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AIR FORCE MAGAZINE

JOURNAL OF THE AIR FORCE ASSOCIATION

Global Force Worries

Depot Nightmares
Holding Fire Over Afghanistan
EW Meets Austerity

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January 2010, Vol. 93, No. 1

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About the cover: *Spirit of Indiana*. Photo by Sagar Pathak. See "Global Force Worries," p. 22.

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Editorial

By Robert S. Dudney, Editor in Chief

The Obama Bomber

THE Obama Administration, seeking to wrap up nearly a year's worth of pondering and probing on the subject of what to do about USAF's heavy bomber fleet, last month gave its unofficial blessing to a new long-range strike program. Secretary of Defense Robert M. Gates on Dec. 11 announced the project "probably" will start in the 2011 budget plan, due out next month.

Gates said he wants "a family of capabilities" and "manned and unmanned" systems. This was not unexpected. The subject has been studied for years. The issues and pitfalls are well-known.

More details might emerge when DOD unveils its spending blueprint. For the moment, it is enough to say that a new system is needed. As the Air Force Association has often noted, the fleet of B-52s, B-1s, and B-2s is the oldest on record (half predates the 1962 Cuban Missile Crisis). With no new aircraft coming in, the nation's long-range attack force would simply fade out.

The singular requirement for this new bomber, whatever its programmatic details, is that it have an unquestioned power to go deep into enemy airspace and threaten, in a variety of ways, a foe's most critical targets. (The threat could be kinetic attack; at other times, it could be mere observation of a target set.) Such aim points, given their importance, usually are remote, hardened, or buried, and heavily defended by surface-to-air missiles and fighters.

The classic bomber attributes of range, payload, and rapid responsiveness obviously offer value. Yet the deep-strike mission puts an even higher premium on penetration of hostile airspace and thus on bomber stealthiness. Stand-off weapons, though useful in many missions, are of less utility. They possess weaknesses such as high per-missile cost, relatively small payload, and less-than-optimum accuracy, compared to penetrating bombers.

Stealth is the key. The less vulnerable an aircraft is to detection by radar, the better it penetrates. It needs far fewer escort aircraft to suppress enemy air defenses—important in light of the inexorable spread of advanced defenses. Very low observable aircraft qualities would offer another kind of benefit as well—extending the aircraft's ability to cruise in a target area. Because a bomber might have to wait for hidden targets to reveal themselves, it must be able to loiter for long periods. On-station survivability is key, especially in a subsonic aircraft, as the new bomber almost certainly will be.

The needed technology—advanced stealth, integrated avionics, and efficient propulsion—already is pretty much in hand, developed in the course of the F-22 and F-35 fifth generation fighter programs. For all that, other factors could complicate the effort, and these must be handled with care.

A new aircraft program is drawing near, but pitfalls await.

One is a debate over whether, and to what extent, the new bomber should rely on a human pilot, as opposed to a pilot located at an Earth-bound site, or even no pilot at all. Gates and others see great value in going unmanned, for several reasons. First, it eliminates risk that a crew might be killed or captured. Second, it would simplify design requirements. Third, an unmanned bomber could persist on station for long periods, perhaps even days.

USAF officials, on the other hand, lean more heavily toward manned systems, and not because the Air Force, long steeped in the culture of combat pilots, is a slave to tradition. There are obvious drawbacks to remotely piloted aircraft. One is their vulnerability to interruption or disruption in electronic links between an aircraft and its controller. Another is the remote pilot's relative lack of situational awareness, caused by limitations of aircraft sensors.

The long-term solution, say technologists, could be fully autonomous "robot" aircraft. At present, that would take a much higher level of computer-based machine intelligence. The human brain is cheaper and better.

Another problem posed by the "unmanned option" is the need for nuclear surety. Without a man in the cockpit, the Pentagon would find it virtually impossible to deploy nuclear weapons on the bomber. Dangers of a mishap would be too great.

Indeed, the nuclear factor poses a fairly comprehensive set of problems. One is that nuclear-capable (therefore manned) aircraft would lack the persistence of remotely piloted types. Another is cost; hardening the bomber for nuclear operations is extremely expensive, leading to reduced numbers. And arms control poses a threat because nuclear bombers would almost certainly be caught up in tight numerical limits.

A recent study by the Mitchell Institute for Airpower Studies suggests DOD start withdrawing bombers from the strategic nuclear triad of bombers, ICBMs, and sub-based missiles. The authors of this paper—Dr. Dana Johnson, Dr. Chris Bowie, and Dr. Robert Haffa—point out that failures to modernize the bomber fleet and bomber weapons already have pushed the US near a "de facto dyad" anyway. They call for directing nuclear-related bomber funding toward a conventional bomber with greater future utility.

Within the active and retired Air Force community, this is—to put it mildly—a minority opinion. Retired Gen. John Michael Loh, former head of Air Combat Command, says the manned nuclear-capable bomber is, if anything, increasing in importance. Writing in the Dec. 7 issue of the *Omaha World-Herald,* Loh calls for building a new nuclear bomber, noting that "defense officials have continued to validate the triad as the best mix of delivery systems for effective deterrence."

That, in Loh's view, also applies to "extended deterrence," the spreading of the US nuclear umbrella over allies such as Japan, South Korea, and NATO nations. Confidence in the US prevents these nations from going nuclear, he said. And, because it is a visible token of US commitment, "the strategic nuclear bomber is the delivery system that is most effective for achieving credible, extended deterrence."

As can be seen, the bomber is still a lightning rod for debates and disputes, many of which are serious and likely to persist for quite a while. Yet to be seen is whether the Administration will find the money, patience, and political will to see this vital program through to completion. ■

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Letters

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Gates and the B-2

"Hear, hear" for Robert Dudney's editorial *["The Real B-2 Mistakes," November 2009, p. 2]* correcting Secretary Gates' flawed logic on why each B-2 ended up costing $2 billion. The basic business principle Congress and some in the Pentagon consistently fail to follow is return on investment. Since the development and successful multiyear production of the F-16 and F-18, they have rejected every argument that promotes return on investment in defense acquisition.

Can you imagine the president of Ford, after investing billions to develop the Ford Fusion, telling the board of directors that Ford should produce less than 1,000 to keep total program costs low? He'd be fired at Ford, but promoted on Capitol Hill!

With Mr. Gates' logic, every new weapon system will end up a "silver bullet." The F-35 and the KC-X tanker may be the next casualties of this insane logic. Let's hope saner minds prevail.

Gen. John Michael Loh,
USAF (Ret.)
Williamsburg, Va.

Disappearing Species

As technology progresses, aesthetically pleasing contemporary fighter aircraft are soon becoming a disappearing species *["The New 'Balanced' Air Force," November 2009, p. 28].* Generation 4 aircraft and their predecessors all have a history and legacy that will be completely apart from succeeding ones. It will seem strange indeed to see F-15s, -16s, and -18s classified as vintage aircraft.

MSgt. Michael O'Hearne
USAFR (Ret.)
Charlestown, N.H.

[Regarding] air superiority: Are we on the right path? I am concerned that our Air Force is putting too much faith in too few airframes. Can the F-22s be in all the places we want them all at once? How about base defense: Are we thinking enough about protecting our airfields, not to mention military facilities, in general?

Our potential adversaries, the Chinese, are updating older fighters, MiG-19s and MiG-21s, in vast numbers, not to mention new fighters and attack aircraft being fielded.

There must be more thought into the area of quality and quantity, and depending too much on quality.

Let's not forget the lessons of the Vietnam War when our pilots were at a disadvantage with little close-in dogfight training, unreliable missiles, fighter planes with limited maneuverability, and no guns. These problems were addressed, to an extent, as the war progressed, too late for many of our pilots and aircrews. We should have used such aircraft as later model F-86s, F-5 Freedom Fighters, and F-100 Super Sabres, but that's a discussion for another time.

We need to remember the dark days of World War II, just after Pearl Harbor, when we were greatly outnumbered, and less than 10 years later when the North Koreans attacked South Korea. We were outnumbered and soon outclassed when the MiG-15 entered the conflict.

Matching the enemy on a one-to-one basis is certainly not needed in today's combat arena, but we cannot and should not take this to an extreme.

Another thing we need to address is making sure we have enough mothballed aircraft available that can be brought on line quickly in the event of a sudden war.

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

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AFA's Mission

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

To advocate aerospace power and a strong national defense.

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

World events are too unpredictable to base our future force structure on a few scenarios. We, as a nation, need to stay on our toes.

Thomas R. Jantz,
St. Clair Shores, Mich.

Just Do It

The Marines operate UAVs, but they don't use their few, expensive officer-pilots to do it *["The Airman's Creed: Just Do It," November 2009, p. 36]*. USAF might try the same thing. Then, USAF's "stop-lost" UAV officers can get on with their career progressions.

USAF should also think outside of the manning box for cyber operations. Logic suggests USAF could have sooner-cheaper-better cyber operations using civilian nerds, near where the civilian nerds already live. This could avoid another stop-lost career dead end for USAF officers.

Paul J. Madden
Seatac, Wash.

Air Invasion of Burma

John T. Correll's article, "The Air Invasion of Burma" (November 2009, p. 50), notes that Gen. George C. Marshall and Gen. Henry H. "Hap" Arnold quickly grasped the utility of British Maj. Gen. Orde C. Wingate's strategy for fighting the Japanese behind the lines in Burma. They gave Wingate their full support.

That's another inspiring example of the excellence of America's military leadership in World War II, and a major reason why we won the war. In the best of the American "can-do" tradition, they were open to new operational concepts.

We also had the good fortune to be led by broad-minded government leaders like Roosevelt and Churchill who would give the green light to such efforts.

Gregg M. Taylor
Clearwater, Fla.

Imagine my delight, when I received my regular copy of *Air Force* Magazine, to find your story, "The Air Invasion of Burma," as one of the feature stories.

Although it brought back a flood of memories for this troop carrier pilot instructor (there aren't many of us left), it omitted any reference to the part many of us played in the origination of that special entity.

After my enlistment and training period as an [Army Air Forces] pilot, I was assigned to Bergstrom Field in Austin, Tex., where some of us were trained as instructors by senior airline pilots of major airline companies, in commercial DC-3s, on loan from their companies. I'll never forget my instrument check ride, given by Frank Aiken, a captain with United Air Lines. After a two-hour ride "under the hood" as he called it, in one of their on-loan flagship DC-3s, we landed and Aiken, without a word to me, walked us back to the ready room, threw his check sheet board on the table, and announced to my squadron leader, "Well, we finally got one." He then turned to me, held out his hand for me to shake, and said very quietly, "You're the first to pass, nice job."

Since the troop carrier concept was just being born, we new instructor pilots not only had to learn the art of glider towing but also glider snatching, glider flying, double glider towing, and the evacuation of wounded personnel from torn-up landing areas, but also had to train new pilot school graduates, in those disciplines, to be the "best they could be," when performing such arduous missions.

Although the original troop carrier concept wasn't without its flaws in both concept as well as actual performance, I like to think we, as all comrades in arms, performed our assigned mission in typical Air Force manner, despite the odds and with enough success to have merited a "well done" from the top brass of the armed forces.

Thank you for your article and for the memories it rekindled in this old, but proud, troop carrier pilot-instructor.

Don J. Daley
Harrisonburg, Va.

Eighty Year Legacies

I understand that the Obama Administration has other priorities in mind. However, I have read many of the same type of articles as the essay by John Tirpak on the KC-135 saga. And, all of this rhetoric bothers me since the premise is that "some KC-135s will be in service for 80 years or more" *["Washington Watch: Another Try at KC-X, Three Tanker Tracks," November 2009, p. 8].*

What has happened to our national defense posture? We are fighting two wars, with Operation Iraqi Freedom winding down and the war in Afghanistan beginning to expand. If we are going to fight and even if we are at peace, we need a much stronger military. Therefore, all of the haggling over buying this weapon or not is ridiculous.

If you read your magazine, you will also see that various other aircraft—B-52H, F-16, C-5, B-1B, etc.—are being retired! So, it seems prudent that we should replace these planes and do it with all possible dispatch! I think the enemy that gave us 9/11 is more of a threat to the United States than Hitler and the Japanese ever were since we were able to rally and defeat them. This time, it may not be so.

William Reid
Essexville, Mich.

Washington Watch

By John A. Tirpak, Executive Editor

F-35 saga rolls on; Chinese power rolls out; Combat air patrols roll up? ....

F-35 Problems Now in the Open

In late fall, the press buzzed with reports about problems gripping the pivotal F-35 fighter. Then the prime contractor, Lockheed Martin, acknowledged in November that the press reports were, essentially, correct.

Lockheed reported that the Lightning II stealth fighter program is behind schedule and over budget, facts established in the latest assessment by DOD's F-35 joint estimate team, or JET.

Even so, company officials were quick to say that the situation was improving, and certainly was not getting worse, as some press accounts had claimed.

Daniel J. Crowley, the Lockheed Martin Aeronautics executive vice president, told the Fort Worth *Star-Telegram* in November, "What I am encouraged by is, each jet that goes out is more complete and it takes less time" to build. He added, "Everybody is looking at the schedule and saying you've had past delays, but they're coming down."

In addition, program officials announced "a significant achievement" with the Nov. 14 first flight of AF-1, the first weight-optimized F-35A test aircraft built in the conventional takeoff and landing configuration that the Air Force plans to procure in large numbers.

"AF-1 is one of the most important aircraft in our test fleet because knowledge gained from its use expanding the flight envelope will benefit the other two variants and every F-35 ever built," said Doug Pearson, Lockheed Martin vice president for F-35 test and verification.

The JET comprises program and cost experts from USAF, the Navy, and Office of the Secretary of Defense. It comes under the authority of the Cost Assessment and Program Evaluation (CAPE) office, which is the old Program Analysis and Evaluation shop with a new name.

The JET found that the F-35 program faces potential schedule slips up to two years and corresponding cost overruns of billions of dollars, according to press reports.

Discussing the JET analysis with reporters in October, Pentagon spokesman Geoffrey S. Morrell said it was "still a work in progress." However, he added, "I think it's fair to say that if the JET had provided some especially good news, we would be trumpeting it." Clearly, DOD was not doing that.

