accelerate a vehicle to high speed, when a combined-cycle scramjet second stage would take over.

The report also anticipates "sniffing" systems that can rapidly identify biological signatures, advanced human and cultural behavior modeling, even more sensor data fusion, and new "metamaterials" that can change shape at need, heal themselves, enhance the efficiency of solar power systems, and perhaps even permit a degree of "invisibility."

Dahm said he's confident Technology Horizons will be translated swiftly and efficiently into S&T priorities for the Air Force. Because it was developed with inputs from the major commands, AFRL, and the Air Staff's Strategic Plans and Programs and acquisition shops, he feels there was "buy in" from those organizations. With both a formal and informal process of getting consensus on the directions the study spells out, the study should get, in Dahm's words, "traction."

Dahm noted that Technology Horizons is "a vision document, ... not a programming document," which allowed it to be more ambitious than the study would have been if dollar amounts were assigned to everything in it.

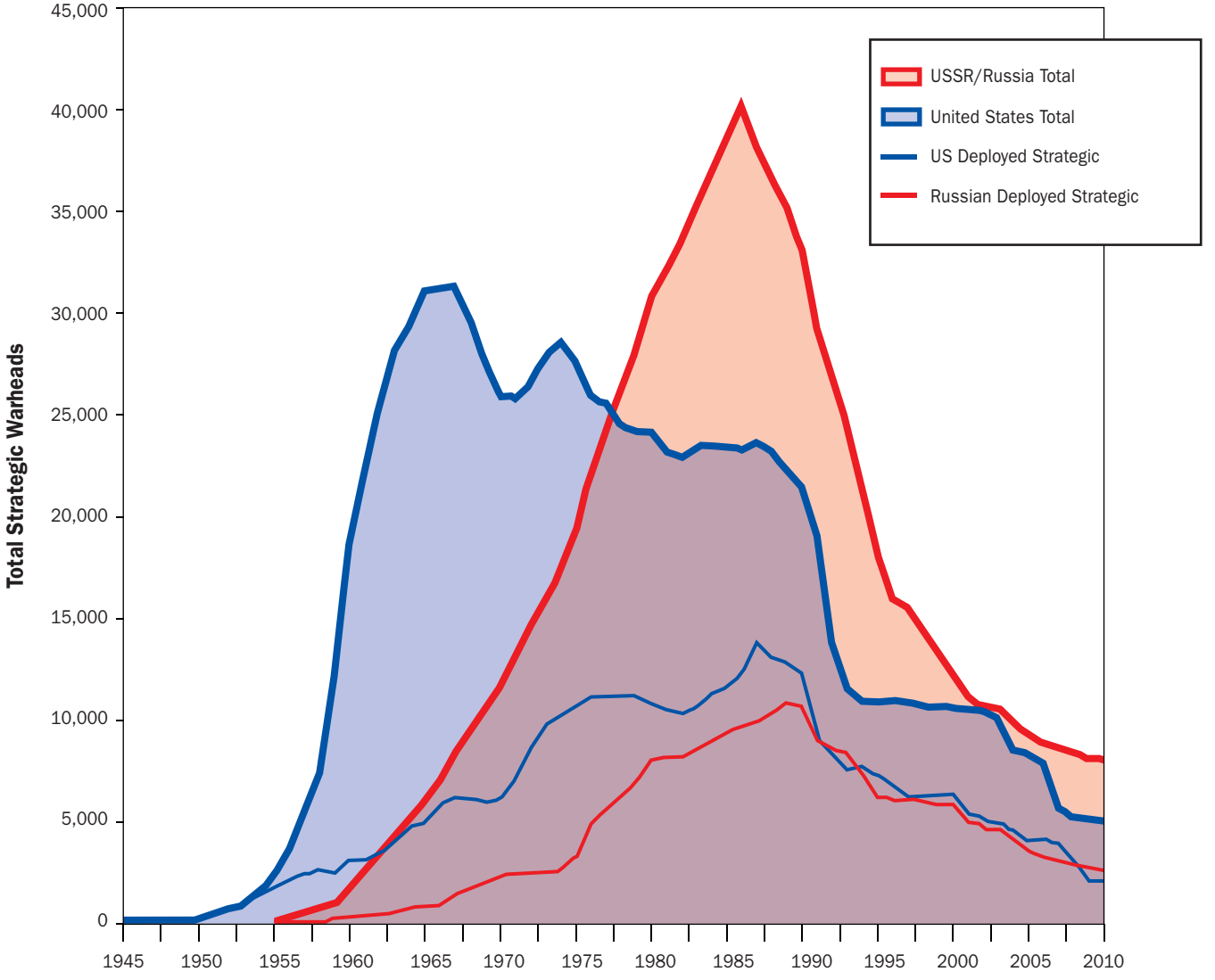
"That's why the Air Force only does these about once every 10 years," he said. "We rarely have the ability to step back and do an almost completely unconstrained view of what the Air Force could have, if it chooses to make those investments." ■

chartpage@afa.org

How Far Is Down?

The US and Russia (and predecessor USSR) have staged a massive flip-flop on nuclear arms. First, Washington and Moscow acquired awesome arsenals of tens of thousands of weapons. With the Cold War's end, though, both sides began abandoning nukes with alacrity. As the chart shows, Russia's total has fallen to 2,600 deployed strategic weapons (of 8,000 in its stockpile). The US has about 1,900 deployed strategic warheads (of some 5,000 in its stockpile). Has the cutting gone far enough? Not according to major arms control groups in the West. They argue that the New START accord, which would bring the US and Russia down to 1,550 deployed warheads each, should be just an interim step on the road toward an eventual abolition of nuclear weapons.

US and Russian Strategic Nuclear Warheads, 1945-2010



Source: Hans M. Kristensen, Federation of American Scientists and Natural Resources Defense Council, presentation to UN panel on nuclear de-alerting, Oct. 13, 2010.

President George H. W. Bush instructed Gen. H. Norman Schwarzkopf, commander of United States Central Command, to start the war as soon as possible after Jan. 15, 1991. The countdown to Operation Desert Storm began. Americans were apprehensive and Congress was reluctant. The world waited.

Twenty years ago, the idea of a decisive air campaign setting up quick operations on the ground with little loss of life was a far-fetched notion. Stealth, precision, and the advantages of intensive surveillance from air and space were unfamiliar concepts in the ranks of the US military.

The most recent forays of US forces into the Middle East had not been encouraging. In 1980, a special mission failed to rescue US hostages from Iran. The 1983 terrorist bombings of the US Embassy compound in Beirut and US Marine Corps barracks were also painful memories—nor had the United States committed the full might of its forces in minor engagements in Grenada and Panama.

Operation Desert Storm wiped the slate clean. A new chapter in US military dominance opened on the night of Jan. 17, 1991.

A Historic First

The six-week air war reversed expectations of high casualties and cleared the way for a four-day rout of Iraq's Air Force and Army.

Stealth became a household word. A handful of F-111s, F-117s, and F-15Es permanently raised the bar for precision attack through the routine and effective use of laser guided bombs on targets ranging from hardened communications sites to tanks in the Kuwaiti desert. An armada of A-10s, F-16s, B-52s, and other aircraft flew more than 43,000 strike sorties attacking Iraqi ground forces. The impact on Iraqi ground forces day after day led Air Force Chief of Staff Gen. Merrill A. McPeak to conclude, "My private conviction is that this is the first time in history that a field army has been defeated by airpower."

Few believed Desert Storm would turn out to be a model air campaign when it started. Although the coalition had spent five months preparing, the largest unknown was how many casualties would result.

"Basically, this is a fairly strong opponent—the world's fourth-largest armed forces and the world's sixth-largest air force," McPeak said. Analysts ranked Iraq's fighting prowess as second only to Israel in the region. The

Two USAF F-15s and a Saudi F-5 form up during a mission in Operation Desert Storm. The aircraft are armed with air-to-air missiles.

DESERT STORM

USAF photo

USAF photo by TSgt. Joe Coleman

The Air Force led the way when Kuwait was freed from its Iraqi occupiers.

By Rebecca Grant

Iraqis had spent plenty of time on the battlefield, too. In eight years of war with Iran, from 1980 to 1988, the Iraqis inflicted upward of 300,000 casualties, bombed Tehran, used chemical weapons, and chased nuclear technology.

Would Iraq use chemical or even biological weapons against the coalition?

"The possibility of mass casualties from chemical weapons was the main reason we had 63 hospitals, two hospital ships, and 18,000 beds ready in the war zone," according to Schwarzkopf's count.

USAF photo

Airpower was the main tool for lowering this risk. Air Force leaders successfully argued for airpower to work over Iraq's military forces before any ground troops attacked. Schwarzkopf ultimately approved a campaign with four phases: three for air alone, one for land forces with air working in support. After gaining air superiority and destroying strategic targets, the air campaign would pick off Iraqi tanks and artillery and hammer frontline divisions, so ground forces could move fast when the attack order came.

Deciding when to start the war was up to Air Force Lt. Gen. Charles A. Horner, the joint force air component commander. Horner organized forces and plans, and now the call on timing to start Operation Desert Storm was his, too. Horner thought first of the F-117s that would be attacking Baghdad and other targets in the heart of Iraq's air defenses.

"The darker the night, the more survivable they are, so we picked the

Top: Demolished vehicles line Highway 80—the Highway of Death—that leads from Kuwait City to Basra, Iraq. Many Iraqi military personnel commandeered civilian vehicles to flee Kuwait. Left: A hardened aircraft shelter shows heavy damage caused by US and coalition forces during Desert Storm.

USAF photo

An F-4G Wild Weasel armed with air-to-surface AGM-88 HARMs heads out on a mission during Desert Storm.

time based on when the least amount of moonlight was present, and that's how we picked the 17th," Horner said in a PBS "Frontline" interview. The early morning hours of Jan. 17, 1991, would have the lowest moon phase, and as a result, would be forever linked to the beginning of airpower's most spectacular campaign.

Warning orders went out to flying units before H-Hour. Five months of training in the desert left aircrews on a knife's edge. Airmen assigned missions on the first daily air tasking orders would be facing Iraq's defenses alone in their cockpits or as part of small, tightly knit crews. Only a few senior commanders had combat experience, gained years earlier in Vietnam.

"The wing commander came around and talked to the boys," recalled then-Capt. Michael Isherwood of the countdown to war. "He said there was nothing to be ashamed of if you had the jitters. He said before his first couple of combat missions, he threw up."

"The first night of the war, we wanted to seize control of the air first and foremost, and we also wanted to introduce shock into their entire system. ... That's why we hit the communications buildings, the sector operation centers, the radars in the airfields," said Horner.

Disabling Iraq's highly modern integrated air defense system was step one. Planners met with executives from the French and Swedish companies that had installed the system. The idea was to saturate and attack it in the right places to overwhelm it. "We knew so much about the Iraqi air defense system, we could have built it ourselves," USAF Brig. Gen. Buster C. Glosson, who commanded fighter forces, later wrote.

Saturation came from an armada of 12-foot-long BQM-74C target drones that flew 300 miles to Baghdad and orbited for 20 minutes. The drones looked so much like aircraft to the

USAF photo

Lt. Gen. Charles Horner, joint force air component commander, points out an image during a media briefing during Desert Storm.

USAF photo

A refueling specialist on a KC-10 transfers fuel to an F-117 during Desert Shield. The F-117 was among the first aircraft to strike targets in Iraq when combat began.

early warning radars that Iraqi air defenders flipped on tracking radars to engage. High-speed anti-radiation missiles fired in barrages by Navy carrier airplanes or targeted at specific radars by USAF F-4Gs picked off active sites. That night, more than 66 HARMs were launched in an hour.

In front of the drone wave, F-117s targeted specific control nodes on the network and other locations, including downtown Baghdad. Some F-117s found their target areas relatively quiet. Others saw dense anti-aircraft fire. "You try to block the [anti-aircraft artillery] out of your mind for a moment and hit the target," F-117 pilot Maj. Joe Salata later told *Airman* Magazine. "You don't want to get hit by anti-aircraft flak or by a SAM, but at the same time, you don't want to go back to the squadron with a miss because you were looking out the window."

Within hours, it was clear the coalition had the upper hand. "We'd feared losses as high as 75 the first day," Schwarzkopf remembered. Instead, the tally was just four US aircraft lost, and all F-117s returned safely.

"We wanted them to feel completely overwhelmed," said Horner, "and I think we achieved that."

Ahead lay a careful sequence of intensive strikes on air defenses and strategic targets such as suspected nuclear, chemical, or biological weapons sites. Attacks on ground forces had begun and would escalate in Phase 3 as air defenses dwindled and strategic target objectives could be crossed off the master list.

Like most air campaigns, it didn't all go according to plan. After the initial attack, Iraq fired back with Scud attacks on Israel and Saudi Arabia. Army Patriot batteries defended Saudi Arabian ports and airfields. Patriot batteries were soon sent to Israel, but pressure mounted to shut down Scud launches. "We reacted to the pressure by diverting fully one-third of the more than 2,000 combat and support missions scheduled each day for the strategic air campaign to the Scud hunt," said Schwarzkopf.

Launches trailed off, until the final salvos at the end of the war. It was a sobering lesson in the difficulty of tracking high-priority mobile targets.

Foul weather also became a factor. Severe storms on night two gave a good taste of what could be expected in the future. A tanker flew into Iraqi airspace to meet an F-117 critically low on fuel. "By the time we hooked up, we were about 60 miles deep in Iraqi airspace, lit up like a Christmas tree because we had to [be] in order for him to see us in the weather we were in," the KC-135 pilot Maj. Dave Horton later told *Air and Space* Magazine.

Night three was just as bad, with a total of 188 sorties aborted on Jan. 19 due to poor weather. Strikes on planned targets needed about 21 days of operations—but there was a catch. Those 21 days had to be good weather days. The weather had a vote, and it was curtailing results.

"Poorest weather in 14 years," McPeak later briefed. Cloud decks played havoc with infrared systems and laser guided bombs. By late January, the air campaign was behind in the number of targets planners wanted to strike, with wartime objectives hanging in the balance. One strategic objective of the campaign was to knock the stuffing out of advanced Iraqi research facilities. Destroying nuclear, biological, and chemical capability was set out as a top priority by Schwarzkopf in the fall of 1990. This was a job only airpower could do, because while fighters and bombers were all over the country, there was no plan for ground forces to enter Iraq.

The task was risky. On Jan. 24, tankers met F-117s in Iraqi airspace above the 33rd parallel to top off the fighters,

Photo via www.pats-world.com/gulfwar

An A-10 shows heavy damage caused by an Iraqi surface-to-air missile during Desert Storm.