Morrell said the JET analysis is "important" to the budget process, but it offered a "worst-case assessment," while the F-35 program office is "generally much more optimistic."

The Office of the Secretary of Defense leadership must ultimately "figure out the sweet spot" between the two views, he said.

Inside the Pentagon, a Washington, D.C.-area online news service, reported in its Nov. 26 issue that DOD is considering a one-year extension of the F-35 development program. ITP described the potential shift as "a move that would allow Defense Department leaders to recalibrate the program and postpone a looming cost breach" that could trigger tremendous problems.

DOD had no public response to the story.

Lockheed Martin photo

F-35 hits a rough patch.

China Ramps Up Offensive ...

China's communist government has been busily expanding its spying and computer attack operations against the United States, says a new assessment delivered to Capitol Hill.

The Congressionally mandated report from the US-China Economic and Security Review Commission declared, "As a means of enhancing its military modernization and economic development, China has been heavily involved in conducting human and cyber espionage" targeting the United States.

The 367-page report, released in late November, noted that US officials "have concluded that Chinese intelligence collection efforts are growing in scale, intensity, and sophistication."

Citing a "marked increase" in cyber intrusions originating in China that target US government and defense-related computer systems, the commission said these actions could "compromise sensitive defense and military data."

Cyber attacks and network intrusions are notoriously difficult to trace back to their origins, but all indications are that China is the prime offender.

Chinese intelligence services are "actively involved in operations directed against the United States," according to the bipartisan panel. "China is the most aggressive country conducting espionage against the United States."

The cyber campaign has all the hallmarks of a state-sponsored operation.

Many of China's cyber-attack capabilities are run from within the People's Liberation Army, and the PRC is actively recruiting technically skilled people from the country's private sector to bolster its capabilities. "It is recruiting skilled cyber operators from information technology firms and computer science programs into the ranks of numerous information warfare militia units," stated the report.

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And much like the Russian government is believed to have included cyber assaults in recent campaigns against Estonia and Georgia, China would be expected to attack opposing government and military information systems in the early stages of a conflict.

The commissioners noted that Chinese espionage must be countered head-on. Lawmakers should ensure the US can "meet the rising challenge of Chinese human intelligence and illicit technology collection."

They said that government computer defenses should be strengthened, with an eye toward developing "effective and reliable attribution techniques for computer exploitation and computer attacks."

... To Expand Its Military Power

In the view of the panel's commissioners, China's rising cyber and intelligence actions are part of a broad and dedicated effort whose underlying goal was to enhance Beijing's military capabilities and expand Chinese regional influence.

It is obvious that some of the actions will place Chinese ambitions at odds with US interests in the Pacific, said the new study. Congress in 2000 set up the 12-member commission to analyze the implications—military, economic, and diplomatic—of growing US-China trade.

Although China is not yet considered a global military power, claimed the study, it is increasingly able to project force beyond the Taiwan Strait and potentially able to interfere with US access to the region.

As the panel noted, China's People's Liberation Army is rapidly modernizing its naval and air forces and upgrading its ballistic missile capabilities. These efforts could make it difficult for the US Navy to come to Taiwan's aid in the event of a cross-strait war, and air bases that USAF operates from near China's periphery are increasingly at risk from an expanding missile threat.

In a broad assessment of overall bilateral relations, the commission highlighted 10 of its 42 recommendations as being "of particular significance," many with direct relevance to the Defense Department's missions.

The report states that Congress should ensure DOD is paying enough attention to China's anti-access capabilities, such as its air defense system, offensive submarine capabilities, and ballistic missile arsenal. The health of US anti-submarine warfare and ballistic missile defense capabilities are key concerns, though US stealth aircraft would still hold the upper hand in any dustup with Chinese air defenders.

The commission also recommended that Washington encourage Beijing to scale back the forces threatening democratic Taiwan and, in so doing, reduce tensions. China can "demonstrate the sincerity of its desire for improved cross-strait relations by drawing down the number of forces, including missiles, opposite Taiwan," said the panel.

Chinese government officials blasted the report upon its release in the week following President Obama's visit to China. Beijing questioned the commission's purposes, charging that the report "ignores the facts and is full of prejudice and ulterior motives," said Foreign Ministry spokesman Qin Gang in a statement.

He added that the United States should not "do things that interfere in China's internal affairs and damage China-US relations."

Rethinking Air-Terror Threat

After al Qaeda hijackers attacked New York and Washington, D.C., with seized airliners, Washington gave high priority to defense of US cities and critical facilities from similar airborne strikes. The urgency felt after Sept. 11, 2001, however, appears to have faded in the capital.

In fact, the Pentagon is now awaiting the outcome of a new review of costly preventive measures put in place after those attacks. These include keeping USAF fighters and other aircraft on alert, poised to respond at a moment's notice to any perceived aviation threat.

The review was ordered by USAF Gen. Victor E. Renuart Jr., commander of both NORAD and of US Northern Command, the command responsible for homeland defense.

The review was first disclosed in the Nov. 19 edition of the *New York Times.* The *Times* story averred that the review stems from pressures on a military straining to fight two wars while simultaneously defending the homeland.

"The fighter force is extremely expensive, so you always have to ask yourself the question, 'How much is enough?'" Canadian Maj. Gen. Pierre J. Forgues of NORAD told the *Times.*

For the record, officials say the study has no predetermined conclusion, and that the level of force commitment could go down, up, or stay the same. In reality, though, the aim is believed to be to determine whether the program is still justified.

Senior officers told the *Times* that the assessment is to gauge the likelihood that terrorists might succeed in hijacking an airliner or flying their own smaller craft into the United States or Canada.

USAF photo by SSgt. Samuel Rogers

CAP flights; still needed?

The review will be completed this spring, said the report.

NORAD ended regular combat air patrols over cities in 2006, and instead introduced sporadic combat patrols. The Air Force keeps fighters and aircrew members on alert at an unspecified number of locations.

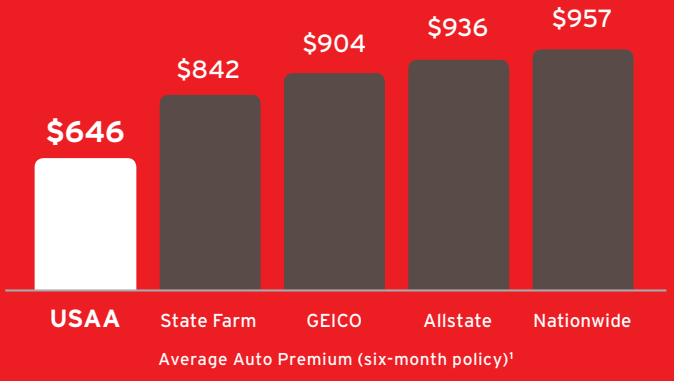
These alert fighters, whose numbers may be adjusted to meet changing threat levels, are capable of reaching, within minutes, targets threatening cities or critical infrastructure such as dams or nuclear power facilities. Supporting and complementing them are defense and FAA surveillance radars, E-3 Airborne Warning and Control System aircraft, and tankers.

Operation Noble Eagle maintains a dedicated 24-hours-a-day/seven-days-a-week fighter alert site at Joint Base Andrews, Md., near sensitive Washington sites, and operates a dedicated, around-the-clock ground-based air defense missile system.

DOD directs the US Air Force to support Noble Eagle, with most of that support coming from the Air National Guard's airmen and fighters.

In the past, Pentagon officials have been prepared to reinforce US air sovereignty with US Navy E-2 Hawkeye early warning aircraft and US Marine Corps F/A-18 fighters. That has not happened on a regular basis, however. ■

USAA AUTO INSURANCE RATES BEAT THE COMPETITION.



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Air Force World

By **Michael Sirak,** Senior Editor, with **Marc Schanz,** Associate Editor

Air Force Seeks Undersecretary

The Senate in late December pondered the nomination of Erin C. Conaton to be undersecretary of the Air Force, a crucial service leadership position that had been vacant since August 2007. She had served as majority staff director of the House Armed Services Committee since 2007.

The Obama Administration on Nov. 10 named Conaton for undersecretary. Nine days later, the Senate held her confirmation hearing, with no apparent opposition. In mid-December, however, Sen. Jeff Sessions (R-Ala.) put a hold on Conaton's nomination, effectively blocking any further Senate action.

Spokeswoman Sarah Haley said Sessions' action was related to USAF's major aerial tanker competition, declining to elaborate. A team comprising Northrop Grumman and EADS is competing for the tanker contract, and would assemble its aircraft at a plant in Alabama. Northrop/EADS has threatened to skip the competition unless DOD and USAF alter their request-for-proposal documents.

CV-22s End First Combat Tour

A contingent of six CV-22 tilt-rotor aircraft and airmen from the 1st Special Operations Wing at Hurlburt Field, Fla., returned home Nov. 12 from what had been a previously undisclosed three-month deployment to the Middle East for Operation Iraqi Freedom.

This was the first combat tour for the CV-22, whose Marine Corps cousin, the MV-22, has already served in Iraq and arrived last fall in Afghanistan. Air Force Special Operations Command, as is its practice, kept a tight lid on this mission and did not divulge information on the mission until the CV-22s were back home.

Lt. Col. Matt Glover, operations officer with the wing's 8th Special Operations Squadron, said he was pleased with how the mission went. "[The maintainers] generated airplanes and spares every night, and the aircrew did a great job flying them. I don't think we could have asked for more," he said.

Johns, Welsh Moving Up

■ Gen. Raymond E. Johns Jr. on Nov. 20 assumed command of Air Mobility Command, succeeding Gen. Arthur J. Lichte, who had led AMC since September 2007. Lichte had set his official retirement for Jan. 1, wrapping up 38 years on active duty. Johns last July was nominated for AMC's top post, and the Senate confirmed him in that same month. In the three years before he assumed command of AMC, Johns had served on the Air Staff as the deputy chief of staff for strategic plans and programs.

■ The Senate on Oct. 28 confirmed Lt. Gen. Mark A. Welsh III to receive a fourth star and take command of US Air Forces in Europe. He will replace Gen. Roger A. Brady, who has led USAFE since January 2008 and who is retiring with more than 40 years of service. Welsh's most recent assignment was as the CIA's associate director for military affairs, where he was the "bridge" between the CIA and Department of Defense.

Gates Sees ISR Gains

Secretary of Defense Robert M. Gates said Nov. 12 he now believes that the Air Force is on the right track in its efforts to quickly field more intelligence-surveillance-reconnaissance capability.

"The Air Force has significantly expanded its capability," Gates told a press group, adding, "And we intend to keep expanding it." He had complained back in 2008 that the service was not turning out unmanned ISR airframes and crews to operate them as quickly as it should.

However, he said, the Air Force is "pushing a lot into the theater. ... It's not just the airframes, both the [MQ-1] Predators and [MQ-9] Reapers and the [MC-12] Liberty aircraft, it's the ground analysis, ground stations, interpreters, intelligence analysts, pilots, and crews for these things."

SDB II Bids In

Teams led by Boeing and Raytheon in early November submitted their proposals for the engineering and manufacturing development phase of the Air Force's Small Diameter Bomb II program.

The Air Force is expected to choose the winner this spring to complete development of the 250-pound-class air-dropped weapon system and then

USAF photo by TSgt. Kevin Wallace

supply thousands of these bombs, which are designed to defeat moving surface targets in all weather conditions. Fielding is anticipated around 2014.

"The Boeing SDB II solution builds on our success with SDB Increment I," said Debra Rub, Boeing weapons programs vice president. Conversely, Raytheon spokesman Mike Nachshen said his company's design uses a proven "form-factored integrated seeker" and other mature technology.

F-22s Debut in Middle East

The Air Force in early November dispatched F-22 Raptor stealth fighters to the Middle East for the first time—for training, not combat. They participated in Exercise Iron Falcon at the United Arab Emirates' Air Warfare Center from mid-November to Dec. 10.

Six F-22s and a contingent of airmen from the 1st Fighter Wing at Langley AFB, Va., made the trip, which Air Forces Central said provided the F-22 aircrews with the opportunity for "bilateral training with coalition partners." USAF F-16s also took part in Iron Falcon, according to AFCENT.

November also marked the debut of the Langley-based F-22 aerial demonstration team in the region as it performed at the Dubai Air Show in the UAE that ran Nov. 15-19.

Space Arms Race? No.

Air Force Gen. Kevin P. Chilton, commander of US Strategic Command,

Four Royal Danish Air Force F-16s form up behind a USAF KC-135 aerial tanker during a mission over Europe. This KC-135, assigned to USAF's 100th Air Refueling Wing at RAF Mildenhall, Britain, is one of 15 Stratotankers permanently assigned to the European theater. The wing constitutes a key part of the US air refueling "bridge" that allows Air Force and allied expeditionary units to deploy worldwide.

12.08.2009

Air Force Posts Best Year Ever in Flight Safety

The Air Force recorded its safest flying year ever in Fiscal 2009. The year-end total of 17 Class A mishaps surpassed 2006's record of 19 mishaps.

The rate of 0.8 mishaps per 100,000 flying hours was even more impressive. It was just the second time USAF ever recorded a rate better than one mishap per 100,000 hours, and was more than 10 percent better than the old record.

In a nutshell, 2009 was an "absolute superb year in the Air Force for aviation," said Maj. Gen. Frederick F. Roggero, USAF's chief of safety. Six airmen died in 2009's crashes, however. This was well below the 10-year average of 9.9 deaths, but did not match the best years—just three airman died in aviation mishaps in 2006 and 2007 combined.

Accidents that result in a death, permanent disability, loss of an aircraft, or more than $1 million in damage are considered Class A.

The million-dollar threshold led to some end-of-year adjustments after USAF released 2009's preliminary results.

An incident where an A-10 hit a black vulture at Barksdale AFB, La., was this fall upgraded to Class A status after the damage estimate surpassed $1 million. This was the Air Force's only Class A bird strike the entire year.

At about the same time, the repair bill for a B-1 engine mishap came in less than expected, and that incident was downgraded.

The threshold for Class A mishaps was raised to $2 million for the current fiscal year, and Roggero said safety officials expect this will result in roughly 20 percent fewer mishaps considered Class A just for their dollar damage. Under the old standard, he said, when a high-performance engine was damaged, the incident almost inevitably became a Class A mishap.

Despite inflation and an old, heavily used fleet, mishap rates have trended downward. Officials credit continued focus on safety in maintenance, training, risk analysis, and better understanding of the human factors that lead to crashes.

Record flight safety has unfortunately not translated into improved safety for off-duty airmen, an area where "we have issues," said Roggero. Airmen "need to remember to take that risk mitigation and apply it outside the gate," he said.

Fifty-five airmen died in off-duty accidents last year. Personal motor vehicle accidents claimed 49 airmen, a number that is about average, and safety officials consider roughly 70 percent of the PMV deaths to be "preventable."

Motorcycles have proved particularly deadly. In 2009 alone, 20 airmen were killed in off-duty motorcycle accidents—more than three times the number killed in aviation mishaps.

said Nov. 3 he wants to avoid increased tension between the US and China over space, and views greater dialogue between the two nations as a means to mitigate increased competition in the space realm.

"I don't think either country ... is interested in a future arms race," said Chilton during a speech at a strategic space symposium in Omaha, Neb., the *Omaha World-Herald* reported Nov. 4.

According to the newspaper, Chilton reiterated that the US would welcome more transparency by the Chinese military to better understand Chinese intentions as China rapidly expands its space and satellite capabilities. At the end of October, Chilton hosted a senior Chinese military delegation at STRATCOM headquarters at Offutt AFB, Neb.

Defense Policy Bill Enacted

President Obama on Oct. 28 signed the Fiscal 2010 defense authorization bill into law that provides $550.2 billion for defense and national security programs and $130 billion to support overseas contingency operations.

The White House was successful in the end in getting Congress to go along with the Pentagon's desire to cap F-22 stealth fighter production and terminate

The Real Thing: *A C-17 Globemaster III participating in Mobility Air Forces Exercise on Nov. 18 takes off from an airfield on the Nevada Test and Training Range near Nellis AFB, Nev. The joint exercise provides realistic training for combat air forces, mobility air forces, and US Army soldiers.*

USAF photo by A1C Brett Clashman

big-ticket projects such as the VH-71 Presidential Helicopter.

But lawmakers did go against the President by including $560 million to keep alive the second engine initiative—the General Electric-Rolls Royce F136—for the F-35 stealth fighter. The measure also slows the Air Force plan to retire some 250 legacy fighters in 2010 and boosts military pay by 3.4 percent.

Strike Command Defines Mission

During a senior leadership meeting in mid-October, Air Force Global Strike Command officials crafted the mission statement and vision for the new organization, which will oversee the nation's ICBMs and nuclear-capable bombers.

The command's mission, they determined, is to: "Develop and provide combat-ready forces for nuclear deterrence and global strike operations, ... safe, secure, credible, ... to support the President of the United States and combatant commanders."

This mission "needs to be understood by everyone in the command, because we truly have been given a special trust and responsibility for our nation's strategic deterrence mission," said Lt. Gen. Frank G. Klotz, the AFGSC commander.

Lawmakers Want KC-X To Factor In "Illegal" Subsidies

A bipartisan group of 39 House members sent a letter to President Obama on Nov. 2 urging him to factor the "illegal" launch subsidies that Airbus has reportedly received from European governments for its A330 aircraft into deliberations over USAF's KC-X tanker competition.

The group, led by Rep. Norm Dicks (D-Wash.), Rep. Jay Inslee (D-Wash.), and Rep. Todd Tiahrt (R-Kan.), represents states where aerospace giant Boeing has a significant presence.

The missive was sent as the Air Force was still formulating the final version of its tanker solicitation to industry. USAF officials anticipate being able to choose a winning tanker later this year from among the bids expected from Boeing and rival Northrop Grumman, whose team includes Airbus' parent company EADS.

Failure to consider these subsidies, the lawmakers warned, would allow EADS to submit "a reduced bid price" for its A330-based tanker as part of Northrop's offering that "would not otherwise be economically viable."

Without saying so explicitly, they imply that this would place Boeing's tanker proposal at a disadvantage. It would also be "injurious" to the US economy and national security industrial base, they argued.

Last year, the World Trade Organization reportedly upheld the US charge that Airbus received illegal subsidies, in an interim ruling released to government officials on both sides of the Atlantic.

A European counterclaim before the WTO alleging illegal US subsidies to Boeing was still under review, with a decision expected later this year.

The Pentagon has indicated that it would not consider WTO findings on subsidies in choosing the new tanker.

But these House members state, "One way or another, it is imperative that the bid price of the Airbus tanker reflect this illegal subsidization."

Boeing Wins KC-135 Appeal

The US Court of Appeals for the Federal Circuit on Nov. 17 overturned an earlier ruling by a lower court and restored a $1 billion KC-135 maintenance contract to Boeing that had been disputed by Alabama Aircraft Industries.

The appeals court said the lower claims court erred in its fall 2008 ruling when it called USAF's "price-realism analysis" during the contract award process "arbitrary and capricious."

The Air Force awarded Boeing the contract in September 2007. AAI protested the award to the Government Accountability Office, which eventually upheld the Air Force's decision in June 2008. AAI then filed its lawsuit in federal claims court and won that round.

Chinese Stealth Fighter Nears

A top Chinese Air Force official said China will have fifth generation fighters fielded within eight to 10 years—putting it ahead of the timeline that Secretary of Defense Robert M. Gates projected in arguing to curtail F-22 production at 187 aircraft.

Gen. He Weirong, Chinese Air Force deputy commander, said in an interview with China Central Television that this new aircraft would match or exceed the capability of similar fighters in existence today, the *Global Times,* reported Nov. 10. Another Chinese officer told GT that the new fighter would definitely be stealthy.

In July 2009, Gates told the Economic Club in Chicago that Beijing would have "no fifth generation aircraft by 2020" and would have only "a handful" by 2025. The Chinese statements came less than two weeks after USAF let a $474 million contract to Lockheed Martin for the final four F-22s to complete the 187-aircraft program of record.

USAF Shedding Some Airmen

The Air Force has too many airmen in hand—thanks to the poor economy which service officials believe has led to a higher retention rate—so it plans to shed 3,700 personnel during Fiscal 2010 to stay on target for an end strength of 331,700 airmen, Air Force Personnel Center officials announced Nov. 16.

The service, they said, plans to use voluntary and involuntary early separation and retirement programs, as needed, to cut 2,074 officers and 1,633 enlisted members and reduce a projected $228 million personnel funding shortfall.

The officer plan includes reducing 2010 officer training school accessions by 144 and delaying entry into service of 417 ROTC graduates. AFPC expects to have to continue the officer reductions into 2011 since voluntary measures will likely not cover the entire 2,074.

Preparing for C-27J Operations

Air Mobility Command announced in late October that it had begun testing the concept of employment for the C-27J intratheater transport, which is expected to make its operational debut in Southwest Asia toward the end of this year.

Using C-130 aircraft as stand-ins for the smaller C-27Js—since the two C-27Js already in the inventory were involved in stateside testing—the COE assessment took place in Iraq. Its goal was to mature the command and control structure and validate the

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Chilton Says Minuteman III Can Last to 2030

Air Force Gen. Kevin P. Chilton, head of US Strategic Command, said in November he hadn't seen anything indicating that the Minuteman III missile cannot serve as a leg of the nation's nuclear deterrent until 2030 as Congress has mandated.

In discussions with the Air Force's Minuteman overseers, "their view is that, with the appropriate investment, they can extend the life out to 2030," Chilton said Nov. 10 during a Capitol Hill speech.

"Most of the investment," he continued, "is not actually in the missile itself, but it is in supporting infrastructure," such as aging test equipment.

Chilton said the Air Force is making those investments, leading him to have a "high" degree of confidence in the Minuteman's long-term viability.

However, he added, "I don't think it is too early in the next year or two to begin thinking about" whether there will be a Minuteman follow-on and what it would look like.

The Air Force has already pumped more than $7 billion to upgrade the Minutemen III force so that it remains viable until 2020. Examples include updated guidance and propulsion.

But subsequent to the development of that modernization plan, Congress mandated that the service keep the missile fleet out to 2030.

The Minuteman III inventory is currently 450 operational missiles, plus test assets. It remained unclear as of mid-December whether the fleet size would be reduced as part of the new arms control treaty that the United States and Russia were negotiating.

Chilton said there are enough test assets to keep conducting Minuteman flight tests out to 2030 to help discover any issues that could impact the missile's performance or reliability.

requirements for the direct intratheater airlift support of the Army envisioned with the C-27J.

The C-27J represents the first new airframe that will be solely owned, operated, and maintained by Air National Guard aircrews. The Air Guard is slated to acquire 38 C-27Js under current planning. Air Guardsmen from the 179th Airlift Wing in Mansfield, Ohio, and the 175th Wing in Baltimore will be the first to train and deploy with them.

GAO Warns of Airlift Gap

The US military still faces a looming capability gap in moving Army medium-weight weapon systems by air within a combat theater, the Government Accountability Office warned in a report Nov. 12.

GAO said "only" the C-17 is currently capable of transporting heavier equipment, such as armored Strykers and mine-resistant, ambush-protected vehicles, within theater, as these are "too large and bulky" for C-130s. Yet, C-17s cannot transport these vehicles "into austere, short, or unimproved landing areas," according to GAO.

While the Air Force-Army joint future theater lift concept will address this shortfall, its fielding is not expected until 2024, said GAO. This means that C-17s may have to be used more in tactical heavy lift roles to mitigate—but not fill—this gap, potentially impacting its "primary role as a strategic airlifter," said GAO.

USAF Will Adjust RPV Training

Speaking in mid-November during the Dubai Air Show in the United Arab Emirates, Air Force Chief of Staff Gen. Norton A. Schwartz said the service would be making changes to its fledgling effort to produce more remotely piloted vehicle (RPV) operators more quickly.

"We are trying to find the sweet spot where we don't train too much and don't train too little," Schwartz said during a meeting with reporters, according to news reports. He said he believed that the service was "on the right path."

USAF put its first batch of freshly minted undergraduate pilots into RPV training in late 2008. Last September, its first beta class of officers with no flying training graduated from initial flight screening and RPV training.

Air Force Gets 190th C-17

The Air Force on Oct. 28 took delivery of its 190th production C-17 transport aircraft. Lt. Gen. Charles E. Stenner Jr., Air Force Reserve chief, accepted the aircraft from Boeing at the company's assembly plant in Long Beach, Calif.

He then accompanied an all-Reserve crew aboard the C-17 on the cross-country flight to bring the aircraft to its new home at Charleston AFB, S.C., where it joined Air Force Reserve Command's 315th Airlift Wing. This C-17 was the 58th to be stationed at Charleston.

Congress, as of mid-November, had authorized the Air Force to procure 213 C-17s, 205 of which had been ordered. The service, as of then, was still awaiting the final version of the Fiscal 2010 defense appropriations bill to know if

USAF photo by SSgt. Aaron Oelrich

Sniffing Out Trouble: *TSgt. Harry Harris, 9th Security Forces Squadron, leads his narcotics detection dog Ben through a drug sweep of luggage at a security checkpoint during a major accident response exercise at Beale AFB, Calif. The test was held to determine the base's ability to safely take in evacuees in case of an emergency.*

The War on Terrorism

Operation Enduring Freedom—Afghanistan

Casualties

By Dec. 16, a total of 929 Americans had died in Operation Enduring Freedom. The total includes 927 troops and two Department of Defense civilians. Of these deaths, 666 were killed in action with the enemy while 263 died in noncombat incidents.

There have been 4,683 troops wounded in action during OEF. This number includes 1,930 who were wounded and returned to duty within 72 hours and 2,753 who were unable to return to duty quickly.

Airpower Supports Major Kunduz Operation

US and coalition forces, backed up by airpower assets, conducted a major operation in Kunduz province, Afghanistan, in early November, with NATO and Afghan officials claiming more than 130 Taliban fighters and eight enemy commanders killed during the five-day operation. No NATO or Afghan troops were killed.

A force of 700 Afghan soldiers and 50 NATO troops cleared several villages of Taliban fighters in and around the province's Char Dara district from Nov. 3 to Nov. 9, according to Afghan and NATO officials.

Aircraft, including A-10s, F-15Es, F-16s, and MQ-9 Reaper remotely piloted vehicles, were utilized several times during the operation to deter enemy activity, conduct reconnaissance, and strike key positions, according to Air Forces Central statements.

On Nov. 4, A-10s provided armed overwatch and attacked an enemy mortar position with precision guided munitions and several strafing runs, while an MQ-9 monitored enemy forces massing for an attack, responding with precision munitions and missiles on their position, according to AFCENT.

On Nov. 5, numerous aircraft, including F-15Es, F-16s, and MQ-9s, conducted armed overwatch. When enemy forces were observed at several fighting positions, the aircraft destroyed several targets with precision guided bombs, missiles, and strafing runs.

Kunduz province, located in Afghanistan's rugged north, has only recently experienced a surge of militant and Taliban activity, according to NATO officials.

Operation Iraqi Freedom—Iraq

Casualties

By Dec. 16, a total of 4,373 Americans had died in Operation Iraqi Freedom. The total includes 4,360 troops and 13 Department of Defense civilians. Of these deaths, 3,477 were killed in action with the enemy while 896 died in noncombat incidents.

There have been 31,603 troops wounded in action during Operation Iraqi Freedom. This number includes 17,710 who were wounded and returned to duty within 72 hours and 13,893 who were unable to return to duty quickly.

Iraqis Acquire Advanced Radar System

The Iraqi Air Force on Oct. 26 obtained the capability to monitor portions of its airspace effectively, when the Digital Air Surveillance Radar system at Kirkuk Regional Air Base was transferred from US to Iraqi control.