USAF photo

Royal Saudi Air Force C-130 transports (foreground) and USAF B-52s share the ramp at an airfield during Desert Storm. Even the elite Republican Guard was ground down by the unrelenting air campaign before the ground war began.

so they could hit bioweapons bunkers. The Iraqis saw the gargantuan radar signature of the tankers and waited. Twenty-seven minutes after refueling ended, they unleashed a barrage of anti-aircraft guns and surface-to-air missiles over Baghdad. Fortunately, the F-117s were nowhere near the capital. They were far north, as the bioweapons bunkers were near Mosul.

Another sortie had a package of 48 F-16s flying in to level the Baghdad nuclear research center, in dangerous airspace. Planners assigned F-4G Wild Weasels to fend off SAMs, but the plan unraveled. Tanker match-ups ran late, commanders made split decisions, and 12 of the F-16s ended up flying to the target alone. Two were lost to SAMs.

Strategic strikes would ultimately consume 23,455 sorties—and still account for only 34 percent of strike sorties in Desert Storm. The culminating goal of the air campaign as structured by Schwarzkopf was to destroy 50 percent of Iraqi tanks, armored personnel carriers, and artillery lined up on the Kuwait border before the coalition attacked on the ground. Schwarzkopf knew on paper his coalition was outgunned. Some 4,700 Iraqi tanks faced 3,500 coalition tanks. "We were outnumbered as a minimum three-to-two as far as troops were concerned," he added. The Iraqis also had more artillery pieces. "We had to come up with some way to make up the difference," he later wrote.

"It was imperative that air knock out as much of this armor as possible, … as the alternative was to let 20-year-olds in tanks go head-to-head," said Isherwood, an A-10 pilot and weapons officer.

A grid based on the Saudi Arabian air defense sectors was slapped over the Iraqi units in Kuwait. Each grid square became known as a kill box. Aircrews were assigned the same box over and over again. As the A-10 pilots knew, Iraqi forces still had air defense weapons. To cope with them, Horner layered SAM-killing F-4G Wild Weasels along with active electronic suppression aircraft and USAF's whole suite of signals intelligence.

A Walkover Promise

A surprise first test of airpower against maneuvering forces came when Iraq launched an attack on the evacuated Saudi border town of Khafji. JSTARS was still a prototype aircraft, but its powerful radar spotted the movement of divisions from Iraq's III Corps. Air planners diverted the first aircraft within 20 minutes. "Every time Iraqi vehicles began to march south, A-10s, F/A-18s, or even the odd Pave Tack F-111 or F-15E would show up, and all hell would break loose," Horner wrote later. Airpower stopped Iraqi forces at Khafji with just 267 sorties across the six Khafji kill boxes.

Still, the effort was an intense one. An AC-130 gunship struck targets through the night of Jan. 30 to 31. Dawn approached and the AWACS controller suggested the gunship break off and head home. "I can't go right now, I have too many targets left on the road," the pilot responded. Thirty seconds later, the Iraqis "fired a heat-seeking anti-aircraft missile into the AC-130's port engine," said Horner. It crashed into the gulf, killing the crew of 14.

Phase 4—the ground war—was due to begin between Feb. 10 and Feb. 20, 1991, and Schwarzkopf was waiting for damage assessments to move closer to the 50 percent attrition goal. Ascertaining the impact of battlefield strikes was one of the most tangled issues in Desert Storm. On Feb. 9, Horner briefed Schwarzkopf, Chairman of the Joint Chiefs of Staff Gen. Colin L. Powell, and others, saying the air campaign would achieve projected Iraqi ground force destruction levels in about 10 more days.

Overhead imagery fixated on strategic strikes in Iraq and often didn't yield the detail necessary to confirm equipment kills in Kuwait unless parts were strewn widely, prompting second guessing. On Feb. 15, the Defense Intelligence Agency rolled in to demand A-10s henceforth receive only one-third credit for each tank kill. The CIA popped up with its own objections. However, Rear Adm. John M. McConnell, J-2 on the Joint Staff, and Defense Secretary Cheney had seen gun camera tapes of aircraft killing tanks. They accepted CENTCOM's damage assessment—as did Schwarzkopf.

On the eve of the ground war, CENTCOM reported Iraq's units were beat down to an average of just 66 percent of their prewar strength. Two days before ground operations, intelligence estimates showed most of the front-line infantry units at below 50 percent capability, while all of the Republican Guard units were between 50 and 75 percent, said *Certain Victory,* a report authored for the US Army by then-Brig. Gen. Robert H. Scales Jr.

Among the Republican Guard divisions, the Tawakalna stood at 57 percent of its prewar combat effectiveness, the Army found. The Medina was at 65 percent and the Hammurabi at 72 percent. The three Republican Guard infantry divisions were around 60 percent combat effectiveness. "The fighting force that invaded Kuwait was not the same as the one facing our troops on the eve of the ground campaign," Glosson summed up.

Schwarzkopf started the ground attack on Feb. 24, 1991. Rain, drizzle, fog, and mud did not hamper the offensive.

"The Air Force did deliver on its promise to make any ground offensive a walkover," Michael R. Gordon and Bernard E. Trainor later wrote. "The ground war was won in four days, but it was preceded by five weeks of bombing."

Schwarzkopf still hoped to destroy the Republican Guard, but then came an error allowing many to escape. Horner walked into the command post after a few hours' sleep late on the morning of Feb. 27. He noticed the fire support coordination lines for XVIII Airborne Corps were set far ahead of the advance of those units. "To this day, I don't know why anyone wanted the FSCL so far north," said Horner.

For 17 hours, air strikes on the Republican Guard slowed to a crawl as pilots operated under tight restrictions. Instead of making room for a fast advance, the premature move limited the air component to strikes under direct control of forward air controllers. Suddenly the Republican Guard got a break from the kill box tempo. Horner swiftly brought this to Schwarzkopf's attention and got the lines moved.

Within hours of removing the FSCL restriction, there was pressure from Washington to wrap up Operation Desert Storm. Iraq's forces were out of Kuwait. Powell told the President they were "within the window of success" and counseled against being seen to be "killing for the sake of killing." Bush ultimately decided to announce a cease-fire to take effect at 5:00 a.m. Riyadh time on Feb. 28.

The cease-fire sealed Kuwait's liberation. It also restricted Iraq's military to operations north of the 33rd parallel and set up zones where the Iraqi Air Force could not fly. US and coalition fighters would patrol the no-fly zones to enforce a UN mandate.

The coalition achieved a military victory of stunning proportions. It outperformed all prewar hopes for swiftness and low casualties. Unity of command for airpower was now a proven point.

Air planners lamented the incomplete destruction of strategic target sets, especially those linked to weapons of mass destruction. But the campaign damaged the most threatening of Iraq's capabilities. "Had the Persian Gulf War not occurred, Iraq could have produced its first nuclear weapon in early 1993," estimated a postwar DIA report.

Desert Storm left USAF with a new set of priorities.

USAF photo

Gen. Norman Schwarzkopf (center) congratulates members of the 24th Infantry Division on a job well done. Maj. Gen. Barry McCaffrey (right) was the division commander.

"Every major turn in the history of warfare has come from the introduction of shock and surprise" in some new manner or form, Gen. Ronald R. Fogleman later said of Operation Desert Storm.

Lessons Learned

Precision became the new minimum standard for airpower. The authors of the *Gulf War Airpower Survey* later compared 12 sorties flown by F-117s and F-111Fs with laser guided bombs to 12 sorties flown by F-111Es delivering ordinary, unguided Mk 82 500-pound bombs. The nonprecision attackers delivered 168 bombs against just two targets: a radio transmitter and an air defense sector operations center. In contrast, the precision attacks used 28 bombs against 26 targets. The differential of 13-to-one was "better than an order of magnitude difference," said the survey. Hundreds of older aircraft—including the tank-plinking F-111s—were retired to make way for precision fighters and investments in stealth.

Space operations earned a place in integrated combat operations. Horner, in fact, earned a fourth star and went on to lead Air Force Space Command.

Mobility proved critical, too. A year after Desert Storm, the stand-up of Air Mobility Command put tankers and airlifters together for the first time, to fine-tune global operations. The Air Force redoubled its commitment to the new C-17 and nursed it through final developmental problems, all to ensure rapid deployment capability.

In time, a whole generation of airmen learned expeditionary operations and no-fly zone enforcement as a way of life.

They would call on this experience 12 years later, at the onset of Operation Iraqi Freedom, for Iraq still belonged to Saddam. The unstated hope that Desert Storm might push Saddam out of power never materialized.

One Middle East expert, Zalmay Khalilzad, wrote in a Pentagon memo, "Iraqi nationalists in the armed forces might see the fate of their country at risk because of his reckless ambition and might move against Saddam."

"We were all convinced the Kurds and Shiites would overthrow Saddam the day this was over, if the coalition made him weak enough," Glosson acknowledged. "I bought into that … and we were all wrong."

The Iraqi dictator never fell within coalition crosshairs. The air commanders never felt they had good intelligence on the Iraqi dictator's location.

A few days after Desert Storm ended, President Bush told an interviewer: "To be very honest with you, I haven't yet felt this wonderfully euphoric feeling that many of the American people feel. ... You mentioned World War II. There was a definitive end to that conflict. And now we have Saddam Hussein still there." ■

Rebecca Grant is president of IRIS Independent Research. She has written extensively on airpower and serves as director, Mitchell Institute, for AFA. The companion piece to this article, "Desert Shield," appeared in the August 2010 issue.

A force buildup on Guam anchors a broad US military strategy to keep China in check.

Pacific Push

By Richard Halloran

In its strategy to deter China from driving the US out of Asia and the Western Pacific, US Pacific Command has quietly shifted its focus from Northeast to Southeast Asia, especially the South China Sea and nations along its littoral areas.

To dissuade China, the US has begun positioning forces which could threaten China's supply lines through the South China Sea. The oil and raw materials transported through those shipping lanes are crucial to a surging Chinese economy—an economy paying for Beijing's swiftly expanding military power.

The pivot point of this emerging strategy is Guam, the US territory in the central Pacific within striking distance of the South China Sea. The island

USAF photo by A1C Jeffrey Schultze

At top: Near Guam, an F-22 from the 90th Fighter Squadron, JB Elmendorf, Alaska, lines up on a tanker. Above: At Andersen AFB, Guam, an F-16 in an aggressor paint scheme lands during joint exercise Valiant Shield 2010.

USAF photo by SSgt. Andy M. Kin

USN photo by Mass Comm. Spec. 2nd Class Matthew White

Vietnamese military officials greet US Navy Cmdr. H. B. Le (right) during his ship's port call to Vietnam. PACOM is shifting focus to Southeast Asia nations such as Vietnam.

is also 1,800 miles from the coast of China, and therefore, within range of Chinese missiles.

Asked why the US was expanding Andersen Air Force Base and other bases on Guam, sites that could be hit by intermediate-range ballistic missiles, a senior US officer replied, "The message to China is that we are here and we mean to stay."

Despite North Korea's episodic provocations and fiery rhetoric, the primary objective of the new US focus is a China that has become more belligerent toward the US since the Beijing Olympics in August 2008. That event, especially its elaborate opening ceremony, is seen by some senior US officers now as a nationalistic declaration of China's sense of pre-eminence.

That attitude was reflected in a somewhat testy exchange between Secretary of Defense Robert M. Gates and Gen. Ma Xiaotian of the People's Liberation Army at the Shangri-La conference of Defense Ministers in Singapore in June.

With China, Gates said, the US wanted "sustained and reliable military-to-military contacts at all levels that reduce miscommunication, misunderstanding, and miscalculation. There is a real cost to the absence of military-to-military relations."

In rebuttal, Ma said: "If anyone has been setting up barriers to cooperation, it is certainly not us."

Territorial Overreach

The general asserted, "There are three main obstacles in the development of military relations: The first is the sales of arms to Taiwan, the second is the intense spy and patrol behaviors of US planes and ships in South China Sea and East China Sea."

The third, Ma said, was the 2000 National Defense Authorization Act and the amendment introduced by then-Rep. Tom DeLay (R-Tex.) that set restrictions on US military contact with the PLA.

DeLay sponsored another amendment the next year, prohibiting the US from paying the $1 million demanded by China for repatriating the Navy reconnaissance aircraft and crew that landed on Hainan Island after the EP-3 and a Chinese fighter shadowing it collided in international airspace.

In addition to harassing US ships in international waters, the Chinese have startled senior US officers with harsh rhetoric in private. Officers who analyze the PLA said Chinese military leaders have their own tactics, not controlled by the Communist Party or government, for dealing with Americans.

Despite their bluster, some Chinese appear to recognize that their swelling economic might has made them vulnerable. By the end of 2010, China will be importing about half the 8.2 million barrels of oil a day it consumes to keep the economy humming.

Some 80 percent of that will have come through the Strait of Malacca.

That lifeline could be cut with relative ease by air and sea power; a single B-52, for instance, can deliver a wide range of cruise missiles, torpedoes, and anti-ship mines. Thus, President Hu Jintao once pointed to Beijing's "Malacca dilemma" and during a visit to Malaysia went out to the strait to see for himself.

Within the last six months, China has elevated its territorial claim to most of the international waters of the South China Sea by calling the sea a "core interest."

In rebuttal, Secretary of State Hillary Rodham Clinton said in Hanoi in July that the US "has a national interest in freedom of navigation, open access to Asia's maritime commons, and respect for international law in the South China Sea."

If Chinese shipping in the South China Sea were disrupted, ships would be forced to navigate the tricky waters of the Arafura Sea between Indonesia and Australia or to sail around Australia, at enormous cost.

USAF photo by Amn. Whitney Amstutz

An F-15 approaches the boom of a KC-135 from the 168th Air Refueling Wing, Alaska Air National Guard.

Moreover, the shipping would still be vulnerable to attack on the long sea-lane north in what strategists call a "distant blockade."

Some US naval thinkers have shown new interest in the "Heartland Theory" propounded by the British geographer Halford J. Mackinder more than a century ago. Mackinder argued that whoever controlled the heartland of Eastern Europe could control the "world island," or Eurasian continent.

Applying that strategy to Asia, students of Mackinder contend that controlling the South China Sea would enable an air and naval power to control East Asia, including China, and therefore the "world island."

In 2006, Maj. Lawrence Spinetta, a student at the Air War College, came to a similar conclusion. "To counter China's growing naval power, the United States can exploit a critical vulnerability—China's dependence on sea lines of communication," notably the Strait of Malacca, he wrote.

Guam is critical to this strategy. The latest addition to Guam's arsenal was the arrival in September of the first of three RQ-4 Global Hawk unmanned surveillance aircraft that will be based on the island by mid-2011.