The DASR system includes a radar and a radar control facility that give Iraqi air controllers the ability to track aircraft from up to 138 miles away, thereby enabling coverage of the entire northern quadrant of Iraq as well as into Iran, Syria, and southern Turkey, according to officials with USAF's 506th Air Expeditionary Group at Kirkuk.

"They'll know if anybody enters their airspace," said Capt. Jeremy Kruger, the onsite program manager with USAF's 521st Air Expeditionary Advisor Squadron.

Work on the DASR system began back in August 2006, when Air Force advisory teams and contractors collaborated with the Iraqis to install more than $53 million in air traffic and navigation equipment for the Iraqi air arm.

The new radar system is part of a larger modernization package for Kirkuk that includes new lighting, signs, and weather observation tools meeting international civil aviation and surveillance standards.

Eventually, Kirkuk's radar system will be remotely accessible from Baghdad's international airport to allow for a more unified air picture over the entire country.

it would receive funding for up to 10 more C-17s.

A-10 Flies With Synthetic Fuel

The Air Force conducted flight tests Nov. 2-3 with an A-10 Thunderbolt II aircraft operating with the synthetic fuel blend that it intends to introduce fleetwide by early next decade. Full certification for unconstrained use of this fuel for the A-10 was expected by the end of December.

USAF is pursing this fuel initiative as one means to decrease US dependence on foreign sources of energy. The fuel blend comprises 50 percent JP-8 jet fuel and 50 percent synthetic paraffinic kerosene. The latter is currently derived from natural gas, but can also be made from coal, of which the US has an abundant supply.

As of mid-November, the Air Force had cleared the B-1B, B-52H, C-17, F-4 (USAF flies QF-4 target drones), F-15, and F-22 to operate on this fuel. Besides the A-10, the C-5, C-130J, F-16, KC-135, and T-38 had run on it in tests and were awaiting certification. Yet to fly with it were the B-2A, T-6, HH-60, MQ-9, and RQ-4.

Space Sensor Explored

The Air Force's Space Based Infrared System program office announced Nov. 3 that it intended to award Raytheon a contract to determine the feasibility of taking existing hardware that the company has held in storage and building an infrared sensor payload that could be used in space to warn of missile launches.

The office said it would like the company to carry out this assessment over a period of 90 days. It sought insights on the quality of IR package that could be assembled and the costs and effort required to create this payload.

The Air Force already has two advanced IR sensor payloads operating in space on classified intelligence satellites to warn of missile launches, alongside existing Defense Support Program early warning spacecraft. And it plans to place the first SBIRS satellite, GEO-1, in space in 2011.

Ramstein Sheds Final C-130E

The last C-130E transport assigned to the 86th Airlift Wing at Ramstein AB, Germany, left the base for good on Nov. 2, marking a historic step in the unit's transition to the new C-130J model.

This C-130E, with tail No. 1299, departed for Poland, which is acquiring five C-130Es from the Air Force under a foreign military sales arrangement.

The wing is in the process of building a force of 14 C-130Js. Lockheed Martin on Nov. 9 delivered the seventh of those 14 C-130Js to the Air Force at the company's production facility in

Senior Staff Changes

RETIREMENTS: Gen. Arthur J. **Lichte,** Lt. Gen. Terry L. **Gabreski,** Maj. Gen. David E. **Clary,** Maj. Gen. Douglas L. **Raaberg,** Brig. Gen. Theresa M. **Casey,** Brig. Gen. Daniel R. **Dinkins Jr.**

NOMINATION: To be ANG Brigadier General: Frank J. **Sullivan.**

CHANGES: Lt. Gen. (sel.) Kurt **Cichowski,** from Vice Cmdr., AFSOC, Hurlburt Field, Fla., to Assoc. Dir. of Central Intel. for Mil. Spt, CIA, Washington, D.C. ... Brig. Gen. (sel.) Kory **Cornum,** from Command Surgeon, ACC, Langley AFB, Va., to Cmdr., 81st Medical Grp., AETC, Keesler AFB, Miss. ... Brig. Gen. Dwyer L. **Dennis,** from Spec. Asst. to the Cmdr., AFMC, AFMC, Wright-Patterson AFB, Ohio, to Dir., Intel. & Rqmts., AFMC, Wright-Patterson AFB, Ohio ... Gen. Raymond E. **Johns Jr.,** from DCS, Strat. Plans & Prgms., USAF, Pentagon, to Cmdr., AMC, Scott AFB, Ill. ... Maj. Gen. Ellen M. **Pawlikowski** from Dep. Dir., Natl. Recon Office, Chantilly, Va., to Cmdr., AFRL, AFMC, Wright-Patterson AFB, Ohio ... Maj. Gen. (sel.) James O. **Poss,** from Dir., ISR Capabilities, DCS, ISR, USAF, Pentagon, to Dir., Strategy, Integration, & Doctrine, DCS, ISR, USAF, Pentagon ... Lt. Gen. Janet C. **Wolfenbarger,** from Dir., Intel & Rqmts., AFMC, Wright-Patterson AFB, Ohio, to Vice Cmdr., AFMC, Wright-Patterson AFB, Ohio ... Brig. Gen. Daniel O. **Wyman** from Cmdr., 81st Medical Grp., AETC, Keesler AFB, Miss., to Command Surgeon, ACC, Langley AFB, Va.

SENIOR EXECUTIVE SERVICE RETIREMENTS: David C. **Bond,** Hanferd J. **Moen,** Kenneth I. **Percell.**

SES CHANGES: Barbara J. **Barger,** to Spec. Asst. to the DCS, Manpower & Personnel, USAF, Pentagon ... Jack L. **Blackhurst,** to Dir., Human Effectiveness Directorate, 711th Human Performance Wg., AFMC, Wright-Patterson AFB, Ohio ... Audrey Y. **Davis,** to Dep. Dir., AF Staff, USAF, Pentagon ... Gerald L. **Freisthler,** to Exec. Dir., ASC, AFMC, Wright-Patterson AFB, Ohio ... James F. **Geurts,** to Dep. Dir., Ctr. for Spec. Ops. Acq. & Log., SOCOM, MacDill AFB, Fla. ... Edmundo A. **Gonzales,** to Dep. Asst. SECAF for Force Mgmt. Integration, Office of the Asst. SECAF for Manpower & Reserve Affairs, Pentagon ... Clyde R. **Hobby,** to Dir., Strat. Prgms., Defense Log. Agency, Ft. Belvoir, Va. ... Randall J. **McFadden,** to Dir., Accq. Mgmt. & Integration Ctr., ACC, Langley AFB, Va. ... Jarris L. **Taylor Jr.,** to Dep. Asst. SECAF for Strat. Diversity Integration, Office of the Asst. SECAF for Manpower & Reserve Affairs, Pentagon ... Angela L. **Tymofichuk,** to Dir., Engineering, Ogden ALC, AFMC, Hill AFB, Utah.

COMMAND CHIEF MASTER SERGEANT CHANGE: Eric R. **Jaren,** to Command Chief Master Sergeant, AFMC, Wright-Patterson AFB, Ohio, ■

Marietta, Ga. All 14 are expected to be with the unit this year.

Cyber Support Careers Kick In

The Air Force's new family of career specialty codes for cyberspace support took effect on Nov. 1, supplanting the three former career fields of communications-electronics, knowledge operations management, and communications-computer systems.

About 43,000 active duty, Air National Guard, and Air Force Reserve personnel from former communications career fields now fall under the 11 new cyberspace support specialty codes, as do more than 8,800 civilian-equivalent positions.

This conversion process was part of USAF's drive to bolster its cyber force. Airmen in this field will receive a new occupational badge that will become mandatory wear by June.

Beale Project Axed

The Air Force announced Nov. 3 that it had terminated negotiations with a private commercial developer to build a waste-water treatment facility at Beale AFB, Calif., under the Department of Defense's enhanced use lease initiative that would have serviced the communities surrounding the base.

"Business developments and market conditions" occurring after the Air Force selected Beale Community Partners LLC in March 2009 for this leasing opportunity "caused steep reductions in the returns the Air Force was to realize from the project."

Those reductions, the service noted, coupled with "other aspects" of the proposed development, drove the decision. "At this point," said Air Force spokesman Gary T. Strasburg, "there are no known plans for any future development," when asked if the service would seek another potential leasing partner.

F-22 Lawsuit Switches Venues

A federal district court in California on Nov. 2 granted Lockheed Martin's motion to transfer an F-22 lawsuit filed in 2007 by a former employee to a federal court in Atlanta, close to the company's F-22 assembly facility in northern Georgia.

Darrol Olsen, a stealth engineer whom Lockheed Martin fired in 1999, alleges that the company knowingly used "defective" stealth coatings on the F-22 in the late 1990s. He wants the company to pay the government back $50 million per F-22 built, the Associated Press reported Nov. 11.

A Lockheed spokesman said Nov. 5 the company requested the move since northern Georgia is "where the relevant documents and witnesses are located." Lockheed Martin "does not believe there is any merit to the allegations and will vigorously defend this matter in court," he said.

Baldacci Opposes Condor Plan

Maine Gov. John E. Baldacci said Nov. 13 the Air National Guard had failed to

Air Force Releases F-35 Basing Short List

The Air Force on Oct. 29 issued its list of 11 candidate bases that are the potential beddown locations for the first 250 to 300 F-35 Lightning II stealth fighters scheduled to enter its inventory by 2017.

On the short list of operational bases are: Hill AFB, Utah; Mountain Home AFB, Idaho; and Shaw AFB, S.C., as well as McEntire Joint National Guard Base, S.C., and the Air National Guard stations in Burlington, Vt., and Jacksonville, Fla.

The candidate training locations are: Eglin AFB, Fla.; Holloman AFB, N.M.; and Luke AFB, Ariz., as well as the ANG stations in Boise, Idaho, and Tucson, Ariz.

The Air Force said it selected these candidate installations out of the pool of more than 200 USAF sites using a "deliberate, repeatable, standardized, and transparent" process.

That process made Air National Guard leaders "really happy," since the Air Guard received five of the 11 slots, said Maj. Gen. Patrick J. Moisio, ANG deputy director. The Air Guard has been calling for the active duty component and Air Guard to receive F-35s concurrently and proportionately.

USAF expects to issue its record of decisions on the final basing choices in early 2011.

respond to questions about proposed low-level training flights over western Maine.

This, said the Maine Democrat, prompted him to write a letter to Lt. Gen. Harry M. Wyatt III, ANG director, registering his "opposition to this proposal."

Last August, Baldacci asked the Air Guard to delay a public hearing in September on the Condor Military Operating Area plan for at least six to nine months and to address a "series of questions regarding the safety, noise, and environmental impacts" of the proposed low-level training route for ANG F-15 and F-16 units in New England.

ANG delayed for 60 days, holding the latest public hearing Nov. 14 in Farmington, Maine. According to Baldacci, Wyatt responded to him only with a rationale for "doing no further analysis."

Call for US-made Attack Platform

Republican lawmakers Sen. Sam Brownback (Kan.) and Rep. Todd Tiahrt (Kan.) on Nov. 15 sent a letter to Secretary of Defense Robert M. Gates protesting the Pentagon's purported negotiations to buy 100 Super Tucano aircraft from Brazil-based Embraer to serve as Air Force Light Attack/Armed Reconnaissance platforms.

Purchasing foreign-built aircraft, they wrote, would be "inappropriate," namely because it "would harm US companies and workers" and "weaken the industrial base." They also noted that an arrangement with the company would "prejudge" the review undertaken last August by USAF to find an aircraft for the LAAR role.

Brownback and Tiahrt invited Gates to visit the production line of Hawker Beechcraft Corp., in Wichita, Kan. The company is teamed with Lockheed Martin in proposing the AT-6B, an armed version of the Beechcraft T-6 trainer, to be the LAAR.

Willow Grove Cut Loose

Pennsylvania Gov. Edward G. Rendell on Nov. 12 informed Secretary of Defense Robert M. Gates that he was withdrawing a plan aimed at giving new life to NAS JRB Willow Grove near Philadelphia.

The Pennsylvania Democrat's letter to Gates said the initiative for Willow Grove to host military, homeland defense, and emergency preparedness missions no longer made sense since "federal authorities have firmly signaled that they do not intend to assign an [Air National Guard] flying mission to this installation.

"Lacking that mission," he continued, "it's difficult to justify state expenditures." BRAC 2005 put the facility on its hit list, sending the Air Guard's 111th Fighter Wing and Air Force Reserve Command's 913th Airlift Wing aircraft elsewhere. Navy and Marine Corps aircraft also moved out.

Lockheed Martin photos

In For the Kill: *USAF and Lockheed Martin recently concluded flight tests on the Joint Air-to-Surface Standoff Missile (JASSM). Sixteen attempts were made between Sept. 10 and Oct. 4, using B-52 and F-16 aircraft against a wide range of targets and in many operational scenarios. Fifteen of the 16 tests were successful.*

Airmen Help Save Bayou

More than 400 airmen from Barksdale AFB, La., worked tirelessly around the clock, starting Oct. 31, to help local officials in northern Bossier Parish reinforce a levee meant to contain the Red Chute Bayou against rising waters after heavy rainfall ravaged northwest Louisiana.

The airmen filled sandbags and hauled them to the affected areas along the bayou to prevent the floodwaters, which had surged nearly 10 feet above normal levels, from overtaking local residences.

"I want to extend my sincere gratitude [to the airmen] for their dedication and work during this natural disaster," said US Rep. John Fleming (R-La.), in whose district Bossier Parish and Barksdale lie, in a floor speech Nov. 2.

USAF Civilian Dies at Bagram

Frank R. Walker, 66, an Air Force civilian supporting Operation Enduring Freedom, died Oct. 28 of noncombat-

USAF photo by SrA. Felicia Juenke

Slowly, Slowly: *A1C Sarah Garrett (r), an electronic warfare specialist, and TSgt. Lee Fortner lower themselves from the tail of an EC-10 Compass Call at Bagram Airfield, Afghanistan, after an inspection. Both airmen are deployed from Davis-Monthan AFB, Ariz.*

related medical causes at Bagram Airfield, Afghanistan.

Walker, of Oklahoma City, was assigned to the 72nd Civil Engineering Directorate at Tinker AFB, Okla., according to the Defense Department. The *Tulsa World,* citing a Tinker spokesman, reported Nov. 1 that Walker died of a heart attack.

Walker was a project construction manager with the US Army Corps of Engineers while overseas and was on his fifth trip to Afghanistan, according to the newspaper.

Airman's Remains Back Home

The remains of Sgt. Robert Stinson, who died in September 1944 at age 23 when his B-24 Liberator bomber was shot down in the Western Pacific, were returned to his family on Oct. 28, ending 65 years of separation.

The Sun of San Bernardino, Calif., reported on that same day that a military honor guard accompanied Stinson's casket on its flight from Hawaii to the airport in Ontario, Calif., where two of his brothers, along with other family members, were waiting to welcome him home.

Stinson's burial took place Oct. 30 in nearby Riverside. Stinson's aircraft was found underwater in 2004 near the islands of Palau by the volunteer BentProp Project, which searches for the remains of US servicemen in the Western Pacific. His remains were identified two years later using DNA.

Obituary

Margaret A. Hamilton Tunner, a member of the World War II-era Women Airforce Service Pilots program, died Oct. 13 at her home in Virginia at age 92. During the war, she flew P-39, P-40, P-47, B-17, and B-24 aircraft, ferrying them from the factory to either coast. She also piloted a new P-51 to Canada. After the war, she served with US occupation forces in Japan and, in 1951, married Lt. Gen. William H. Tunner, the architect of the Berlin Airlift. Her interest in flying continued and, in her 70s, she learned to fly ultralights, while, at 78, she co-piloted an F-15 out of Langley AFB, Va., courtesy of the Clinton Administration. ■

News Notes

■ Maj. Gen. Garry C. Dean on Nov. 12 assumed command of 1st Air Force (Air Forces Northern) at Tyndall AFB, Fla. Dean, formerly USAF's deputy inspector general, replaced Maj. Gen. Henry C. Morrow who had led 1st Air Force since November 2006.

■ USAF's sole B-2A stealth bomber unit, the 509th Bomb Wing at Whiteman AFB, Mo., received an "excellent" rating after a 12-day nuclear operational readiness inspection that concluded Oct. 23.

■ The Thunderbirds air demonstration squadron concluded its 2009 flying season with performances Nov. 14-15 at Nellis AFB, Nev. The team put on more than 70 shows, including a six-week tour of Asia and the Pacific region.

■ Lockheed Martin said Nov. 11 the extended-range version of its stealthy AGM-158 Joint Air-to-Surface Standoff Missile flew its preplanned course and destroyed the designated target in a flight test, giving it a six-for-six record so far in flight testing.

■ The US and Colombia on Oct. 30 signed the new bilateral defense cooperation agreement that grants the US access to at least seven Colombian military bases, from which to mount counternarcotics surveillance activities in the eastern Pacific region.

■ Bradley Myers, a firefighter with the 99th Civil Engineer Squadron stationed at Creech AFB, Nev., is the Defense Department's civilian firefighter of the year for 2008, the Air Force announced in late October.

■ The Air Force's Fleet Viability Board is assessing the higher-than-anticipated wear and tear that operations in Southwest Asia may have placed on the service's EC-130H Compass Call electronic warfare platforms, reported Flightglobal Oct. 28.

■ Virginia Dosedel, an Air Force financial analyst, received the Air Force's annual Spirit of Hope Award on Oct. 27 for her work with Sew Much Comfort, a nonprofit charitable organization providing clothing to cover the prosthetics of wounded warriors.

■ The National Aeronautic Association on Oct. 30 confirmed as official US records the 41 altitude, payload, and time-to-climb marks set by a C-5M Super Galaxy during a Sept. 13 flight out of Dover AFB, Del.

■ The Air Force's physical training uniform now is considered an official uniform with proscribed wear procedures contained in a revised Air Force Instruction 36-2903, Air Force Uniform Office officials announced Oct. 28.

■ On the eve of President Obama's first visit to China in November, Chinese officials said China would help search for the remains of the 15 US airmen who were lost when their bomber aircraft crashed on Nov. 5, 1950 over China's Guangdong province. ■

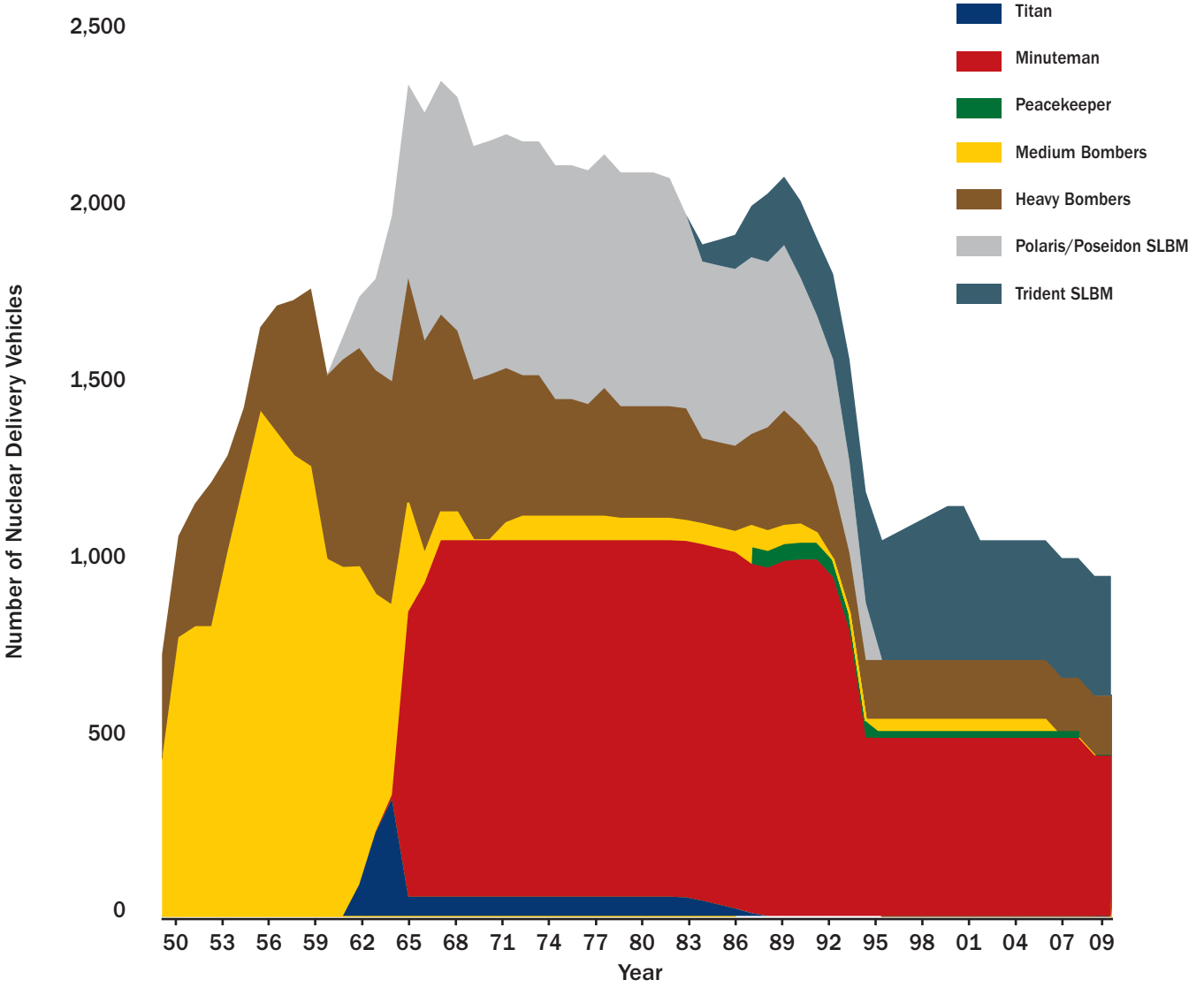
Chart Page

By Tamar A. Mehuron and Heather Lewis

The Bomber Squeeze

Over six decades, the US strategic nuclear deterrent has undergone dramatic change. The post-Cold War years saw the number of delivery systems drop from 2,000 to under 1,000. Equally significant, but less remarked, has been the long decline of the manned bomber. Today, the US has 450 USAF Minuteman III ICBMs and 336 Navy Trident D-5 SLBMs, but fewer than 120 nuclear-capable bombers—20 B-2s and 94 B-52s. That marks an enormous change from the 1950s, when USAF's 1,700 bombers comprised 100 percent of the deterrent. In light of DOD's failure to modernize the bomber force, many wonder about its future nuclear role. In the words of a new report from the Mitchell Institute for Airpower Studies, "The US ... may be moving to a 'de facto dyad'" of ICBMs and SLBMs.

Evolution of the US Strategic Nuclear Deterrent



Source: "Triad, Dyad, Monad? Shaping the US Nuclear Force for the Future," p. 17, Dana J. Johnson, Christopher J. Bowie, and Robert P. Haffa, published by the Mitchell Institute for Airpower Studies, December 2009.

Issue Brief

By Adam J. Hebert, Executive Editor

Drifting in Space

"The Secretary of the Air Force is hereby designated as the DOD executive agent for space and in that role shall ... exercise DOD-wide responsibilities for planning and programming of space systems and acquisition."—Department of Defense Directive 5101.2, June 3, 2003

With those words, then-Defense Secretary Donald H. Rumsfeld conferred upon the Air Force responsibility for military space programs defensewide. He acted to ensure that there was unity and clarity of effort in space.

It did not last long. In 2005, during a leadership vacuum in USAF, the Office of the Secretary of Defense "temporarily" withdrew this executive agent status from the service and began exercising the authority itself.

Nearly five years later, OSD officials still cling to this control. However, the excuses for not permanently resolving the matter of who controls military space had, by early 2010, just about run out.

The Air Force was originally chosen to lead these programs because of its overwhelming dominance of the field of military space. USAF runs the vast majority of orbital programs, provides a preponderance of the personnel in military space missions, has a four-star major command dedicated to space, and supplies the most uniformed personnel for space agencies such as the National Reconnaissance Office.

It was the Air Force undersecretary who actually performed the duties of executive agent for space. Undersecretaries Ronald M. Sega and Peter B. Teets were space experts, and Teets also served as director of the NRO.

This arrangement fell apart in 2005. In January of that year, Secretary of the Air Force James G. Roche stepped down, but his successor, Michael W. Wynne, was not in place until November. Worse, Teets retired in March, and the Bush Administration simply never got around to naming a successor. (The Obama Administration finally did so in November, nominating Erin C. Conaton for the post.)

Thus, for nearly a year, the service was left with no Secretary, undersecretary, or acquisition leader. It was then that OSD, in a classic bureaucratic power grab, seized control of 21 major service acquisition programs, 11 of which were space programs. OSD had, in effect, wrested away the space executive agency.

Air Force leaders are united in their desire to regain control of space, but have been extraordinarily polite in their requests.

There is no reason to give up on the notion of being executive agent for space, said Gen. Norton A. Schwartz, Chief of Staff.

Space is primarily an Air Force responsibility, said Gen. C. Robert Kehler, head of Air Force Space Command, who added the service is "positioned to be the organization of choice" for executive agency.

The Air Force "should be taking steps internally to raise confidence in its ability to manage space programs and carry out its responsibilities," said Michael B. Donley, the current SECAF, so that authority "would be returned ... at the earliest opportunity."

These requests fell on deaf ears. Clearly, OSD did not want to hear them, and critics of the Air Force's role in space have been much more vocal than USAF's advocates. One of them, now-departed DOD acquisition chief John J. Young Jr., said in 2008: "I fundamentally disagree that a single service should have the total acquisition decision authority ... for a set of programs as was done in space."

Young favored a joint office within OSD to oversee military space, and said he "would have never" given the job to USAF's No. 2 civilian because "the Air Force undersecretary is the Air Force undersecretary."

On that last point, Young and Donley seemed to agree. Conaton, formerly staff director of the House Armed Services Committee, was chosen for management acumen. Her confirmation "will prompt a review of how we organize for the management and oversight of space acquisition, executive agent, and other activities in the Air Force headquarters," said Donley in November. The service was "drafting terms of reference for such a review in the months ahead."