Together, the three Global Hawks will be able to maintain a 24-hour watch, seven days a week, over the South China Sea or wherever Pacific Command deems necessary.

USAF Gen. Gary L. North, commander of Pacific Air Forces, flew from Hawaii in September to tell a crowd at Andersen that Global Hawk missions would include humanitarian, anti-piracy, and if necessary, "combat operations."

Global Hawk is packed with sensors that can cover 40,000 square miles in a day from an altitude of 60,000 feet.

The intelligence aircraft has a range of 10,900 miles, enough to recon the East Asian littoral from Seoul to Singapore. It operates day and night, in all weather, and produces high-resolution images that can be transmitted to a ground station at Joint Base Pearl Harbor-Hickam, the Pacific Air Forces headquarters in Hawaii, and several others almost instantly.

Persistent Presence

While new to Andersen, Global Hawk provides a proven capability, North said. The general, who commanded the aircraft in the air war over Iraq for three years, said Global Hawk had flown 35,000 hours over Iraq and Afghanistan—and another 10,000 hours elsewhere.

Lt. Gen. Herbert J. Carlisle, commander of 13th Air Force at Hickam, which oversees the operations on Guam, suggested an added benefit from Global Hawk: "People have a tendency to behave" when they know they are being watched.

Still to come on Guam are a wharf and maintenance facilities for transiting nuclear-powered aircraft carriers and escorting warships. This support unit is intended to keep the ships on station longer without having to return to Pearl Harbor or to rely on bases in Japan and Singapore.

An Army missile defense unit of 600 soldiers, plus families, is due to be stationed on Guam, according to an environmental impact statement (EIS), to be a direct counter to the Chinese missile threat.

Further, senior US officers said plans to move 8,600 marines, plus 9,000 dependents from Okinawa to Guam by 2014, were on track despite dithering by successive governments in Tokyo. (At least, that is the official view. Privately, US senior officers have expressed skepticism that the schedule will be maintained.)

The EIS disclosed that, in addition to building barracks, quarters, and ranges for the marines, additional training sites may be built on the island of Tinian, 100 miles north of Guam. Naval construction battalions (Seabees) built the world's largest air base there during World War II, including the airfield from which B-29 bombers struck Japan, and carried out the atomic bombings of Hiroshima and Nagasaki. Senior Air Force officers said the Tinian airfields

Photo by Sara Mortimer

SrA. Joshua Moreland drags SSgt. Doug Kessler—with simulated wounds—to safety during a combat readiness exercise at Andersen. The base is within range of Chinese ballistic missiles.

themselves had been surveyed for possible emergency use.

Already in place at Andersen is what the Air Force calls "persistence presence" of B-52 and B-2 bombers on continuous rotational deployment. They are frequently joined by F-15 and F-22 fighters that come to Guam for several months at a time from bases in the continental US.

Naval Base Guam at Apra Harbor is the homeport for three nuclear-powered fast-attack submarines and their tender. Others based at Pearl Harbor or on the US West Coast come in from patrol from time to time.

One day not long ago, a B-52 bomber thundered down the runway just as it would have during the Christmas bombing of North Vietnam in 1972. It almost disappeared from view in the dip for which this airfield is famous, then lifted off and turned west to do its part in an exercise called Valiant Shield.

Minutes later, two F-15 fighters followed the B-52. After that, three Navy P-3C patrol airplanes landed. Along the ramps under a blazing sun, mechanics tended to F-22 fighters, KC-135 tankers, E-3 Airborne Warning and Control System aircraft, and Marine Corps F/A-18s. Altogether, the Air Force, Navy, and Marine Corps had 106 aircraft on Guam for integrated training.

At sea between Guam and Palau to the southwest, the carrier *George Washington* launched and recovered her 85 fighters, attack aircraft, and electronic warfare airplanes, as the force trained to defend islands belonging to allies and friends from Japan through Taiwan to the Philippines and Indonesia. It was the largest joint exercise ever mounted from Guam.

Photo courtesy of Lockheed Martin

China blames poor military relations with the US on, among other causes, the 2001 incident where this US Navy EP-3 and a Chinese fighter aircraft collided.

Back at Hickam, the air war was controlled by the 613th Air and Space Operations Center in a dark cavern filled with several hundred computer monitors flashing a torrent of battle reports and sending out a stream of intelligence and orders. Col. Alan Kollien, then the 613th vice commander, said the drill tested "our ability to provide command and control" from more than 3,000 miles away.

The Indonesia Connection

After the week-long exercise, lessons learned were thrashed out, then written up in reports to Pacific Air Forces and the Pacific Fleet. Those assessments were sent to Washington, where Air Force and Navy staffs are devising a joint operational plan called AirSea Battle to guide combat operations in the event of hostilities.

At Andersen and other bases on Guam, plans are moving ahead to harden hangars, communications centers, fuel storage, and ammunition bunkers to withstand blasts from Chinese missiles.

Officers declined to identify the sites being reinforced but did say they would be strong enough to survive the worst typhoon Guam had experienced and to ride out an earthquake that registered seven on a Richter scale.

Guam is clearly a focal point of military activity, but the US is also reaching out to Asian nations with shared interests. Some of these new partnerships are not well-known.

Diplomatically, US leaders have for several years cultivated relations with Indonesia, the world's most populous Muslim nation and a potential ally in the struggle against terror. The Indonesian archipelago, moreover, is situated alongside the southern flank and astride several passages into the South China Sea.

At the workaday level, the US sends Air Force pilots to take part in exercises with the Indonesian Air Force, deploys specialists to assist in training for force protection, and responds to requests for help on counterterror operations.

"We have to take it slow and not move too fast," said a US officer. "They want to do it for themselves."

The TNI, as the Indonesian armed forces are called, has done a good job of revamping itself, according to a knowledgeable US officer. The TNI in past years was much criticized at home and abroad for oppressive tactics and violations of human rights.

Even more intriguing has been the US reconciliation with Vietnam since 1995, when diplomatic relations were established after the bitter war that ended almost 36 years ago. Many Vietnamese fear China, for its thousand years of occupation of northern Vietnam (from the third century B.C. to 939) and repeated clashes since then. The latest was a brief skirmish in 1979.

USAF photo by SrA. Nichelle Anderson

Military personnel from South Korea arrive at Andersen this past November for a visit to strengthen ties with the US.

USAF photo by Nichelle Anderson

On a visit to Guam this fall, Secretary of State Hillary Clinton inspects a Global Hawk at Andersen Air Force Base. Three RQ-4 aircraft will be based there.

Hanoi has become a regular stop for US Secretaries of Defense. Gates noted in October, when he attended a meeting of Defense Ministers of the Association of Southeast Asian Nations in Hanoi, that he was the third US Secretary of Defense to visit Vietnam.

In an address at Vietnam National University, Gates said: "Think of the historical consequences of this relationship, and about how dramatically it has transformed in such a short period of time. A decade of conflict and bloodshed between our nations has given way to prospering bilateral relations now marking their 15th year."

"Wars end," Gates said. "Nations wise enough to put past bitterness and heartbreak behind them can find in each other future friends and partners."

Similarly, Clinton told the press in Hanoi three weeks later that "this is my second visit to Hanoi this year, and it is a sign of the importance that the United States places on our relationship with Vietnam, with Southeast Asia, and with the entire Asia-Pacific region."

"It is clear," she said, "that our countries have reached a level of cooperation that would have been unimaginable just a few years ago."

At the troop level, Americans have worked with the Vietnamese on maritime security and on search and rescue operations usually conducted by the coast guard.

Several US warships have made port calls in Vietnam, including the destroyer *Lassen* commanded by Cmdr. Hung Ba Le, the first Vietnamese-American to be skipper of a US warship.

In some contrast to Southeast Asia, US allies in Northeast Asia—Japan and South Korea—are no longer seen as the "linchpins" or "cornerstones" of the broader US security posture in Asia.

Only One Bright Spot

In Japan, political paralysis has turned the Tokyo government into a listless ally. "Japan has been marginalized," said a Japanese diplomat, "and we have done it to ourselves."

The most recent governments have reneged on an agreement to move a Marine Corps base in Okinawa. At the same time, the Chinese government successfully bullied Japan over a collision at sea.

Part of the paralysis can be attributed to having had 12 Prime Ministers and Cabinets since Prime Minister Kiichi Miyazawa left office in 1993. Only Prime Minister Junichiro Koizumi served for any length of time, from April 2001 to September 2006. But he left little mark on Japanese politics.

The other 11 Japanese Prime Ministers have served for an average of a year. Some have come to office with little experience in governing or foreign policy.

By contrast, the US has had three Presidents (Bill Clinton, George W. Bush, and Barack Obama) in the same 17-year period.

An American scholar who considers a working US-Japan alliance to be in America's best interests was equally pessimistic. "Japan is its own worst enemy," he said. "In Washington, neither the Democrats nor the Republicans want to bypass Japan. But a partner must want to participate, and there's little sign of that now."

The political situation in Tokyo was deemed so sour that officers at US Forces Japan's headquarters at Yokota Air Base, west of Tokyo, were not willing to discuss it, even on background.

The one bright spot, said American and Japanese military officers, was good working relations between the two forces. There remain 35,600 American military personnel in Japan.

In South Korea, military relations between the South Koreans and the US have been strained for several years. The US wants to withdraw many forces because South Korea's military forces are better armed, equipped, trained, and fed than their North Korean adversaries. South Korean governments, however, whether left wing or conservative, have been reluctant to take full responsibility for the defense of their own country.

For example, US military leaders had informed South Korea that wartime operational control of their forces would be transferred to them in April 2012. President Lee Myung Bak, however, persuaded Obama to postpone that transfer to 2015.

The US has been drawing down its forces in South Korea gradually over the last 10 years, dropping from 36,200 in 2000 to 24,700 in 2008. When the South Koreans complained they were being abandoned, the US agreed to keep a floor of 28,500 troops in South Korea.

They are being formed into an expeditionary force with missions outside of Korea and will be concentrated at a large new Army post being constructed at Pyongtaek and a slightly expanded Air Force base nearby at Osan, 30 miles south of Seoul. Other moves will straighten command lines that have been tangled since the Korean War ended in 1953 and will nearly complete a process of integrating US forces in Alaska, Korea, Japan, Guam, and the South China Sea under PACOM in Hawaii. Even the US troops under constant threat of attack from North Korea are now part of the revamped posture in the Pacific. ■

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Verbatim

By Robert S. Dudney, Contributing Editor

China's the One

"The Chinese have enormous influence over [North Korea], ... and yet, ... they appear unwilling to use it. ... We appreciate Beijing's offer to propose an emergency six-party gathering, but ... we first need an appropriate basis for the resumption of talks. There is none, so long as North Korea persists in its illegal, ill-advised, and dangerous behavior. ... China has unique influence. Therefore, they bear unique responsibility. Now is the time for Beijing to step up to that responsibility."***—Adm. Michael G. Mullen, Chairman of the Joint Chiefs of Staff, in Dec. 8 remarks to the press in Seoul, South Korea.***

Tale of Two Pilots

"I don't know what 'fifth generation' means, except that, when I talk to an F-22 pilot, he makes it clear that he flies a fifth generation jet, and I don't."***—Maj. Chris Cassem, F-15E pilot at the USAF Weapons School, Nov. 30,*** **Aviation Week.**

Oh, Shut Up

"It is entirely possible that [North Korea's] recent revelation of their uranium enrichment centrifuges and Pyongyang's shelling of a South Korean island ... are designed to remind the world that they deserve respect in negotiations that will shape their future."***—Former President Jimmy Carter, Nov. 24,*** **Washington Post.**

Bipolar Briefings

"Gates Gets a Sobering War Update"***—Headline on Dec. 8 Los Angeles*** **Times** ***dispatch from Kabul, Afghanistan.*** "Petraeus Gives Gates an Upbeat Assessment"***—Dec. 8, headline on*** **National Journal** ***story from Kabul.***

Signifying Nothing

"Do Europeans want to be actors on the international stage, or do they want to be the actors in a play they are not writing? At the pace we're going, Europe is progressively becoming a protectorate, and in 50 years, we will become the game in a balancing act between the new powers and will be under a Sino-American dominion."***—Former French Defense Minister Herve Morin, quoted in the Dec. 5*** **Los Angeles Times.**

Darth Obama

"In the first 20 months of the Obama Administration, the CIA reportedly conducted at least 126 ... drone strikes in Pakistan—nearly triple the Bush Administration's total—killing at least 800 people. As many as 15 other significant commanders in al Qaeda, the Taliban, and affiliated groups have been felled by drones under Obama."***—Peter Bergen and Katherine Tiedemann, both of the New America Foundation, writing in December 2010 issue of*** **The Atlantic.**

Boots in the Air

"I would argue that there isn't an Army remotely piloted aircraft operator who has a clue on how to operate in international airspace. This is not a pejorative comment. I am just saying what the reality is."***—Gen. Norton A. Schwartz, USAF Chief of Staff, Oct. 6, National Press Club, Washington, D.C.***

Dear Jackass

"The government of Kim Jong Il has been determined to do anything but interconnect with the rest of the world. ... Such despotic regimes understand [they] ... can inflict large-scale damage through cyber attacks. After all, it is not so painful to disrupt the information superhighway if you are riding a mule."***—Former Rep. Thomas M. Davis (R-Va.),*** **High Frontier,** ***the Air Force Space Command journal, released Nov. 15.***

Sen. Maverick (R-Ariz.)

"McCain is not a big fan of the Air Force. In fact, he hates the Air Force."***—F. Whitten Peters, former Secretary of the Air Force, speaking of Sen. John McCain (R-Ariz.) in "Own the Sky" in the November*** **Washingtonian** ***Magazine.***

Anchors A-Waste

"I'm convinced that China will, within 10 years, certainly, have aircraft carriers or air-capable ships of a sort. I think that's great. I think I love this. As a former Navy guy, I'd love to see China invest all its money in aircraft carriers, which are more and more just big submarine targets."***—Bernard Cole, National War College professor, in a Nov. 5 lecture to Center for National Policy, Washington, D.C.***

Sunshine Patriots, Santa Fe Div.

"We always thank our servicemen and our veterans. We pray for their safety. To then turn around and say, 'But we don't want to be inconvenienced in the least by your getting the training you need,' is hypocritical."***—Chris Calvert, former USAF pilot and now member of Santa Fe City Council, N.M., quoted in the Nov. 8*** **Wall Street Journal.** ***Calvert was referring to critics of USAF training flights in the area.***

Nukes Are Iran's Choice

"The only long-term solution in avoiding an Iranian nuclear weapons capability is for the Iranians to decide it's not in their interest. Everything else is a short-term solution, is a two-to-three-year solution. And if it's a military solution, as far as I'm concerned, it will only make them—it will bring together a divided nation, it will make them absolutely committed to attaining nuclear weapons, and they will just go deeper and more covert."***—Secretary of Defense Robert M. Gates, remarks to the*** **Wall Street Journal** ***CEO Conference, Washington, D.C., Nov. 16.***

Wait! What Means "Stealth"?