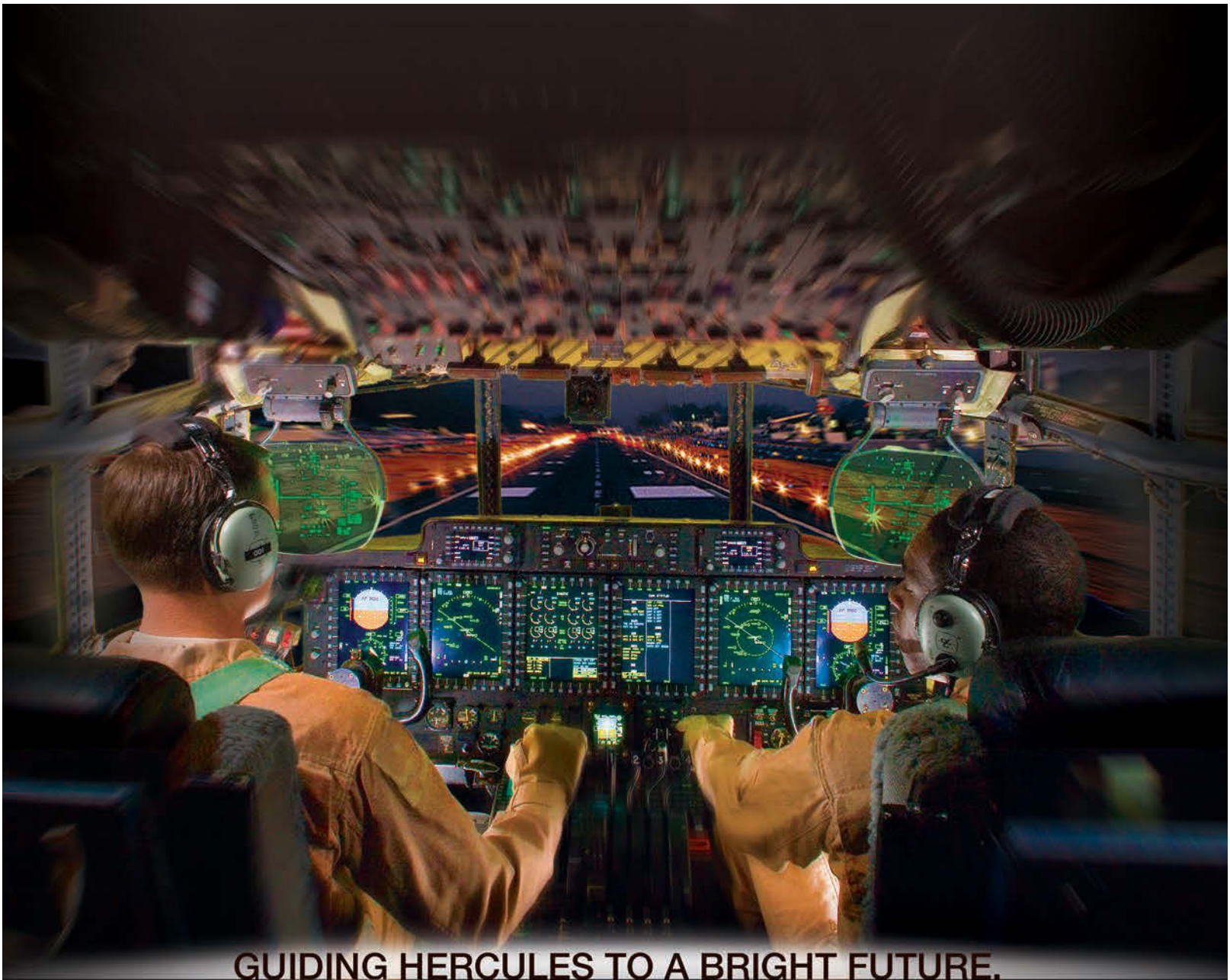
The positions of undersecretary and NRO director have been permanently decoupled. The NRO director's position has not stayed vacant, and retired Air Force Gen. Bruce Carlson is the current director.

Agencies such as the NRO, CIA, and National Security Agency all have significant influence on military space programs that are nominally Air Force responsibilities. "Everyone in the government uses Air Force space assets, and many desire (and receive) a say in system design and operations," noted Thomas P. Ehrhard, special assistant to Schwartz, in a paper he wrote while at the Center for Strategic and Budgetary Assessments, a Washington, D.C.-based think tank.

These numerous stakeholders contribute to specification changes, "gold plating" of requirements, and budget and schedule problems. Though they often originate elsewhere, these problems inevitably fall on the Air Force.

A new review may provide some guidance. "I'm hopeful that results from the Space Posture Review illuminate the path forward on DOD and interagency governance for space," Donley said. That hasn't happened yet, but when the key positions are filled and the Space Posture Review is done, the time will have come for DOD to permanently decide the issue. Stay tuned. ■

More information: http://www.dtic.mil/whs/directives/corres/html/510102.htm



GUIDING HERCULES TO A BRIGHT FUTURE.

The C-130 Avionics Modernization Program (AMP) upgrades older Hercules airlifters to modern capability at a fraction of the cost of a new aircraft. A fully-integrated digital cockpit reduces crew workload for greater situational awareness and safer operations. And by standardizing configuration across models, C-130 AMP significantly reduces total ownership costs. Our proven solution is the right choice for this critical national security upgrade.

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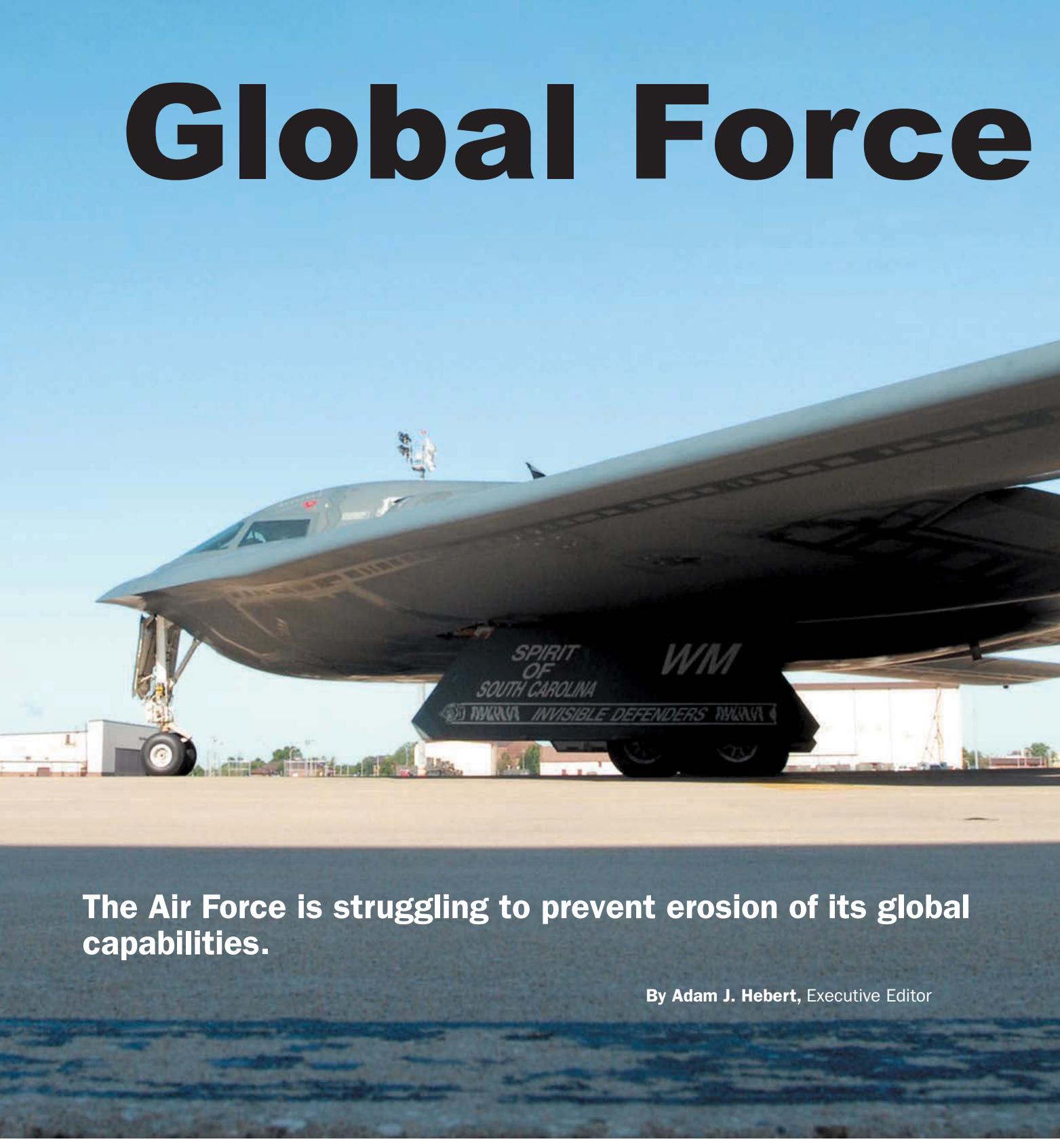
Global Force



The Air Force is struggling to prevent erosion of its global capabilities.

By Adam J. Hebert, Executive Editor

Air Force strategic nuclear weapons, space-based communication and surveillance assets, and computer networks have all benefited from top-level Pentagon attention in recent years. These cornerstones of USAF's global power have been relatively well-supported in every way.

Yet there is unease about the future of these pivotal capabilities. Air Force leaders speaking at the Air Force Association's Global Warfare Symposium in Beverly Hills, Calif., on Nov. 19 to 20, said USAF's ability to effectively deal with nuclear threats, watch targets around the globe, and control on-orbit military systems are unmatched, but these advantages are fleeting.

Some threats are obvious. For example, USAF's space- and cyber-based networks were often built as if they would never come under attack. Several

Worries

USAF photo by SrA. Kenny Holston

The power of USAF's strategic forces is exemplified by the nuclear-capable B-2 bomber at left.

officials pounded home the point that the service needs to change its ways, because space and cyber domains are no longer sanctuaries. In fact, they are already under attack. As for nuclear weapons, they are declining in number and modernization is nowhere in sight.

Budget Pain

All signs are that things are about to get even rougher.

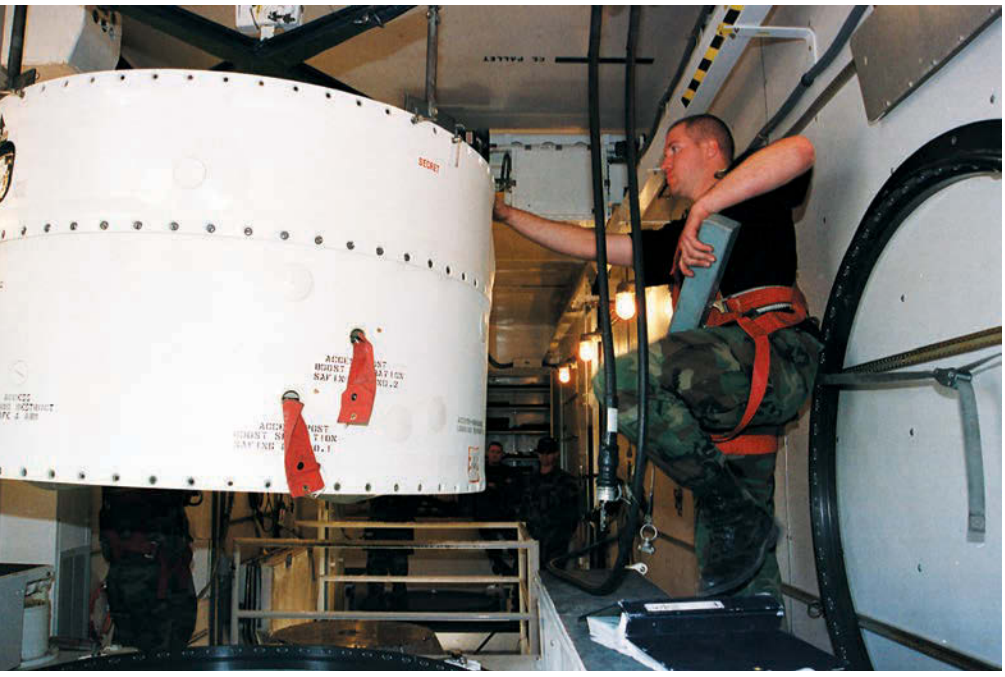
Secretary of the Air Force Michael B. Donley said the USAF's budget topline was "reduced significantly across the five-year defense program" that begins with Fiscal 2011.

The service has suffered its share of budget pain in recent years. Even so, the times may get tougher, Donley warned, and "within that constrained topline," the Air Force still faces rising personnel, operations, and investment expenses.

"Simply put," said Donley, "the Air Force and the rest of DOD are resource challenged," a statement with which no one would disagree.

Many Air Force global capabilities are dangerously thin, said US Strategic Command's Gen. Kevin Chilton.

USAF photo by TSgt. Amaani Lyle



USAF photo by John Turner

An airman positions a Minuteman III guidance set at Malmstrom AFB, Mont. The Air Force is working to keep the ICBMs operational at least through 2030.

Without adequate funding, it becomes harder to provide the unique air, space, and cyber advantages upon which US combat forces depend, Donley concluded.

Even under the current funding paradigm, noted Gen. Kevin P. Chilton, commander of US Strategic Command, capability is sometimes dangerously thin.

"We need to stop managing our constellation programs in ... 'gap management' fashion" with no backup capability, he said. In the past, the US had robust development programs that meant satellites often were built and ready for launch in the event a problem developed in orbit. No more.

"We've gotten to the point in some cases where this combatant commander has to count on 100 percent launch success" to meet national security requirements, Chilton said. "We should not be in this position. ... We need to do better."

Fortunately, in recent years, the Air Force has managed to achieve 100 percent launch success. After a string of failures in the 1990s, the service has now had 65 consecutive successful space launches—a record that is expanded with every liftoff.

Although satellite development schedules have been spotty, the launch success allows new capabilities to be reliably put on orbit as soon as the payloads are ready.

A case in point is the Space Based Infrared System (SBIRS) now in highly elliptical orbit. This sensor gives US forces greatly improved missile-launch detection and warning. As Chilton noted, only the Air Force can provide early missile warning to US troops within range of Scuds and other ballistic missiles.

A Flood of Intelligence

The Wideband Global SATCOM is another space-based upgrade. Two WGS birds are now on orbit, and a third was launched Dec. 5 to orbit over the Atlantic. The Pentagon put WGS-1 over the Pacific. WGS-2 followed last April, and is now improving communications in the US Central Command war zone.

Each provides more communications bandwidth than the entire constellation of Defense Satellite Communications System satellites Wideband Global is replacing.

Troops in Iraq and Afghanistan are benefiting from far more than just expanded bandwidth. Lt. Gen. Larry D. James, commander of 14th Air Force at Vandenberg AFB, Calif., noted how much USAF-supplied intelligence-surveillance-reconnaissance (ISR) power is flooding into the region.

By the end of November, there were 39 unmanned aerial vehicle (UAV) combat air patrols providing around-the-clock ISR coverage. These consist of 31 MQ-1 Predator combat air patrols, seven MQ-9 Reaper orbits, and a lone RQ-4 Global Hawk patrol. Defense Secretary Robert M. Gates' stated goal is for 50 UAV CAPs over the war zone by the end of 2010. The armed Predators and Reapers offer the invaluable ability to track targets for long periods while relaying intelligence to other platforms. They can also attack enemies with their own weapons if there is an immediate danger.

On the manned ISR front, James cited the success of the MC-12 Liberty Project Aircraft program, which went from concept to fielding in just 10 months. By November, there were six MC-12s flying over the sandbox, with 31 more expected by July.

Officers commanding numbered air forces, major commands, and STRAT-

USAF photo by A1C Nathan Doza

A1C Sven Bickham (l) and SrA. Ricardo Reveles install a new antenna and satellite dish at Joint Base Balad in Iraq.

COM all desire better situational awareness—knowledge—of what is going on where they work and fight. USAF has made impressive strides in just the past two years, several speakers asserted, but there is often limited depth available, and the capabilities are vulnerable to disruption.

The Air Force has therefore improved its space situational awareness, to help ensure space-based capabilities stay available for combat forces. Space is a naturally hostile environment, one where the US and other spacefaring nations are continually adding to the debris field, noted Gen. C. Robert Kehler, head of Air Force Space Command.

Indeed, China recently became the third nation (after the US and USSR) to destroy a satellite with a missile. China's unannounced anti-satellite test naturally created a debris field of its own.

A year ago, Donley said, 14th Air Force tracked 100 satellites, performing "conjunction analysis" on the lookout for potential collisions. This was before last February's collision between a defunct Russian Cosmos satellite and a commercial Iridium communications spacecraft. The collision was fatal to the Iridium bird, and created even more space junk for other satellites to avoid.

Consequently, the Air Force today watches 800 satellites, all of which can maneuver, for possible collisions. James said 40 to 50 possible conjunctions are assessed every day. Controllers have actually maneuvered satellites about 30 times in the past nine months, to avoid near-misses and possible collisions.

Fourteenth Air Force's surveillance will soon expand to 1,300 satellites. This includes spacecraft that cannot maneuver, but as James noted, it will be good to know in advance that a collision may be coming.

The improved space vision is so valuable that James said if additional money were available, he would work to further bolster space situation awareness. The first Space Based Surveillance System payload is set to launch this year, and James said the Air Force would actually benefit from having two SBSS birds.

Space situational awareness is not just traffic management. It includes knowledge of other nations' plans, capabilities, and intentions, and insight into whether a system failure is a mechanical problem or an attack. "In the perfect world," said Chilton, "we know what gets into orbit before it launches, so we don't have to do the hard job of trying to figure out what it is once it's up there."

United Lauch Alliance photo by Pat Corkery

A Delta IV rocket blasts off from Cape Canaveral AFS, Fla., on Dec. 5 carrying the Air Force's Wideband Global SATCOM-3 satellite. With no backup capability, DOD is depending on 100 percent launch success.

Although this year's Quadrennial Defense Review and Space Posture Review will have a lot to say about future military space priorities, "many of our shorter term plans are clear," Donley said. By the end of 2011, five major satellites will be readied for launch: the first Advanced Extremely High Frequency Satellite communications system; the SBSS "pathfinder"; a GPS-2F navigation satellite; a SBIRS payload for geostationary orbit; and the first Operationally Responsive Space system.

Protecting Space Support

Thanks to investments such as these, space accounts for 21 percent of total Air Force modernization spending—including procurement, research and development, and construction dollars. Unfortunately, the boom times (such as they were) may be over. "Resource pressures are ... here to stay," said Kehler.

That's what makes Operationally Response Space important to the Air Force. Small launchers and satellites would give the nation a "strategic alternative" to the massive, expensive, and lengthy programs preceding most military space launches. As a concept, ORS is not just about new systems, Kehler added. ORS begins by taking existing programs and making them more responsive.

Space-based systems are the eyes and ears of combat forces worldwide, and losing these capabilities would be devastating. Kehler said lost space support would immediately affect every aspect of US military operations.

Cyber capabilities are equally vital—nearly everything DOD does somehow runs through its computer networks. An effective cyber assault has the potential to make the US military, at least tem-

USAF photo by TSgt. Cecilio M. Ricardo Jr.

Capt. Kenny Bierman programs Joint Precision Airdrop System software for a release over Iraq. Almost every Air Force capability now runs through computer networks.

porarily, grind to a technological halt. The information needed to conduct war the American way flows through cyberspace, and "cyber" is not a mission, Kehler stressed—it is a domain just like air or space.

Dependence on cyberspace can be illustrated by the requirements for strategic deterrence.

Outlining how STRATCOM provides strategic deterrence, Chilton started with early warning capability. This includes warning of attacks in space, against space, or in cyberspace.

After early warning, commanders need attribution to begin planning a response. Attribution could mean determining who fired a particular missile, or who is responsible for a virus invading military networks. The Air Force will play a key role providing this intelligence, even if the attack is not directly against the service.

Next is command and control. As Chilton explained, "Once you're warned, you have to be able to do something with your forces," by communicating orders to them. A response could be to flush bombers, or to "adjust the bandwidth in your cyber domain to prepare for the attack." Air Force network and communications systems make reliable C2 possible.

Only at this point, after USAF's global ISR and communications networks have performed multiple missions, do delivery systems and weapons come to the forefront of strategic deterrence.

A trustworthy network is a foundation of US military power, and the network is therefore also a liability. "It's not a convenience for us, ... it's a necessity. We cannot conduct warfighting operations without it," said Chilton. Even with perfect logistics, perfect maintenance, and the best trained crews in the world, "you can be shut down if you don't have your networks."

A new approach is needed. Improving the "firewall" protecting military networks has probably reached the point of diminishing marginal returns. Cyber defenses have become like the Maginot Line, said Maj. Gen. Richard E. Webber, commander of 24th Air Force at Lackland AFB, Tex., USAF's new cyber warfare unit. Building a higher wall doesn't help. What is needed now is defense in depth.

Alan Paller, director of research for the SANS Institute, cited China, which aggressively recruits hackers, programmers, and other tech-savvy individuals. The communist government moves them into People's Liberation Army cyber warfare units where they often disappear from public view—but sometimes leave their "fingerprints" on later cyber attacks, including against the Pentagon.

DOD needs the same dedicated cyber warriors, and may need to keep them in the job for extended periods. The military also needs to learn to "fight through" cyber attacks even if the network is degraded. Shutting

Vigilance Over the Pacific

Gen. Gary L. North, the head of Pacific Air Forces, operates in a region so huge that he comes under some of the same pressures felt by so-called "global" commanders. He cited some disconcerting facts about that theater, facts which compel him to keep his command at a high state of readiness.

Speaking Nov. 20 at AFA's symposium in Beverly Hills, Calif., North observed that six of the world's largest militaries operate in his theater—China, Russia, North Korea, South Korea, India, and, of course, the United States.

Among those nations, one (not named but clearly China) is investing heavily in fourth generation fighters, advanced "double digit" surface-to-air missiles, and surface-to-surface missile capabilities. China is now also thought to be closer to fielding a fifth generation fighter than previously thought.

Another Pacific nation (Russia) doubled its military spending between 2001 and 2009, exports the aforementioned fighters, SAMs, and ballistic missiles around the world, and has resumed Cold War-style long-range bomber flights over the Pacific.

A third nation (an unnamed North Korea) developed nuclear weapons and long-range missiles "while its population starves."

In this environment, it is easy to see why "the Pacific is not a theater that is at war, but it's not a theater that is completely at peace either," North said.

"Our high-end competition is good, and getting better," he said—meaning PACAF cannot let its capabilities slip.

To that end, North said the command's No. 1 focus is on properly posturing its forces in the region. F-22s are now in place in Alaska and are headed to Hawaii. In South Korea, advanced all-weather F-16s have replaced older "Vipers" that will now serve as aggressors for Red Flag-Alaska exercises.

And Guam remains a linchpin of power projection in the region. Andersen Air Force Base there is home to US Pacific Command's continuous long-range bomber presence. It also hosts rotational tanker and fighter deployments, and—beginning in 2010—will be home to the Global Hawk long-range unmanned surveillance aircraft.

USAF photo by SrA. Christina M. Rumsey

At Andersen AFB, Guam, SSgt. William Perkins gives directions as an Air Launched Cruise Missile is loaded into the belly of a B-52 bomber.

down a network under attack simply accomplishes the enemy's goal, Webber noted, because "we create our own denial of service by disconnecting."

A potential Achilles' heel is exposed to adversaries. Vulnerabilities abound: Eighty percent of DOD communications run along commercial networks. The Internet protects anonymity, making attribution difficult. Most satellite downlinks use basic radio-frequency links that can be jammed.

"What would your game-changing target be if you were an enemy of America today?" asked Lockheed Martin's Charles E. Croom Jr., a retired Air Force lieutenant general.

"We've got to train like we fight, ... and those networks will go down," said Croom during an industry panel.

Exacerbating DOD's challenge is just how problematic it can be to shut down networks to simulate an attack.

During wargames, for example, if the network goes down, the exercise probably grinds to a halt. Most nations have no hope of matching US dominance in aircraft or weaponry, so building the ability to attack satellites, ground stations, or computer networks becomes appealing.

At the opposite end of the force continuum are America's strategic weapons. Several commanders lauded USAF's renewed focus on the nuclear mission but said there is much still to be done.

Much like space and cyber capabilities, nuclear operations are now an area of intense top-level emphasis. High profile incidents with nuclear cruise missiles and ICBM nose-cone components showed attention to nukes had inexcusably flagged in the Air Force. While focus and standards wavered, an entire generation of nuclear experts and research was lost as the mission took a backseat to conventional operations after the Cold War.

Greater Range and Flexibility

Chilton observed that the Navy is already performing preliminary design work and defining requirements for its next generation ballistic missile submarine, even though the first *Ohio*-class boomer does not exit service until 2027. "The Navy's got a plan," he said, and "the Air Force needs to have a plan for a land-based strategic deterrent replacement and for sustainment of the air leg of the nuclear deterrent force."

USAF's plan to build a nuclear-capable bomber fielded by 2018 was canceled by Defense Secretary Gates earlier this year, there is no plan for a next generation nuclear cruise missile, and the Air Force was recently ordered by Congress to make sure the Minuteman III ICBM can remain in service through 2030.

Each leg of the nuclear triad is valuable, said Chilton, who does not want any of the delivery types to go away as overall numbers of deployed nuclear weapons decline over the next few years.

For the ICBMs, slow atrophy has never been the plan. "Over the past several years, we've been engaged in a roughly $7 billion multiyear program to refurbish or modernize practically every inch of the Minuteman III missile—from the top of its nosecones to the bottom of its first stage nozzles," said Lt. Gen. Frank G. Klotz, commander of Air Force Global Strike Command, USAF's newest major command.

All three rocket motors received new propellant. The MM III's guidance system was updated with new electronics. "The propulsion system rocket engine—or the post-boost vehicle for my space friends—is undergoing life extension," he said. Newer warheads pulled from the deactivated Peacekeeper system are being deployed on a portion of the Minuteman fleet.

Command and control improvements have also been intensive.

To ensure connectivity, missileers updated the ability to receive "very low frequency and MilStar communications," Klotz said. The force will use the AEHF Satcom System when it comes on line.

These upgrades have allowed the Minuteman III to maintain an operational readiness rate better than 99 percent, but it's not too early to think about what comes next.

"Advances in technology suggest the possibility of an ICBM or ICBM-like system of greater range and greater flexibility, while maintaining the enduring attributes of rapid response, high reliability, and assured penetration of defenses," he said. Maintenance, security, and command and control methods can also be improved.

Even getting to 2030 will take additional work. "Upgrades to the system beyond those currently under way may be both reasonable and prudent," Klotz said. For example, the MM III guidance system uses gyroscopes and accelerometers in an era when even economy cars can be ordered with GPS guidance systems.

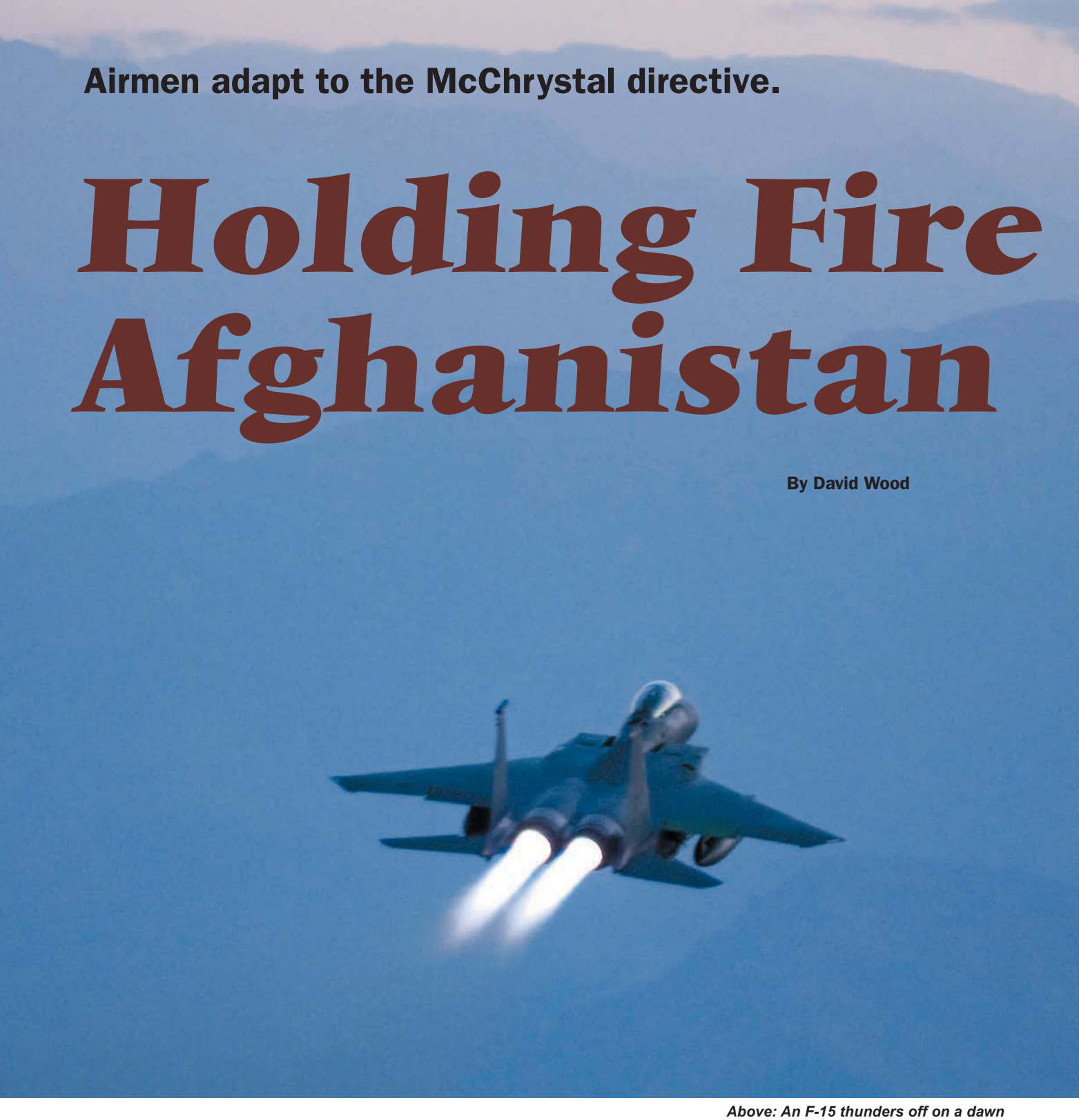
The 1960s and 1970s technology has reached its "practical limits" for accuracy and maintainability, he said, and modern technology could drastically reduce missile field maintenance requirements and the accompanying security demands—while simultaneously improving accuracy.