"The radar network acts as the watchful eyes of the air defense system in all the border areas of the country and in various locations, detecting the slightest movements within the skies of the Islamic Republic, accurately monitoring them all."***—Iranian Air Marshal Hamid Arzhangi, Nov. 19 remarks to Fars News Agency, regarding Iran's new air defense system.***

Well, Of Course It Is!

"An unusual breed of Asian snakes can glide long distances in the air, and the Department of Defense is funding research at Virginia Tech to find out why."***—From a Nov. 23*** **Washington Post** ***story, "Pentagon Seeks Flying Snakes' Secret."***

21st Century Rivet Joint

By Marcus Weisgerber

Photos by Jim Haseltine

The RC-135V/W Rivet Joint is far from attractive. The RJ features a bulbous nose, two jowls on each side of the fuselage extending from the rear of the cockpit to the wings, and bumps and lumps just about everywhere, with pointy antennas jutting from its roof and belly.

The aircraft is not winning any beauty contests. But what it lacks in looks, it makes up for in capabilities.

Don't let the nearly 50-year-old heavily modified airframe fool you. Inside, the RJ is packed with some of the most sophisticated and sensitive surveillance equipment in the Air Force's inventory, providing a great deal of vital intelligence. And today, perhaps more than ever, the Boeing 707-based RJ is doing more than just listening; it's helping to save lives on the battlefield.

The aircraft and its crews—which spent decades flying near the Soviet Union gathering intelligence that commanders hoped would give the United States a leg up on its rival during the Cold War—have spent much of the last decade adapting to a new mission. The mission is more tactical in nature, and has a more immediate use for the critical battle information from the front lines in Southwest Asia.

"It's not that the Cold War-like missions have gone away, ... but ... we've adapted to this fight that we're in today," Brig. Gen. John N. T. Shanahan, commander of the 55th Wing at Offutt AFB, Neb., said in an interview.

RC-135s have evolved into key battlefield intelligence aircraft, and the UK will soon fly its own.

The 55th Wing oversees all of the Air Force RC-135 signals intelligence (Sigint) aircraft, although the full complement of the wing's airplanes is rarely there. Rivet Joint reconnaissance squadrons are based at locations around the world, including RAF Mildenhall in the United Kingdom and Kadena AB, Japan.

The wing has continuously deployed to the Middle East since 1990 when it began flying missions in the days following Iraq's invasion of Kuwait. Today, the deployed Rivet Joint aircraft routinely fly missions in support of operations in Iraq and Afghanistan from a forward operating base in the Persian Gulf region. With only 17 Rivet Joints in the inventory, they are all in high demand.

"It has always been a low-density, high-demand asset, which translates to crews being on the road," said Maj. Gen. Thomas K. Andersen, director of requirements at Air Combat Command.

Over the last decade, the Air Force has changed the way it employs the Rivet Joint, specifically in irregular combat in Afghanistan and Iraq. Today's wars are, needless to say, far different from the Strategic Air Command days.

At left, a Rivet Joint displays its antennae and sensors. Below, an RC-135S Cobra Ball in flight passes an RC-135W on the flight line at Offutt AFB, Neb.

"The world has changed [and] the kind of fight that we're fighting has changed quite a bit, and with that, we have changed," Lt. Col. Richard M. Rosa, commander of the 763rd Expeditionary Reconnaissance Squadron, based in Southwest Asia, said in an interview.

"We've adapted over time, ... from a predominantly strategic asset that is able to bring a tremendous amount of capability to bear in the tactical environment," said Rosa, who has been part of the RC-135 community since 1999.

The shift from the strategic to tactical means RJ aircrew are now protecting ground troops from deadly roadside bombs. While the details of these tactics are classified, service officials say Rivet Joint crews are responsible for helping identify improvised explosive devices, and in turn, saving lives.

In addition to its traditional signals intelligence mission, Rivet Joint aircrews have adapted in four key areas, making the aircraft increasingly relevant on the battlefield today. Airmen on board frequently provide imminent threat warning, support for troops in contact, and support for personnel recovery. Crews are also cross-cueing, a tactic that allows the RC-135 to electronically connect to other airplanes (such as the F-15E, A-10, U-2, EC-130 Compass Call, and MQ-1 Predator) and with other assets in the air and on the ground.

It was during the first Gulf War that the aircraft and crews began integrating into more of a tactical role, providing near real-time threat warning and enemy indications, directly supporting troops on the ground.

Shanahan attributes much of the mission success in this new tactical irregular warfare environment to the crews and linguists, who have proved to be innovative in the shifting, unpredictable environment of IW.

"We've done it through tremendous innovation, whether it's technological or if it's really personnel, just people doing innovative things, trying new things, doing great things, each and every day," Rosa said. The information obtained is pushed in real time to ground units through a variety of means, said Shanahan. Data are also collected and made available for further worldwide processing, analysis, and dissemination via the Real-Time Regional Gateway.

The Best of Both Worlds

Despite the shift to the tactical mission, crews still must remain proficient for strategic intelligence-gathering duties.

The stand-up of the 338th Combat Training Squadron at Offutt in 1999, to train aircrews for operations in 12 different types of reconnaissance aircraft including the Rivet Joint, has helped better prepare aircrews for shifting between strategic and tactical missions. In the past much of the training was "farmed out" to other entities, according to Rosa. For example, Rivet Joint pilots and navigators trained with KC-135 tanker crews while electronic warfare officers and other operators were trained "in house," within individual units to which they were assigned.

"The evolution of the training unit allows the foundation to be built on both that strategic-type mission, as well as that tactical-type mission," Rosa said.

As the Air Force's Rivet Joint mission evolves, the United Kingdom's Royal Air Force is poised to become the first foreign nation to fly the RC-135.

The Air Force planned to start training the first British RC-135 aircrews at Offutt this past fall, with the 338th CTS overseeing the task. The initial cadre will consist of about 100 RAF officers from the electronic warfare and linguist career fields, and training will take about a year. Maintainers will start learning how to take care of the aircraft once the first aircrew classes conclude.

Once trained, the Brits will join their American counterparts on USAF Rivet Joint missions until RAF RC-135s finish undergoing extensive modifications. Three Eisenhower-era KC-135 aerial tanker airframes will be transformed into high-tech, intelligence-gathering aircraft. A co-manning arrangement between Air Force officials and their British counterparts allows for joint crew operations.

"Now we have the best of both worlds," Shanahan said. "They're going to preserve their renowned [signals intelligence] capability; ... we are going to take advantage of the capabilities that they bring through an enduring partnership, which will include flying with each other over the next decade and beyond."

The RAF is in the process of transitioning its Sigint missions to the RC-135 from the Nimrod R1, which the Ministry of Defense intends to retire in the coming

USAF photo by Josh Plueger

Brig. Gen. John Shanahan (l) tours a security forces facility with TSgt. Anthony Pevestorf at Offutt. Shanahan has seen the RC-135's shift to a more tactical role.

months. The RAF originally planned to upgrade its Nimrod fleet—which began flying in the late 1960s—through the Helix program.

However in 2006, a Nimrod exploded in the sky above Afghanistan, killing all 14 crew members on board. Soon after, the British military asked the Air Force about the potential of acquiring Rivet Joints to replace its Nimrods. The Pentagon subsequently offered London one RC-135 aircraft. A foreign military sale was officially announced in October 2008, and the British government has since signed a letter of offer and acceptance to receive three aircraft.

The RC-135 "allows the UK to preserve an incredibly good Sigint capability in their country that they've had for decades and would be losing if they were not to get into another program," Shanahan said.

Last fall, the British Rivet Joint program survived a major scrub of military programs in the United Kingdom, which calls for cutting the country's defense budget by eight percent over the next four years. The addition of RC-135 signals intelligence aircraft into the RAF inventory will give the British the ability "to provide global independent strategic intelligence gathering," according to the defense white paper released by the government this past October.

The future of British signals intelligence operations rests on the RAF's acquisition of Rivet Joint aircraft. L-3 Communications in Greenville, Tex.—which maintains and upgrades Air Force RC-135s under the guidance of USAF's Big Safari program office, the service's rapid acquisition directorate—will convert the KC-135Rs into Rivet Joint configuration, which essentially involves gutting the airplane. This includes the installation of additional cooling units, removing the tanker boom, and installing the Rivet Joint's signature "hog nose" radome.

A Force Multiplier

British crews from 51 Squadron at RAF Waddington—home to the Nimrod R1—are expected to receive their first RC-135 in 2013. While US officials are working through security clearance issues, indications show the British RC-135s should be largely the same as Air Force Rivet Joints.

"I think this is one that does wonderful things for both the UK and the US because we take advantage of strengths in both countries," Shanahan said.

Just how long the Rivet Joint will continue to fly is anyone's guess.

Some Air Force estimates have the RC-135 in the inventory for another 30 years. Over time, the wing's RC-135s have received numerous upgrades, including glass cockpits, radios, more powerful engines, and a tactical display for pilots. Every four years, each RC-135 goes through an 18-month overhaul at an L-3 facility in Greenville. "The jets are holding up well," Rosa said, noting the work done by maintainers in theater helps keep the aircraft flying.

Now aircrews are hoping for new tools some service officials say could revolutionize the way they gather and process information. The installation of new satellite communications equipment linking the aircraft with the Wideband Global Satellite Communications (WGS) system could allow aircrews to share the information they gather with intelligence processing centers on the ground, including the Air Force Distributed Common Ground System.

"It's going to be a true force multiplier," Shanahan said of WGS. "I look [at] it as an exponential leap in our capabilities in terms of bandwidth both to the airplane and off the airplane."

WGS would allow the Rivet Joint to share more information with other aircraft and ground crews in real time, thus allowing more exploitation to occur simultaneously. When WGS bandwidth is combined with ground processing, exploitation, and dissemination improvements such as Service Oriented Architecture, "we're going to be able to blow past this idea of reachback and turn it into something that we'll call 'reach anywhere,'" Shanahan said.

The installation of the capability is like adding "three to four crews of manpower, being able to collect against a target in real time to do processing, exploitation, and dissemination on a massive scale," according to Shanahan. "We'll have a whole lot of capability against a target set with our airplane, and of course, others will be out there collecting on the same target set."

This all sets the stage for full integration into the Air Force's DCGS, meaning the information will not just be available to intel analysts, but to other service members in real time. "We've started down that path, but WGS lets us sprint instead of just crawling or walking," Shanahan said.

As the crews and aircraft continue adapting to irregular warfare missions, officials are also considering the addition of a new command and control oversight position in the back of the aircraft, as well as the new equipment.

Dubbed the nonkinetic effects package commander, the concept is much like the airborne strike package commanders, who have been part of all US conflicts since World War II. "We now need a similar position for a one-stop tactical-level boss to plan, direct, execute, and—to some extent—assess nonkinetic effects as part of air tasking order execution," Shanahan said.

The concept calls for this new commander to work closely with the air and space operations center "to ensure operational-to-tactical integration," according to Shanahan. Officials are currently building tactics, techniques, and procedures for the airborne commander slot and plan to test the use of the position during a major electronic attack and intelligence-surveillance-reconnaissance-focused Red Flag exercise this spring.

"We are well-positioned to take on this role in the RC-135 Rivet Joint and the EC-130H Compass Call," Shanahan said. "I like what I see so far and I like the fact that we're moving out on it." ■

Marcus Weisgerber is managing editor of the Washington, D.C.-based defense newsletter Inside the Air Force. *His most recent article for* Air Force *Magazine, "The Light Attack Aircraft," appeared in the January 2010 issue.*

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Congress and the Air Force spent a decade wrestling over the final fate of the legendary SR-71 Blackbird.

Going Nowhere

On May 31, 1967, a torrential rainstorm assaulted Kadena Air Base on Okinawa, Japan. Paul Bacalis, the head of the CIA's aerial reconnaissance office, was on base that day. Bacalis recalled an aide's question about the A-12 Oxcart sitting on the runway—"What do you say, boss?"—as well his response: "Launch him!"

Bacalis then watched the aircraft head for North Vietnam on its first operational mission. Less than a year later, on March 21, 1968, it was the Air Force SR-71's turn to contribute to the Vietnam War effort. The SR-71 was the military derivative and successor to Lockheed's famed but short-lived A-12 spy aircraft. Maj. Jerome F. O'Malley and Capt. Edward D. Payne embarked from Kadena on a five-hour mission over North Vietnam.

As with the A-12, the SR-71 Blackbird was a technological triumph, capable of flying at altitudes more than 85,000 feet and speeds faster than 2,100 miles per hour. Most importantly, it could be fitted with a variety of sensors, including two Technical Objective Cameras capable of nine-inch resolution, an Optical Bar Camera that could carry either black-and-white or infrared film, or imaging radar, producing imagery even in the presence of cloud cover. The airplane could also carry intercept equipment to gather radar emissions.

While the SR-71 began its career in Asia, its reach would become global—gathering intelligence on targets in America's backyard (Cuba, Nicaragua), as well as in the Middle East (during the 1973 Yom Kippur War and its aftermath, and at Benina Airfield in Libya after the 1986 El Dorado Canyon raid).

Peripheral SR-71 missions included those flown off the borders of East Germany, Poland, and the Soviet Union and later missions yielding radar images of Soviet submarine ports.

By the end of 1989, Air Force SR-71s had flown 3,551 operational sorties.

But in the late 1980s, even as SR-71s flew missions around the world, its days as a reconnaissance platform appeared numbered. Key staff members of the House Permanent Select Committee on Intelligence, Air Force Chief of Staff Gen. Larry D. Welch, and Lt. Gen. Leo W. Smith II of the Budget Review Board all favored its retirement.

The primary argument focused on the substantial costs of operating the fleet—for pilots, fuel, maintenance, and facilities—while the benefits of the high-performance aircraft were marginal, given the capabilities of satel-

Fast

By Jeffrey T. Richelson

DOD photos

The SR-71 reconnaissance aircraft gathered intelligence on hotspots from Cuba to the Mideast and the Soviet Union. At left: An SR-71 undergoes maintenance on a flight line. Below: A 9th Strategic Reconnaissance Wing Blackbird lands after a mission.

lites and other reconnaissance aircraft. In addition, the Pentagon reported there was an air-breathing successor to the SR-71 under development.

Passionate Supporters

A temporary reprieve was granted in 1988, because Adm. Lee Baggett Jr., head of US Atlantic Command, wanted the SR-71 to continue its coverage of Russia's Kola Peninsula, home to a significant Soviet naval presence.

Baggett took his case to the Joint Chiefs of Staff. The JCS agreed to fund the SR-71 detachment at RAF Mildenhall, UK, for another year, but even better for SR-71 supporters, the Senate Appropriations Committee also approved another year's funding for SR-71 facilities at Palmdale, Calif., and at Kadena.

The victory was temporary. Before the end of January 1989, the trade press reported the Air Force planned to retire the entire Blackbird fleet.

There were dissenters to the proposal. During hearings in 1989, Sen. John Glenn (D-Ohio) challenged the decision, stating he did "not buy it on cost," enumerating the aircraft's capabilities, and characterizing the decision as "crazy."

The Blackbird generated large numbers of loyal and passionate supporters who were enamored with the aircraft's unique capabilities, extreme performance, and distinct, classic appearance. But passion alone could not save the airplane, and on March 6, 1990, pilot Lt. Col. Raymond E. Yeilding and reconnaissance systems operator Lt. Col. Joseph T. Vida took off from Palmdale on what was anticipated to be the SR-71's retirement flight.

Sixty-eight minutes later, they landed at Dulles Airport in suburban Northern Virginia, having set four speed records on their mission to deliver the aircraft to the National Air and Space Museum.

Then, on Aug. 2, 1990, a little less than six months after Yeilding and Vida landed at Dulles, Iraqi strongman Saddam Hussein made one in a series of miscalculations that would eventually put his head in a hangman's noose.

Hussein ordered three Republican Guard divisions into Kuwait, triggering a US-led international response. A buildup of troops followed, as the coalition prepared for air and ground campaigns.

The possibility of war led to calls for resuming SR-71 operations. Ben Rich, the head of Lockheed Skunk Works (the SR-71's legendary development shop), contacted Air Force Vice Chief of Staff Gen. John Michael Loh and offered to put together a package of three airplanes for about $100 million. Rich suggested using the supersonic spy aircraft not only to gather intelligence but also "to sonic-boom the bastards." Loh presented the idea to Defense Secretary Richard B. Cheney, who wasn't interested, telling Loh, "Once we let this damned airplane back in, we'll never get it back out."

DOD photos

Airmen assist pilot Maj. Barry MacKean after an SR-71 flight. Opponents of continued Blackbird operations objected to its cost and felt that satellites and other reconnaissance assets could do the job.

Other voices for reactivation came from the Senate and the military. A request from Sen. Robert C. Byrd (D-W. Va.) to use the Blackbird to support the Desert Shield force went nowhere. Even the pleas of US Central Command's Gen. H. Norman Schwarzkopf were in vain, as the Joint Chiefs of Staff Chairman, Gen. Colin L. Powell rejected his first request, and a second passed up to Cheney fared no better.

The Gulf War was not sufficient to get the SR-71 recalled to active duty, not even the postwar Department of Defense assessment, "The Conduct of the Persian Gulf War," which asserted, "The SR-71 ... would have provided broad-area coverage of a large number of Iraqi units" during Desert Shield and "would have been of value for BDA [bomb damage assessment] and determining Iraqi force dispositions" during Desert Storm.

Back From the Grave

In 1994, nearly four years after the Blackbird's nominal final flight, proponents finally began to have more success.

On Feb. 3, after a briefing by Lockheed on SR-71 reactivation, Gil I. Klinger, the Pentagon's director of space and advanced technology strategy, requested the company produce a study on the cost of reactivation, with the results presented by mid-March. Lockheed proposed returning three refurbished SR-71s to operational status for 12 months, with one 30-day deployment, for $79.4 million.

Thanks to Byrd and several of his colleagues, Lockheed got what it wanted. Byrd and others contended that in 1990, the Pentagon was less than fully truthful about the status of the planned replacement for the SR-71.

The efforts of Byrd and other SR-71 supporters paid off when the DOD appropriations bill for Fiscal 1995 provided $100 million, with $60 million earmarked for restoring three aircraft to operational status—cost estimates validated by a July 15, 1994, Pentagon study.

Other appropriations tracked closely with the Lockheed proposal; the budget would fund one year of operations, with one 30-day deployment during which there would be 10 operational sorties.

While the absence of an SR-71 replacement was one factor in the Senate appropriators' decision to breathe new life into the Blackbird program, another was likely the continuing conflict with North Korea over its nuclear program,

Below, SSgt. David Hansen directs an SR-71.

DOD photos

A Blackbird from RAF Mildenhall, UK, takes off through the fog. Its cameras could produce imagery even in cloudy conditions.

which had the Pentagon studying scenarios for an attack on the country's Yongbyon reactor.

Even without conflict, restoring the three SR-71s to operational status began on Jan. 5, 1995. But while Congress could force DOD and the Air Force to restore the airplanes to operational status, it couldn't force them to actually use them—or stop them from planning for program termination.

A December 1994 congressional memo to the commander of Air Combat Command noted the Air Force and Pentagon leadership was not programming funds to operate the airplanes in the 1996 fiscal year or beyond. In addition, it reported the Pentagon was setting aside $5 million for program termination costs. The memo also noted the "recent discussion with Air Staff ... indicate[s] that the congressional proponents for the program will be satisfied if the Air Force shows it is making 'good faith efforts' to achieve a deployable mission capability within the current fiscal year."

A month after the reactivation began, Air Force Chief of Staff Gen. Ronald R. Fogleman, in a handwritten note to two other senior Air Force officers, wrote, "We see the SR-71 as a one-year congressionally directed action that should be terminated ASAP."

It did not appear Fogleman would get his wish, when further funds were appropriated in April.

But while funds were appropriated, they were not authorized to be spent by the Senate Armed Services Committee. This set off months of legal wrangling over whether funds could be spent if they had not been authorized.

On April 16, 1996, relying on the findings of DOD and Air Force general counsels, the Air Force ordered an immediate halt to all SR-71 operations.

Call in the Lawyers

The legal findings, allowing DOD and the Air Force to shut down SR-71 operations, were also the basis for denying two requests from members of the Intelligence Community to employ the Blackbird. On May 28, 1996, the National Security Agency requested a mission over Bosnia. Then in June, the Defense Intelligence Agency submitted a request from US Pacific Command for a mission, with the likely target of North Korea. That request met the same fate as NSA's.

After Blackbird supporters on the Senate Appropriations Committee threatened to block the Fiscal 1997 intelligence authorization act, $39 million was appropriated for the SR-71—$30 million for operations and maintenance and $9 million for procurement.

In 1997, another military command requested assistance from the SR-71, this time US Southern Command, one

An SR-71 taxis along a flight line. Numerous loyal supporters admired the SR-71's distinct appearance and capabilities: It could fly higher than 85,000 feet and faster than 2,100 mph.

DOD photos

At top, Lt. Col. William Dyckman (l) and Lt. Col. Thomas Bergam deplane from the SR-71's last operational flight in 1990. At right, the high-altitude pressure suits worn by Blackbird pilots.

of whose primary missions was, and is, counternarcotics.

The US Intelligence Community monitors every aspect of the drug trade, from cultivation to refining to shipment. But in 1997, SOUTHCOM felt some of the answers it wanted required a greater overhead collection effort. The command first looked to the venerable U-2 spyplane.

The U-2 Was Unavailable

From Oct. 15, 1996, through Dec. 15, 1996, and then again from April 12, 1997, until June 14, 1997, SOUTHCOM requested U-2 missions in its area of responsibility to provide broad-area coverage in support of its counternarcotics missions. A secret Sept. 12, 1997, Joint Staff memo, since declassified, explained that "wide-area imagery is required to identify specific drug laboratory and transshipment point locations and associated trafficker ingress and egress routes."

But the command's requests were denied because, according to the memo, the U-2 fleet was fully committed to fulfilling the "higher priority requests" from other regional commands.

With the U-2 repeatedly unavailable, on Aug. 18, 1997, SOUTHCOM's operations directorate requested two SR-71 missions be flown in September. For a while, it appeared they were going to get them.

An order was prepared for the Chairman of the Joint Chiefs of Staff, approving the SR-71 missions, when the Air Force objected. Air Force Lt. Gen. John P. Jumper, the deputy chief of staff for air and space operations, told the Joint Staff's director in early September the Air Force believed a U-2 undergoing maintenance work could be used to fulfill SOUTHCOM's request.

Whether this U-2 ever flew in support of SOUTHCOM is not publicly known, but it is known the SR-71s never did. Ultimately, the Joint Staff's operations directorate informed the command there would be no Blackbird missions.

The Joint Staff veto of the SOUTHCOM missions was followed by a higher-level veto of the Blackbird program from the White House.

In October, President Bill Clinton line-item-vetoed the entire SR-71 program. All operations except routine maintenance stopped. But then, in June 1998, the Supreme Court overturned the Line Item Veto Act.

On Aug. 5, 1998, Rep. Norman D. Dicks (D-Wash.), a veteran congressman with a background in intelligence issues, wrote to DOD requesting the $39 million previously approved for the SR-71 be used for the program again, with the authority to spend the money being extended through the 1999 fiscal year.

Sixteen days later, William J. Lynn III, then the Pentagon's comptroller, wrote Dicks with bad news, saying, "While I fully understand your thoughts on the matter, unfortunately, it is no longer a course that is open to us." Lynn explained that in March 1998, the Secretary of Defense had approved permanent retirement for the SR-71 and the Air Force had begun retiring the aircraft in April.

"To reverse this process now would require much more than ... $39 million," Lynn noted, and could not be done during the remainder of the fiscal year. The department was powerless to extend funding.

Lynn also informed Dicks that the Air Force had better uses for $30 million in maintenance funds—notably the maintenance costs associated with aircraft returning from duty in Southwest Asia. The SR-71, Lynn noted to Dicks, "was an extremely valuable reconnaissance asset, and we plan to retire these aircraft in a manner befitting their outstanding contribution to our nation's defense."

In the end, the repeated attempts to get the SR-71 back in the air, flying missions, proved futile. Its advocates in Congress had a passionate belief in its continued viability, and various intelligence agencies and military commands believed there were times when it could satisfy their requirements.

None of those groups were able to overcome the opposition of those who felt the SR-71 had outlived its utility and wanted to put the Blackbird out to pasture—and keep it there. ■

Jeffrey T. Richelson is a senior fellow and consultant of the National Security Archive in Washington, D.C., and author of nine books on intelligence and military topics. His most recent article for Air Force *Magazine, "Ups and Downs of Space Radars," appeared in the January 2009 issue.*

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The Silent Deterrent

Airmen at Minot AFB, N.D., work below ground, on the surface, and in the air to keep their ICBMs at peak readiness.

Photography by Ted Carlson
Text by June Lee

SSgt. Keith McClain (left) and SrA. Malcolm Salyards maintain an LGM-30G Minuteman III in a silo. Minot AFB, N.D., is home to the 91st Missile Wing, one of USAF's three intercontinental ballistic missile wings.

*Much has changed at Minot AFB, N.D., since the 91st Missile Wing transferred from Air Force Space Command to Air Force Global Strke Command in December 2009. Since then, USAF has made sweeping changes in its nuclear enterprise. **I1I** A1C Jonathan Bruce (left) and SrA. Cody Higginbotham, both with the 742nd Security Forces Squadron, guard the entrance to Lima-01, one of Minot's missile alert facilities. **I2I** SSgt. Kemuel Abrams is with the 54th Helicopter Squadron. The squadron's primary mission is to support the 91st Missile Wing by making sure the missile facilities dispersed throughout North Dakota are safe and secure.*

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*I3I A bird's eye view of the Minuteman III missile alert facility Lima-01. **I4I** TSgt. Justin Heersink checks the acidity level of the water at the Lima-01 facility. A small team of airmen lives and works at each MAF at all times.*


4

I1I *Second Lt. Amanda Shirley and 1st Lt. Matt Vallerand of the 742nd Missile Squadron work in a launch control center.* ***I2I*** *An LGM-30G Minuteman III in its silo. The ICBM fleet is at 450, and they are scattered throughout sites in North Dakota, Montana, and Wyoming. The 91st has responsibility for 150 ICBMs.* ***I3I*** *The exterior of the Minuteman III missile alert facility Lima-01. The electronics and sensors show that this is no farmhouse.* ***I4I*** *Airmen at the 91st Missile Wing attend a briefing, led by 91st Missile Wing Operations Group Commander Col. Robert Walker, before heading out to their alert facilities.* ***I5I*** *Lt. Col. Donnie Holloway, commander of the 742nd Missile Squadron, stands in front of the squadron's shield. "Clavis Pacis" means "key to peace" in Latin. Holloway, shown here at the gate to Lima MAF, is charged with ensuring that his crews have what they need to perform their mission.*

[1] Higginbotham scopes out the land for any suspicious activity around the Lima-04 launch facility. [2] McClain does maintenance work on an LGM-30G. [3] Bruce secures the gate to Lima-04 after patrolling the grounds. [4] Lt. Col. Jay Tewksbury, commander of the 54th Helicopter Squadron, stands in front of a UH-1N Huey on the ramp at Minot. The squadron uses the helicopters to provide security and to support the 91st Missile Wing.

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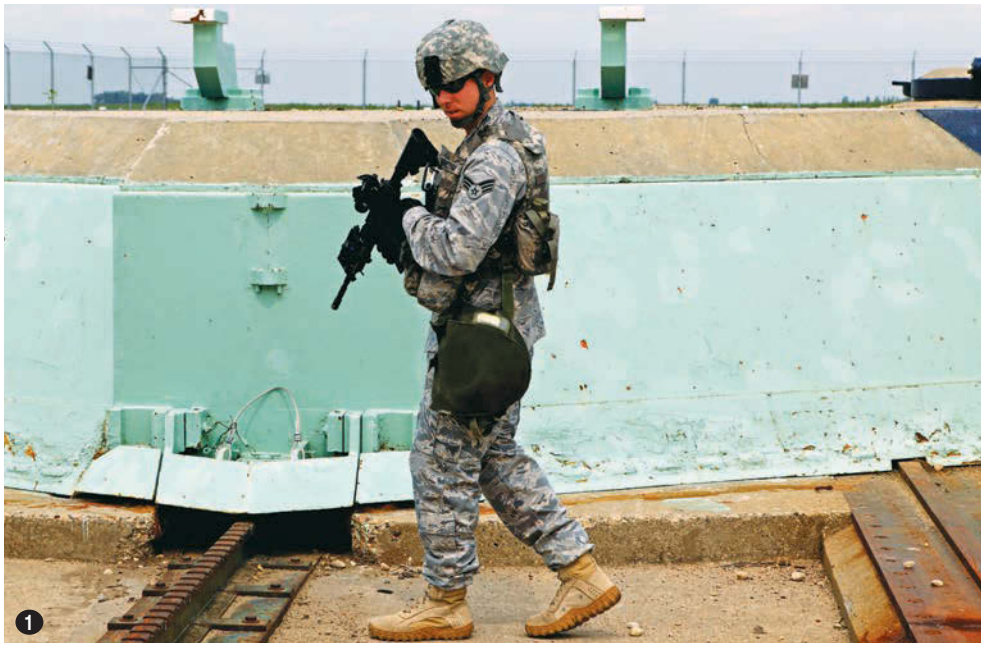
I1I *Bruce keeps a watchful eye as he patrols the interior of the Lima-04 silo site.* ***I2I*** *Seen here are the rocket nozzles on an LGM-30G Minuteman III missile. With the missile's guidance system leading the way, the rocket nozzles can adjust to keep the ICBM on course.* ***I3I*** *An aerial view of another Minuteman III launch site, Kilo-02. Aside from the various antennae and sensors, not much is seen from above as the silos are located underground.* ***I4I*** *A UH-1N Huey flies above North Dakota against the backdrop of a fiery sunset.*

|1| *Higginbotham goes on foot patrol searching for any threatening activity around Lima-04. The massive plug covering the missile silo is directly behind him.* *|2|* *Shirley and Vallerand ensure the emergency air-conditioning unit at their launch control center is working properly.* *|3|* *An LGM-30G sits in its hardened underground silo. The Minuteman III has the capability to reach targets more than 6,000 miles away in 35 minutes or less.* *|4|* *A UH-1N of the 54th whirs up on the ramp at Minot for a night mission.*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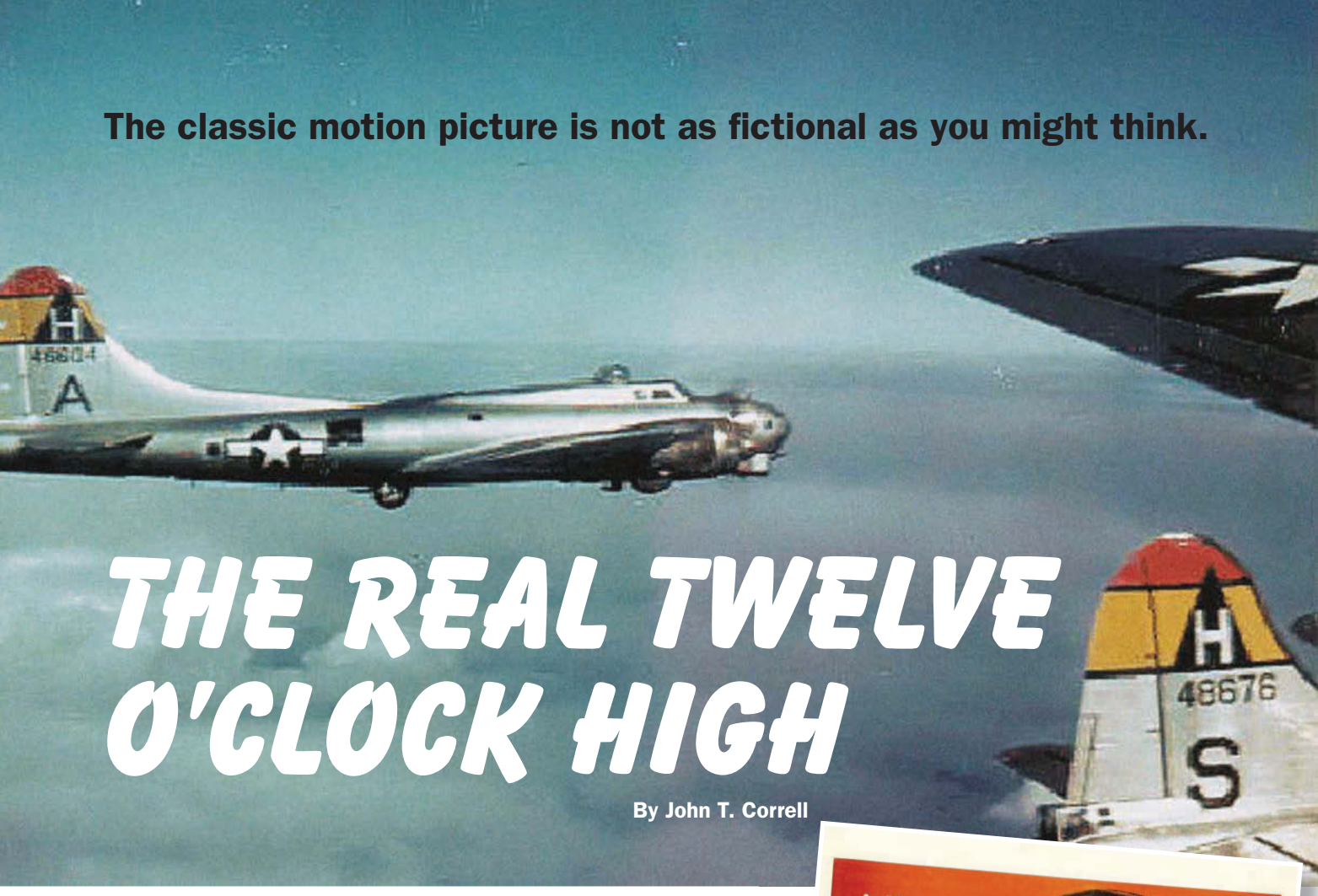
I1I A top view of an LGM-30G ICBM in its silo. I2I The headquarters building for the 91st Missile Wing at Minot. I3I A UH-1N passes over a missile launch facility. The other two ICBM wings are the 90th Missile Wing at F. E. Warren AFB, Wyo., and the 341st Missile Wing, Malmstrom AFB, Mont. I4I First Lt. Michael Dommer, copilot, Maj. Michael Galluzzo, pilot, and Abrams, the flight engineer (l-r), depart their UH-1N at Minot. The ICBM force is largely unseen, but its airmen ensure the nuclear missiles are secure and more than 99 percent reliable. ■

The classic motion picture is not as fictional as you might think.



THE REAL TWELVE O'CLOCK HIGH

By John T. Correll

The best movie ever made about the Air Force may be "Twelve O'Clock High," released in 1949. It is the harrowing story of the first B-17 bombers in England in World War II and the terrible losses they took before long-range fighters were available to escort them on combat missions over Europe.

It had an authenticity seldom seen in war movies. It pushed all the right buttons for airmen, who held it in such regard that the movie became something of a cult film for several generations of Air Force members.

In those days, almost everybody in the Air Force had seen it at least once, and the film was used for many years in USAF leadership courses.

"Twelve O'Clock High" was based on actual persons and events. Very little of it was pure fiction. The film was adapted from a novel of the same name by Beirne Lay Jr. and Sy Bartlett, who drew deeply on their own wartime experiences. Both had been successful Hollywood screenwriters before the war, but in 1943, when "Twelve O'Clock High" takes place, they were Air Force officers in England.

Lay, the principal author, was either a direct participant in or an eyewitness to the main occurrences in the story. He was one of six officers who went to Europe with Brig. Gen. Ira Eaker in February 1942 to establish the advanced element of Eighth Air Force. Bartlett was there, too, as the aide of Maj. Gen. Carl Spaatz, and like Lay, he was directly involved in happenings depicted in the film.

"Twelve O'Clock High" is set at Archbury in the English midlands, where the "hard-luck" 918th Bomb Group has accumulated the highest loss rate and the worst bombing effectiveness record in all of Eighth Air Force. Morale is a disaster. General Pritchard, head of Bomber Command, concludes that the problem is the group commander, Col. Keith Davenport, whose leadership style has allowed discipline to erode and whose overidentification with the crews has encouraged them to feel sorry for themselves.

Pritchard comes to Archbury, accompanied by his tough operations officer, Brig. Gen. Frank Savage. He relieves

Top: B-17s from the 306th Bomb Group on a mission during World War II. Above: The movie poster for "Twelve O'Clock High."

the popular Davenport and replaces him with Savage.

Savage incurs the immediate enmity of both aircrews and support people when he clamps down on discipline and deals harshly with slackers. Among the first to feel his wrath is the guard at the gate who carelessly waves Savage through, neither saluting nor checking his ID.

Resentful of the new order, all of the pilots ask for transfers out, but Savage sticks to his principles. As the group recovers its focus and combat effectiveness improves, the pilots change their minds and rally to the support of Savage, who leads the 918th on a big mission over the German heartland.

The B-17s inflict severe damage on the target—a big ball bearing plant—but a second strike is necessary to finish it off. As Savage attempts to board his aircraft to lead the restrike, he suffers a mental breakdown from the accumulated strain. However, he has done his job well and his crews are now strong enough to fly the mission successfully without him. They clobber the target, and the 918th moves on to new leadership.

Eaker and Overacker

The actual "hard-luck" group was the 306th Bomb Group at Thurleigh, which (multiplied by three) became the 918th at Archbury in the book and movie.

In November 1942, Eaker (then VIII Bomber Command commander) and Spaatz (Eighth Air Force commander) visited Thurleigh. Sy Bartlett, in his capacity as Spaatz's aide, went along. There was no MP in sight as they drove onto the base, and their entry was not challenged.

Ira Eaker, as a lieutenant general.

Eaker and Spaatz, noting similar sloppy conditions and loose policies elsewhere around the base, agreed that the group commander, Col. Charles B. "Chip" Overacker, would probably have to be relieved.

"Eaker waited six more weeks, during which the group's record, measured by number of bombs on target and by B-17s lost, became the worst in VIII Bomber Command," according to James Parton, Eaker's aide and later his biographer. Parton had also been along on the November trip to Thurleigh.

On Jan. 4, 1943, Eaker—by then promoted to major general and moved up to succeed Spaatz as commander of Eighth Air Force—returned to Thurleigh. With him were Beirne Lay and Col. Frank A. Armstrong Jr., former commander of the 97th Bomb Group. Eaker had used Armstrong before to tighten up loose organizations. Like Savage in the movie, he had led the first B-17 mission over Europe in August 1942.

This time, Eaker's car was waved through the gate by a sentry who failed to salute. "As we visited hangars, shops, and offices, I found similar attitudes as seen at the front gate," Eaker said. Behind closed doors in Overacker's office, Eaker said, "Chip, you'd better get your things and come back with me." Turning to Armstrong, he said, "Frank, you're in command. I'll send your clothes down."

"In the next 40 days, Armstrong's strong, steady, disciplinary hand turned the 306th around completely, making it the best group in the VIII Bomber Command and the first to drop bombs on Germany itself," Parton said.

However, unlike Savage, Armstrong did not crack up. That was one of the few major departures from fact in "Twelve O'Clock High." For years thereafter, Armstrong was regularly asked about his nervous breakdown in England. Even though that part of the script was a disservice to Armstrong, the incident was not altogether fictitious. According to Lay, the breakdown had happened to another "very fine commander who had been on four rough missions in a row."

"Twelve O'Clock High" took some creative license in time shifting and combinations of events. The Big Mission in the book and movie was a composite of the first B-17 mission into the German homeland (flown in actuality Jan. 27, 1943) and the famous "double mission" against Schweinfurt and Regensburg Aug. 17, 1943. The novel specifies that the targets were ball bearing plants at "Hambruecken"

Frank Armstrong Jr., as a lieutenant general.

(Schweinfurt, thinly disguised) and the Messerschmitt fighter plant at "Bonhofen" (Regensburg). Neither city was mentioned by name in the movie.

Like Savage, Frank Armstrong led the Jan. 27 mission into Germany. Bartlett, who was a friend of Armstrong's, talked his way aboard one of the B-17s that day and, according to some accounts, persuaded the bombardier to let him toggle the bombs.

Armstrong was not there for the Schweinfurt-Regensburg missions. Like Savage, his time at the group was short. With matters at Thurleigh in hand, Armstrong returned to VIII Bomber Command headquarters Feb. 17 and was promoted to brigadier general.

Beirne Lay, on the other hand, was there for the double mission. He was a fully qualified aviator, having served for several years in the Air Corps in the 1930s. He initially came to Eaker's attention as the author/screenwriter of *I Wanted Wings.* In 1943, he aspired to a combat command and flew as many missions as he could in preparation. In the strike on Regensburg, he was copilot of the B-17 *Picadilly Lily,* which became the name of Savage's airplane in the movie. He wrote of the experience in "Regensburg Mission," published in *Air Force* Magazine in December 1943.

Who Was Who

Collaboration on the novel began in 1946, with Lay entering the project at Bartlett's urging. Bartlett contributed ideas and energy, but it was Lay who "put the book on paper." Bartlett's wife, actress Ellen Drew, named the story. "She heard us discussing German fighter tactics, which usually involved head-on attacks from '12

An AAF bomber heads for home after the real "big mission," which left the cities of Schweinfurt and Regensburg, Germany, in flames.

o'clock high,'" Lay said. "'There's your title,' she cried."

The book was dedicated to "fighting leaders, like Frank A. Armstrong Jr." Even before it was published in the spring of 1948, work on the movie was under way and Lay and Bartlett were writing the screenplay. Part of the enjoyment of the movie is knowing who was who.

Pritchard (played by Millard Mitchell) was, of course, Eaker. He has no first name in the movie, but in the novel, it is Patrick. The movie also blurred the distinction between VIII Bomber Command ("Pinetree" at High Wycombe) and Eighth Air Force ("Widewings" in London). The headquarters in the film is referred to as Pinetree.

Davenport, the fired group commander (played by Gary Merrill), was Overacker. In the final scenes of movie, Davenport returns to Archbury to provide personal support for Savage after his crack-up. Overacker did not return in either the book or real life. It had been Eaker's intention to give him a new job as head of the B-17 Combat Crew Replacement Center in England. Before that happened, though, Overacker filed a report sharply critical of Eaker and he was reassigned to Proving Ground Command in Florida instead.

Clearly Savage was Armstrong, but the authors may have borrowed a bit of Curtis E. LeMay—who was commander of the neighboring B-17 bomb group at Grafton-Underwood at the time—for the character. Several actors, including James Cagney and Burt Lancaster, were considered for the part before Gregory Peck was chosen. Peck hesitated before taking the role since he had no military experience. He had been classified 4F in World War II because of an injury.

The character of Maj. Joe Cobb, the tough air exec played by John Kellogg, was supposedly inspired by Lt. Col. Paul W. Tibbets Jr., who was at the 97th Group when Armstrong was commander. On the historic first B-17 mission in August 1942, Armstrong was commander of the operation but he flew as copilot in Tibbets' aircraft. Tibbets had deployed to North Africa before the Overacker incident in January 1943.

The Medal of Honor mission of Lt. Jesse Bishop (played by Bob Patten) was based almost exactly on the actions on July 26, 1943, of Flight Officer John Morgan, a copilot in the 92nd Bomb Group at RAF Alconbury. There were no other similarities between Bishop and Morgan.

Sergeant McIlhenny, Savage's clerk and driver (played by Robert Arthur) who kept losing and regaining his stripes, was based on Sgt. Donald Bevan, a driver at the 306th when Armstrong was there. In the movie, McIlhenny stows away on a B-17 and flies a combat mission as a gunner. Bevan received some newspaper publicity in 1943 as a "stowaway gunner." In fact, he had permission to be aboard. Bevan managed to fly 17 missions as a gunner, along with his regular duties as a driver.

Alas, there was no real life counterpart for Harvey Stovall, the group adjutant-ground exec who was such an excellent character in the movie. He was said to have been named for Stoval Field near Yuma, Ariz.

Ben Gately, the pilot of *Leper Colony*—the B-17 to which slackers, incompetents, and malcontents were consigned but which goes on to glory in the end—was also fictional. He was primarily the creation of Sy Bartlett.

How the Movie Was Made

Twentieth Century Fox considered filming the movie in California, but the landscape did not look much like England. Besides, the B-17s the studio wanted to borrow from the Air Force were in the East. The picture was made with considerable Air Force assistance, including the use of air bases, equipment, uniforms, and aircraft.

The principal shooting location was Auxiliary Field No. 3 at Eglin AFB, Fla., where 15 buildings, including a World War II control tower, were constructed to simulate Archbury. Hundreds of airmen from Eglin worked as extras in the film. However, the light-colored runways at Eglin were a problem. Wartime runways in England had been black to make them less visible to enemy aircraft.

Thus all of the takeoffs and landings were filmed at Ozark Field in southern Alabama, where the runways were suitably dark. Ozark Field (which is now part of Fort Rucker) had closed shortly after World War II. It was overgrown with weeds and was derelict in appearance, but that served another purpose. The movie opens with a postwar scene in which former adjutant Stovall returns to England on business and bicycles out to the old airfield, now abandoned and grown up with weeds. As he walks on the ramp, sounds and images from the war begin to play in his head and then on the screen. The weeds at Ozark were ideal for this sequence. Afterward, the weeds were mowed and the field spruced up for shots depicting wartime. Director Henry King said Ozark Field "was more English than any field I have seen in that country."

"Twelve O'Clock High" used 12 B-17s, six of them from the drone group at Eglin, which had been using them for ditching tests and targets. Others were drawn from storage depots in Alabama and New Mexico. Some of the latter had been used as radio-controlled drones in 1946 atomic tests at Bikini Atoll and were safe only for short periods of use.

One of the radiation-contaminated B-17s was used for the crash landing scene early in the movie. The studio paid stunt pilot Paul Mantz $2,500 to do it. He brought the airplane low over the fence at Ozark with the wheels al-

most completely retracted, cut power, and skidded along on the dry grass for about 1,200 feet before coming to a stop.

The movie relied extensively on US and German combat film footage as background for the air battles. Cockpit scenes were filmed in cutaway sets on Fox's Sound Stage 9 in Hollywood. Eighth Air Force veterans gave the finished product high marks for accuracy. LeMay attended the premiere and said, "I didn't see one technical error in this thing."

The story was recycled twice in later years. "A Gathering of Eagles," released by Universal International Pictures in 1963, transplanted the plot and characters to a Strategic Air Command wing that busted its operational readiness inspection. It starred Rock Hudson as Col. James Caldwell, a tough officer in the Frank Savage mold, who is sent by SAC headquarters to replace the ineffective wing commander.

Hard-nosed leadership prevails again and next time around, the wing aces the inspection. "A Gathering of Eagles" was produced and co-written by Sy Bartlett, who cloned nearly all of the elements of "Twelve O'Clock High." It was pretty good, but an ORI was not World War II and it did not achieve the intensity of the original.

The "Twelve O'Clock High" television series ran on ABC from 1964 to 1967. It started with Robert Lansing as a properly dour General Frank Savage. For the second season, though, the network ordered that Savage-Lansing be killed off in combat and the program be brightened up with a younger-looking cast and a less somber tone.

The TV series had only one real B-17, which was repainted as required to depict different aircraft. It could taxi, but takeoffs and landings—and other imagery of B-17s—were from stock film footage. Lay wrote part of one pilot script but soon disappeared from the venture. Synopses and data on all 79 TV episodes can be found in *The 12 O'Clock High Logbook* (2005) by Allan T. Duffin and Paul Matheis, which has a wealth of information about both the novel and the movie.

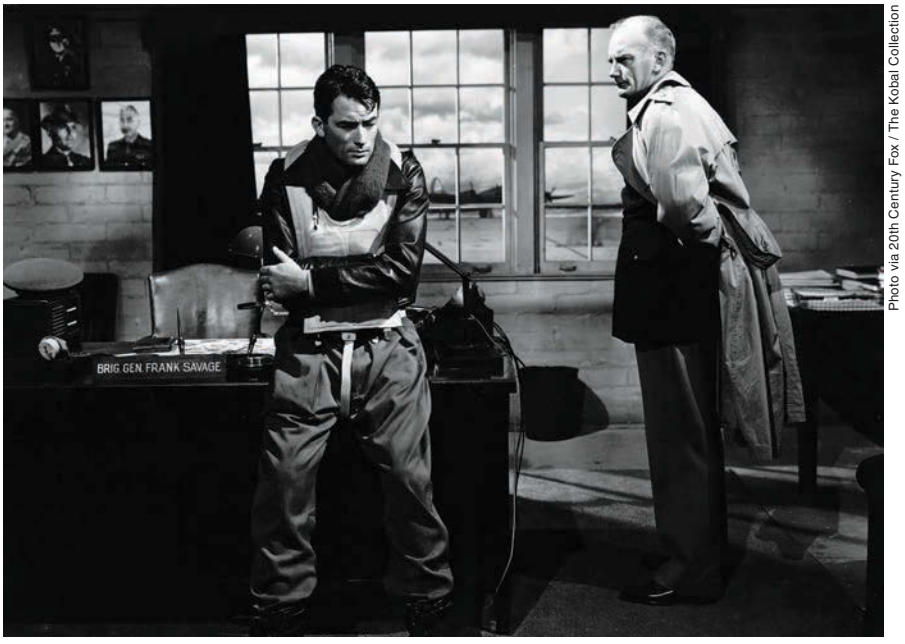


Photo via 20th Century Fox / The Kobal Collection

Gregrory Peck (l), as Brig. Gen. Frank Savage/Col. Frank Armstrong, and Millard Mitchell, as Maj. Gen. Patrick Pritchard/Maj. Gen. Ira Eaker, in a still from the movie.

They Went On From There

"Twelve O'Clock High" marked the lives of a number of people who figured in it, none more so than Frank Armstrong, who is remembered mainly as the model for Frank Savage rather than for his own further achievements, which were considerable.

After his tour in England, Armstrong returned to the United States and transferred to the Air Force's newest bomber, the B-29. In 1944, he commanded a B-29 wing in the Pacific, where his A-2 (intelligence) officer was none other than Maj. Sy Bartlett. Armstrong retired in 1962 as a lieutenant general, having commanded SAC's 2nd Air Force and Alaskan Air Command.

In September 1944, the Army Air Forces had three candidates to organize a B-29 group to deliver the atomic bomb. Armstrong was one of those candidates but Tibbets, the model for Maj. Joe Cobb, was chosen instead and in 1945, he flew the *Enola Gay* on the mission that dropped the first atomic bomb on Hiroshima. In 1949, Tibbets was initially assigned, at Bartlett's request, as technical advisor for the film "Twelve O'Clock High" but plans changed and another officer was sent.

After various assignments in the United States and Japan, Overacker retired in 1956 as a colonel. His last tour of duty was in Air Training Command.

Beirne Lay got the combat assignment he wanted. He returned to England in 1944 as commander of the 487th Bomb Group, flying B-24s. He was shot down over France but parachuted to safety and with the help of the underground, eventually made his way back to England. He was prohibited from further combat flying because of his knowledge of underground activities. In 1956, Lay received the Air Force Association's Gill Robb Wilson award for contributions to national defense in the field of arts and letters. He continued his work as a screenwriter, remained in the Air Force Reserve, and retired as a colonel in 1963.

"Twelve O'Clock High" is still available on DVD, but it is no longer used by the Air Force as a leadership training film. Present-day airmen do not have the special feeling for it that earlier generations did. Nevertheless, bits and pieces of the tradition linger here and there, as does the heritage of the organization on which the movie's 918th Bomb Group was patterned.

In July 2002, the 306th Bombardment Group Museum opened at Thurleigh in Bedfordshire, site of the historic airfield. Displays, artifacts, memorabilia, and photos commemorate the war years.

The 306th continued in US Air Force service as a bomb group and later as a strategic wing. It was inactivated and reactivated several times and operated various kinds of aircraft, including B-29, B-47, and B-52 bombers and KC-97 and KC-135 tankers. In its current incarnation, it is the 306th Flying Training Group, organized in 2004 to teach airmanship operations at the Air Force Academy.

The group's designation as the 306th was deliberately chosen for its historical significance and its relationship to "Twelve O'Clock High." ■

John T. Correll was editor in chief of Air Force *Magazine for 18 years and is now a contributing editor. His most recent article, "Entebbe," appeared in the December 2010 issue.*

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AFA National Report

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By Frances McKenney, Assistant Managing Editor

At the Air Force Ball, Los Angeles

Air Force Secretary Michael B. Donley and Chief of Staff Gen. Norton A. Schwartz headed the list of VIPs at the 39th annual Air Force Ball, in Los Angeles this November. Gen. C. Robert Kehler received the evening's top honor, the General Thomas D. White US Air Force Space Award.

Sponsored by the Air Force Association and its **Gen. B. A. Schriever Los Angeles Chapter,** the White award takes note of the year's outstanding contributor to progress in space. Kehler heads Air Force Space Command. Pat Coulter, master of ceremonies for the ball, told the audience that Kehler was singled out for "providing game-changing capabilities" to commanders while "managing a global network of satellite command and control, communications, missile warning, space launch facilities, and space systems acquisition."

AFA Chairman of the Board S. Sanford Schlitt, Schriever Chapter COB Thomas D. Taverney, and Lt. Gen. John T. Sheridan, commander of the Space and Missile Systems Center at Los Angeles AFB, Calif., presented the award to Kehler.

More Honors at LA

The Air Force Ball in Los Angeles took place at the Beverly Hilton and was the culmination of the two-day AFA Global Warfare Symposium.

The gala paid tribute to Women Airforce Service Pilots, through a video about their World War II service, and introduced to the audience two WASPs who live nearby: Violet Thurn Cowden of Huntington Beach and Edna Modisette Davis of Santa Barbara.

In other honors, Schriever Chapter President Nancy Fitzgerald and Schlitt named Gary E. Payton as a Schriever Fellow. Payton received the recognition for his tenure as deputy undersecretary of the Air Force for space programs, overseeing USAF's space portfolio from 2005 until last July. Payton is a retired Air Force colonel and flew on the space shuttle *Discovery* in 1985 as a payload specialist. He has worked for the Missile Defense Agency, Orbimage, and NASA.

AFA Chairman of the Board Sandy Schlitt (at right) and his wife, Patricia (left), met Vice President Joe Biden at the White House's Veterans Day breakfast for military- affiliated organizations. A memorial service at Arlington National Cemetery followed.

In bringing the LA Ball to a close, general chairman Wanda M. Austin—president and chief executive officer of Aerospace Corp.—described the work of the Schriever Chapter's Education Foundation. She said the organization uses proceeds from the ball to support Air Force personnel in the area and to sponsor 100 Visions of Exploration classrooms.

The Visions program is an AFA-*USA Today* initiative that provides newspapers to students and lesson plans for their teachers, to promote the study of science and math.

Austin announced to the Air Force Ball guests that this year's gala raised $40,000.

Ceremony for an Ace

When Army Air Forces Lt. Col. Boyd D. Wagner died in a training flight in Florida in November 1942, it took weeks to recover most of his remains because the crash site was not on his expected flight path. It took another 67 years to recover more remains of Wagner, the AAF's first World War II ace.

With help from the **Lt. Col. B. D. "Buzz" Wagner Chapter** of Johnstown, Pa., those additional remains were laid to rest in an urn under the original memorial headstone, in a cemetery near Johnstown this past October.

The chapter—headed by William B. Burns—took the lead in arranging military honors for the interment ceremony. It involved the Air National Guard's Band of the Mid-Atlantic, the Army Reserve's 458th Engineering Battalion honor guard, the Pennsylvania ANG's 258th Air Traffic Control Squadron, an AFJROTC unit, a local high school band, and the Civil Air Patrol.

The 17th Weapons Squadron, Nellis AFB, Nev., conducted an F-15 flyover of the ceremony. Wagner had commanded the unit's World War II predecessor, the 17th Pursuit Squadron, in the Philippines. The flyover had particular poignancy for Wagner's nephew, retired USAF Col. Boyd Wagner Gilbert; bad weather had forced cancellation of a flyover for the January 1943 funeral of his uncle.

A native of Emeigh, Pa., Wagner had returned from duty in the South Pacific and was flying a P-40 to Alabama when he crashed. The war hero had just turned 26.

In 2003, another native of the Johnstown area, now-retired USAF Col.

More photos at http://www.airforce-magazine.com, in "AFA National Report"

James E. Moschgat, began researching Wagner's life and eventually discovered some of the pilot's personal items, such as a high school ring, as well as more remains at the Florida crash site. The Army's Central Identification Laboratory in Hawaii confirmed in 2010 that the remains were Wagner's, using DNA from Gilbert, his last surviving relative.

After 66 Years, Still a Jubilee

The awardees are in their 90s. Some use wheelchairs, some use walkers, but all the World War II veterans showed great pride at the **Long Island Chapter's** latest Jubilee of Liberty Medal ceremony in Farmingdale, N.Y., in October.

The chapter has hosted 22 such events. They pay tribute to veterans of the June 6, 1944, Normandy invasion, when some 70,000 American troops—and another 80,000 Allies—landed on the beaches of France to begin the drive to liberate western Europe.

The Jubilee of Liberty Medal originated in 1994 when the regional government of Normandy decided to mint the award for presentation to US vets attending the 50th anniversary remembrance of the invasion. Since then, some members of Congress have awarded medals to those who couldn't make it to the Normandy ceremony.

At the Long Island presentation, held before an audience of 250 at the American Airpower Museum, 10 Normandy veterans received their medals from US Rep. Steve Israel (D-N.Y.).

Fred Di Fabio, organizer of the event and now chapter president, said the museum's C-47 "Gooney Bird," bearing invasion colors, provided a perfect backdrop. He noted that the chapter has awarded more than 375 Jubilee medals over the years.

Chapter Secretary Cathy Ward served as master of ceremonies. In addition, New York State President Maxine Rauch presented the State Teacher of the Year Award to Joseph Castille.

Over the Top

A donation from the **Wright Memorial Chapter** in Dayton, Ohio, has allowed completion of a Fisher House at nearby Wright-Patterson Air Force Base.

Fisher Houses, built on the grounds of major military and Department of Veterans Affairs medical centers, allow families to stay near service members who are undergoing medical treatment.

Chapter President Jeff Liffick presented $10,000 to the Fisher-Nightingale Houses, Inc., at a chapter meeting.

Announcing the donation on its website, Fisher-Nightingale said the check means the Wright-Patterson Fisher House has "finally been paid for." It noted that the project had cost some $3 million.

The new house replaces an older facility, called Nightingale House, that had been constructed from two base housing units. It was not handicapped-accessible and had shared bathrooms.

The new Fisher House is scheduled to open this month.

You've Got a Partner

If the actual airplane or a simulator isn't nearby to train on, 2nd Lt. Joseph Barton can always pull out the door prize he won at a reception sponsored by the **Golden Triangle Chapter** in Mississippi: It's a poster showing the cockpit of a T-6 Texan II.

The reception was part of a chapter co-sponsored initiative called Pilot Partner. The program matches each of the 15 specialized undergraduate pilot training classes arriving at Columbus AFB, Miss., with at least two local businesses or civic organizations.

To host the Pilot Partner welcome reception for Barton's Class 11-15, the Golden Triangle Chapter teamed up with the local Chamber of Commerce.

Chapter President Rick Johnson, treasurer 2nd Lt. Travis Manter, and former treasurer Mike Counihan attended the party, held at a dirt-track speedway.

Barton won the door prize from among 31 pilots.

More Chapter News

■ To earn the Outstanding Cadet award at a drill meet sponsored by the Arnold Air Society at North Carolina State University in Raleigh, N.C., AFJROTC cadets had to face a panel of judges from the **Tarheel Chapter.**

John G. Brosky, 1920-2010

Retired Maj. Gen. John G. Brosky, former Air Force Association Chairman of the Board and President, died Oct. 10 of pneumonia and heart problems. He was 90 years old and was a resident of Carnegie, Pa.

General Brosky led AFA from 1981 to 1984, but in the Pittsburgh area was especially noted for his achievements in a 46-year law career. According to the *Pittsburgh Post-Gazette,* in 1957 he began reforming court procedures by proposing that the county court work year-round, rather than closing down for the summers. He later worked to create consistent procedures for domestic relations and juvenile crime cases, such as instituting a paternity testing program and a more reliable child support payment method. He retired in 2002 as a Superior Court judge.

Born in Scott, Pa., Brosky graduated from the University of Pittsburgh in 1942 and, having been in ROTC, served as a captain in the Army in the South Pacific. After the war, he earned a law degree and joined the Pennsylvania Air National Guard, serving from 1960 to 1980.

Nine cadets stood before Chapter President Ray Benson Jr., Veterans Affairs VP Lewis E. Feuerstein, and member Woody Sellers, vying for the trophy. Justin Dant from Ronald Reagan High School in Pfafftown, N.C., earned the award, presented by State President Louis A. Emond. The chapter paid for all trophies for this drill competition, as well as AFA logo T-shirts.

■ Two Virginia chapters sent representatives to a Veterans Day ceremony at the Virginia War Memorial in Richmond. Steven J. Combs, treasurer of the **Richmond Chapter,** and Albert Pianalto, VP of the **Leigh Wade Chapter** in Chester, Va., presented an AFA wreath at the annual ceremony, on behalf of all AFA chapters in Virginia.

■ From the **Red Tail Memorial Chapter** in Ocala, Fla., president Michael H. Emig attended the second annual Diamondback Drill Competition at Belleview High School in Belleview, Fla., in November. He presented trophies to the overall winners in several categories. Eleven schools, with some 400 cadets, competed.

David R. Cummock, 1937-2010

Retired Col. David R. Cummock, an AFA National Director Emeritus, died Nov. 22 at his home in Port Orange, Fla. He was 73 years old.

AFA's Member of the Year in 2009, Colonel Cummock had also been AFA Massachusetts Member of the Year for 1988 and AFA Florida Member of the Year in 1997.

He was a longtime AFA leader, having been Florida Region President, as well as Massachusetts State President and President of chapters in Florida and Massachusetts. He was a Trustee and Secretary-Treasurer for the former Aerospace Education Foundation.

Born in Salt Lake City, Utah, Cummock began his first career in 1957 as an Air Force aviation cadet, receiving a commission the next year. He left active duty in 1967 to become an American Airlines pilot and served in the 104th Fighter Wing, Massachusetts Air National Guard. He retired from the Guard in 1986 and from American Airlines in 1997.

He founded the Wright Flight Program in Massachusetts and Florida. Wright Flight is a nonprofit organization that encourages academic performance through incentive flights.

In addition to working with middle school and high school students in Wright Flight, Cummock and his wife, Marguerite, took a particular interest in supporting cadets at Embry-Riddle Aeronautical University Daytona Beach.

Bryan L. Murphy Jr., 1921-2010

Retired Maj. Bryan L. Murphy Jr., an AFA National Director Emeritus, died Oct. 25 in Fort Worth, Tex. He was 89 years old.

Major Murphy was born in Guthrie, Okla., and earned a bachelor's degree and MBA from Southern Methodist University. He was an Air Force pilot and retired as a reserve major, having served from 1943 to 1965. He was also a 35 year-plus retiree from General Dynamics.

He had served as AFA Texas State President and was a member of the Fort Worth Chapter. ■

Reunions

reunions@afa.org

1st Flt Det, Nha Trang AB, South Vietnam. April 11-15, at the Orleans Hotel in Las Vegas. **Contact:** Roger Gibson (228-209-1180) (rgibson2403@aol.com).

332nd FG, 15th AF (WWII). March 23-26, in Orlando, FL. **Contact:** Leo Gray (954-471-9942) (332redtailpilotsreunion@gmail.com).

444th FIS. April 18-21, at the Sheraton Hotel in Charleston, SC. **Contact:** Wallace Mitchell, 535 Mimosa Rd., Sumter, SC 29150 (803-469-3297).

Officer Candidate School Class 61-C. March 22-25, at the Peppermill Resort/Casino in Reno, NV. **Contact:** Art Chambers (850-249-9494). ■

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.

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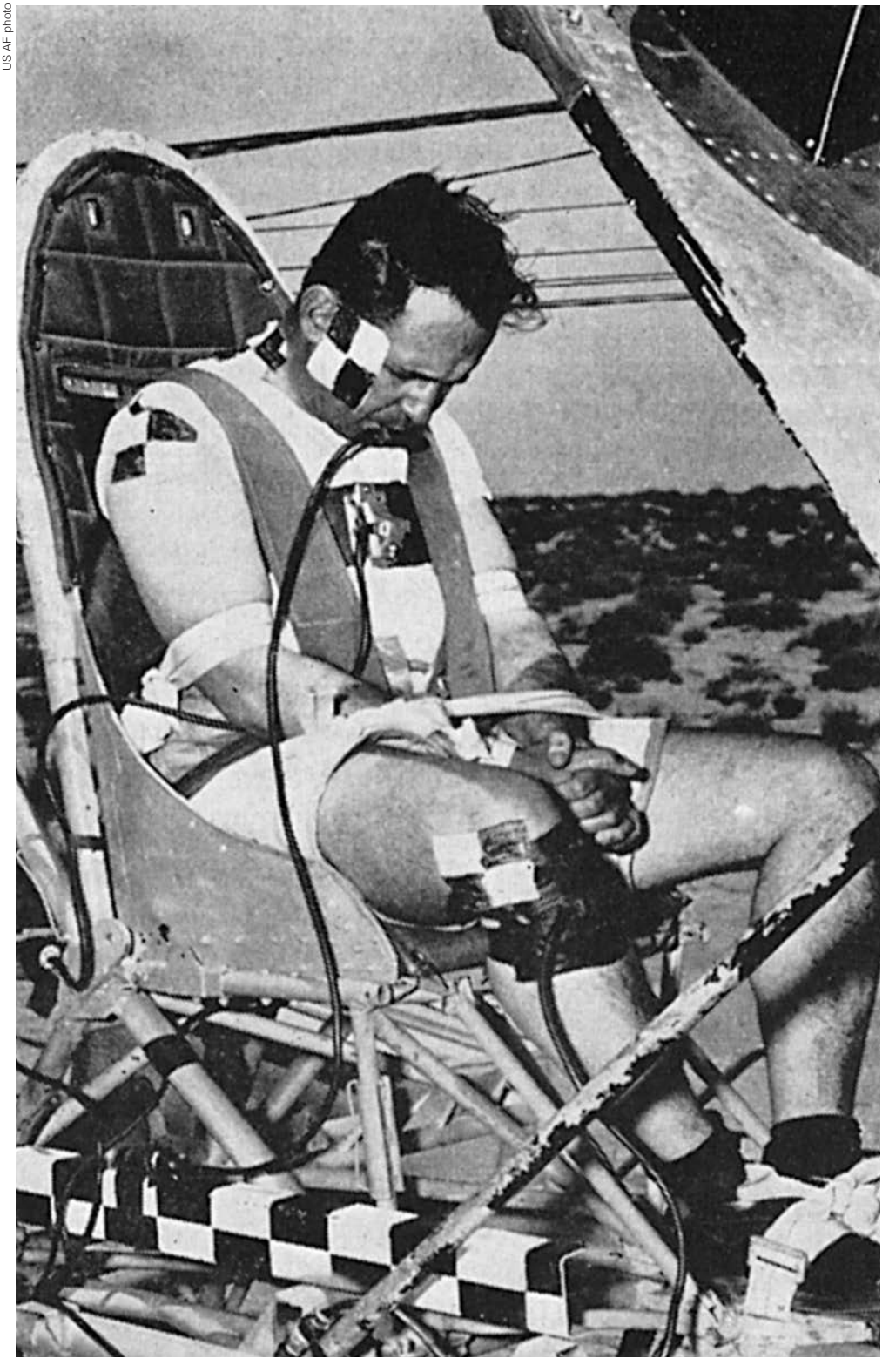
Stapp's "Eyes-Out" Sled Rides

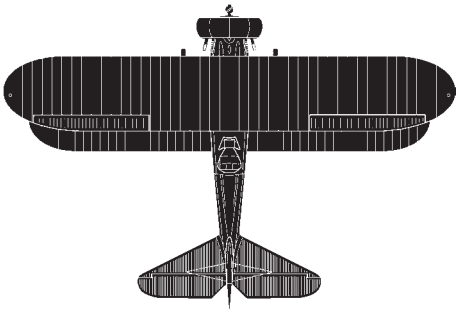
US AF photo



Once Chuck Yeager broke the sound barrier in 1947, a question arose: Could a pilot eject at supersonic speed and live? Somebody had to find out, and it was USAF Lt. Col. John Paul Stapp (shown here), a medical officer. In 1947, he began riding rocket-propelled sleds to higher and higher speeds. On Dec. 10, 1954, Stapp rode a rocket sled at Holloman AFB, N.M., to 632 mph and decelerated to zero in 1.4 seconds, as would happen in a true ejection. Stapp survived a force of 46.2Gs. The physical toll was sometimes high. During 29 high-speed sled rides, Stapp suffered retinal hemorrhages, cracked ribs, and broken wrists. What was a sudden stop like? "It felt as though my eyes were being pulled out of my head," said Stapp, who became famous as "the fastest man on Earth."

Artwork by Zaur Eylanbekov

P-12



The P-12 pursuit aircraft, though it had no official nickname, was one of the best known Army Air Corps fighters of the interwar era. The Boeing airplane was operated by the Army and Navy (the F4B-1) in slightly different forms. The first P-12, sans military markings, was delivered on Feb. 26, 1929, to AAC Capt. Ira C. Eaker, who immediately took it on a goodwill flight to Central America. The P-12 proved to be the Army's last biplane fighter.

In the late 1920s, Boeing was determined to hold its lead in fighter aircraft. It created the Model 83 and Model 89, based on all it had learned from earlier Boeing PW-9 and F3B fighters. The Navy tested both, and loaned the Model 89 to the AAC. Impressed, the Army ordered 10. The P-12 featured all of the refinements Boeing had developed in the 1920s. It was smaller, lighter, and more agile than airplanes it replaced. Early models used a fuselage built of welded steel tubing in the center section and the engine mounts. The aft fuselage was formed of square Dural tubing bolted together. All P-12 production aircraft used Pratt & Whitney R-1340 engines, the first time the Army had used a radial power plant in a fighter.

By 1932, the Air Corps had acquired a total of 366 P-12s. They never saw combat, but they put in good service until they were replaced by the Boeing P-26 in 1934 and 1935. The P-12s later served as trainers until they were retired in 1941.

—Walter J. Boyne

This aircraft: United States Army Air Corps P-12C—*#12*—as it appeared in 1934 when assigned to the Army Command and Staff School.

Capt. Ira Eaker beside his Boeing P-12.

In Brief

Designed, built by Boeing ★ first flight (AAC model) April 11, 1929 ★ crew of one ★ number built 586 ★ one Pratt & Whitney R-1340 engine ★ armament either two .30 cal machine guns or one .30 cal and one .50 cal machine guns ★ load up to 244 lb of bombs ★ **Specific to P-12E:** max speed 189 mph ★ cruise speed 160 mph ★ max range 570 mi ★ weight (loaded) 2,690 lb ★ span 30 ft ★ length 20 ft 4 in ★ height 9 ft.

Famous Fliers

Military: H. H. Arnold, Ira Eaker, Robert Short, many other World War II air leaders. **Stunt pilots:** Jesse Bristow, Milo Burcham, Arthur Goebel. **Other notables:** Howard Hughes, Paul Mantz.

Interesting Facts

Developed by Boeing as a private business venture ★ featured in National Museum of the US Air Force, Dayton, Ohio ★ flown by 17th Pursuit Group (March Field, Calif.) and 20th Pursuit Group (Barksdale Field, La.) ★ assigned to Hawaii, Panama, and Philippines ★ equipped to carry 55-gallon fuel tank under the belly ★ operated by air arms of US, Brazil, China (Nationalist Air Force), and Thailand.

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