Recent investment in the Air Force's global warfare capabilities is paying dividends. The question is whether scarce investment funding will continue to flow to these high-priority systems. ■

Airmen adapt to the McChrystal directive.

Holding Fire Afghanistan

By David Wood



Above: An F-15 thunders off on a dawn close air support mission from Bagram Airfield, Afghanistan.

USAF fighters, their lethal munitions hanging underwing, streaked down a mile of concrete and lifted off, engines glowing against the distant Hindu Kush mountains. They were en route to a battle zone where a group of US troops was pinned down under heavy enemy fire, in need of help.

These were F-16s and F-15Es, and this was Bagram Airfield, Afghanistan. There, in perhaps the most complex war US forces ever have fought, one comes face to face with a sharp change in counterinsurgency airpower.

How sharp? Stand in the old Soviet-built tower at Bagram with Brig. Gen. Steven L. Kwast, commander of the 455th Air Expeditionary Wing, and hear him assert, "If we are near civilians and engaged with the enemy, and we can disengage, we should disengage. ... Counterinsurgency is not about killing the enemy. It's about protecting the people."

Winning the war, he went on, comes down to a simple matter of trust. "The moment the Afghan people trust us, we will win overnight," said Kwast.

Over

USAF photo by SSgt. Samuel Morse

How, he is asked, do you build trust through airpower?

"By making sure you are only using airpower responsibly, that you are only using airpower when there is no other way to protect civilians," Kwast said. "We have to protect the people, so that every time they hear an airplane they know, 'It's there to protect me.'"

After playing a dazzlingly successful role in ousting the Taliban from Afghanistan in 2001, airpower in Afghanistan has become—fairly or unfairly—associated with the problem that has had a bigger effect than anything else in undercutting that trust: civilian casualties. Civilians have been killed in operations by insurgents and coalition forces alike, of course. However, air strikes have gotten most of the bad press. US military authorities last summer issued a tactical directive tightening the rules on the use of air attacks.

The effect on fighter crew members has been dramatic. It is, in fact, a fundamental shift in strategy for a fighter guy, said Col. James J. Beissner, an

Below: Troops from the 12th Infantry Regiment keep an eye out for insurgents while fellow soldiers dodge heavy sniper fire in a gun battle at Waterpur Valley in Afghanistan's Kunar province.

DOD photo by Sgt. Matthew Moeller

USAF photo by SSgt. Michael B. Keller

USAF F-15E fighters drop 2,000-pound Joint Direct Attack Munitions on a cave in eastern Afghanistan.

F-15E pilot and vice commander of the 455th.

Beissner went on, "It used to be, the ground commander requested a bomb, and a bomb he got." Now, the ground commander requests a bomb, and the joint terminal attack controller, the aircrew, and the ground commander all talk about it, said Beissner. "'Do we really need to go kinetic, or is there a better approach?'"

Who Are These Guys?

Responsibility now falls on fighter pilots and other aircrew members to work with ground forces to find, if possible, a solution other than releasing ordnance on a target.

"It's very effective and it's changed the way we fight—for the better," said Beissner.

Examples of the changed atmosphere abound. Capt. Roberto Flammia was flying his F-16 over eastern Afghanistan one night when he spied several men wearing backpacks and running along a mountain streambed toward a US position. Flammia discussed the targets with a nearby JTAC, who asked him to strafe the men with his 20 mm cannon.

"I said, No, there's no reason to," Flammia recalled. "We're not gonna blow up guys who just look suspicious."

On another nighttime mission, Beissner was cued by a Predator unmanned aerial vehicle to three men racing away from a US position. The ground commander requested a bomb, but Beissner judged the targets to be too close to civilian houses.

"The real question was, who were these guys?" said Beissner. "Do we really know?"

Hurried conversations between aircrew, ground commander, and the JTAC didn't bring a clear answer to

AP photo

Afghan security forces keep watch over a burned fuel tanker north of Kabul. The tanker was hijacked by Taliban forces and then destroyed by an F-15E.

those questions, so no ordnance was dropped.

"We decided it's just not worth alienating the population," Beissner said.

The problem of casualties and perception has been around quite a while now.

In July 2002, scores of Afghans were killed or injured when ordnance fired from an AC-130 struck a wedding party in Oruzgan province southwest of Kabul. The US command said the aircraft was responding to ground fire; the Afghan government claimed the shots were from wedding guests who, as is the custom, were firing guns into the air in celebration. The aircrew was cleared of wrongdoing, but 48 Afghans died.

From that time on, nearly every air strike has brought loud claims from the Taliban that the US is killing innocents.

Never mind that the Taliban itself has been responsible for most civilian deaths, as documented in a series of studies by the United Nations Assistance Mission in Afghanistan. During the first half of 2009, for example, UNAMA reported 1,013 civilian Afghan casualties, 24 percent higher than the same period in 2008. The Taliban and related insurgents caused 59 percent of the casualties, while pro-government forces (US, coalition, and Afghan security forces) were responsible for 30.5 percent.

The imbalance is unmistakable: During the six-month period, UNAMA recorded 40 air strikes, which killed 200 civilians, while 400 civilians were killed by Taliban improvised explosive devices or suicide bomb attacks.

As casualties mounted in early 2009, however, it was errant coalition air strikes that aroused international condemnation—and a stiff reaction in Washington. "I believe that the civilian casualties are doing us an enormous harm in Afghanistan, and we have got to do better," Defense Secretary Robert M. Gates said.

It was no surprise when Gen. Stanley A. McChrystal, who replaced Gen. David D. McKiernan as the top commander in Afghanistan last year, moved quickly to sharply limit the use of air strikes.

"This is different from conventional combat," McChrystal wrote in a July 2 directive. "We must avoid the trap of winning tactical victories—but suffering strategic defeats—by causing civilian casualties ... and thus alienating the people. ... [The] loss of popular support will be decisive to either side in this struggle."

DOD photo by Spc. Matthew Thompson

Army Gen. Stanley McChrystal (l) speaks with an ISAF soldier from the Czech Republic during a visit to a forward operating base in Afghanistan. McChrystal has ordered that air strikes be limited.

Air strikes would be authorized only under "very limited and prescribed conditions," McChrystal wrote.

Ever since, US airmen, soldiers, sailors, and marines have been adjusting to the new strictures.

The stakes grow exponentially when American troops are taking a pummeling from the enemy and need help immediately. With additional troops pouring into Afghanistan and the Taliban and other insurgent groups broadening the fight, reports of "troops in contact" (TIC) incidents are growing—peaking at 670 for the month of August 2009, up from 485 the previous August.

The stress on aircrews and ground forces goes up exponentially as well. When a guy on the ground says he needs a bomb now, "to say, 'Well, hold on a second,' that's frustrating," said Beissner.

Fluid, Rapid-response Strikes

There is no question that TIC situations generate the greatest number of errant bombings. In a major report in fall 2008, the organization Human Rights Watch said:

"In our investigation, we found that civilian casualties rarely occur during planned air strikes on suspected Taliban targets. ... High civilian loss of life during air strikes has almost always occurred during the fluid, rapid-response strikes, often carried out in support of ground troops after they came under insurgent attack. Such unplanned strikes included situations where US special forces units—normally small numbers of lightly armed personnel—came under insurgent attack; in US-NATO attacks in pursuit of insurgent forces that had retreated to populated villages; and in air attacks where US 'anticipatory self-defense' rules of engagement applied."

Changing tactics, techniques, and procedures has not been easy for crews trained to put maximum firepower on target.

Lt. Col. Timothy Gosnell, an F-16 pilot, is the commander of the 421st Expeditionary Fighter Squadron from Hill AFB, Utah, which arrived in Afghanistan last July. Gosnell recounted a typical event: A young man comes up on the radio net. "You hear firing in the background, and he says, 'Good evening, Viper One,' and a few minutes later, you can hear the fear in his voice. He's really scared."

For the pilot, said Gosnell, it becomes a matter of being able to interpret everything on the targeting pod and asking, "Can I really do something here?" Gosnell said, "We are put in the position of being, really, the voice of reason. That falls on us."

US ground troops have embraced a number of procedures designed to

USAF photo by SSgt. Christine Jones

US soldiers patrol Anzala Khil village in Afghanistan. Insurgents' ability to blend in with the local environment makes close air support challenging.

minimize civilian casualties. To deal with the threat of a speeding car headed for a checkpoint, soldiers use a series of steps, each one an escalation of hostility. Soldiers might, in succession, make hand signals, flash lights, fire a rifle shot into the air, shoot out the car's tires, and shoot the driver.

Similarly, airmen use such "escalation of force" tactics to try to resolve a situation on the ground without using direct and lethal force. This builds on an inherent American advantage—most insurgents do not want to engage in direct combat with US forces, preferring to strike and quickly withdraw. And insurgents have come to respect American airpower.

When called for help where troops are in contact with the enemy, for example, an F-15E or F-16 pilot will descend to 5,000 feet and rip across the combat zone "just to let them know we're here," said one pilot. Often, that is enough to convince insurgents to break off contact and disappear. If not, a pilot may dive to 500 feet in a simulated attack—usually enough to drive off insurgents.

Such "shows of force" make up about 10 percent of the roughly 70 close air support sorties that airmen fly every day in the Afghan battlespace.

Often, the enemy fighters will attempt to regroup. If they have moved well away from civilians and friendly forces, pilots will attack with real munitions.

"The intent is to reduce collateral damage—not to minimize effects on the enemy," said Col. Keith McBride, deputy director of the combined air and space operations center (CAOC) in Southwest Asia.

It might seem that, after repeated nonlethal shows of force, Afghan insurgents would conclude that there is nothing to fear other than ear-splitting noise when American aircraft appear overhead. Not so, said McBride.

"It's like the theory of deterrence," he said. "If there is no real threat, then there is no real deterrence. And we are still bombing."

Eyeballs in the Sky

Through last summer's "fighting season," the number of air munitions released rose from 437 in June to a high of 660 in October. More significantly, though, is the percent of all CAS missions that went "kinetic," i.e., involved releasing bombs, rockets, or other munitions.

In June, 5.6 percent of all CAS missions in Afghanistan went kinetic. In August, when the pace of fighting reached its high point, just over 11 percent of US CAS missions went kinetic; by October, the rate had dropped to less than one percent.

Even in nonkinetic situations, fighters will show up and circle around to see what else is in the vicinity.

"A lot of times, with airpower overhead, all the ground commander wants is to see over the next hill" so he can make a tactical decision about whether to stay engaged with the enemy, attack them with air munitions, or simply scare them away, said Col. Mark Waite, director of combat operations at the CAOC. "Eyeballs in the sky can give that commander the situational awareness he needs to make that decision."

American pilots enjoy broad discretion about using each of the classified steps in escalation of force, and there can still be shortcuts.

"Sometimes, that voice on the radio down there causes you to skip a step or two," said Gosnell. He added that if you can hear that fear in the voice, it may be time to skip the discussion and just act.

According to military doctrine, the ground commander has the final say about using airpower to affect his situation on the ground, but aircrews never lose accountability for the munitions they drop.

CAS missions in Afghanistan are likely to continue apace. Coalition aircrews are flying an increasing number of CAS sorties, growing last year from 1,792 in January to a high of 2,502 in August.

Whether the shift in air tactics has had an effect on civilian casualties is unclear. Air strikes involving civilians often take place in remote areas not easily reachable by military authorities, and the dead are quickly buried in accordance with Islamic cultural practices.

Civilians still die. That happened in early September, when an F-15E released bombs on a gathering of Taliban fighters who had hijacked two fuel tanker trucks. A German air controller north of Kabul called in the strike, and there was concern that the tankers would be turned into massive and deadly bombs.

Unfortunately, civilians were among the people gathered around the two trucks, and as many as 142 were killed or injured in the strike and its aftermath. Taliban propagandists were quick to capitalize on the incident, demanding an international investigation.

Meanwhile, the jet aircraft continue to lift off from Bagram and Kandahar Airfields in 24-hour operations, their wings loaded with ordnance and their crews deeply sensitive to airpower's new counterinsurgency role. ■

David Wood is the national security correspondent for Politics Daily. *His most recent article for* Air Force *Magazine, "Desert Airlift," appeared in the October 2007 issue.*

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Depot Nightmares

At Warner Robins Air Logistics Center, what workers see can be awfully grim.

By Marc V. Schanz, Associate Editor

Take a look inside Building 48 at Robins AFB, Ga., and you will see the Air Force's venerable F-15 fighter force getting the equivalent of a massive booster shot—courtesy of mechanics and other technicians who work in the fighter's programmed depot maintenance shop. It certainly needs a boost.

All of the Air Force's F-15 models come through this shop for the programmed depot maintenance (PDM) cycle. That is where F-15 major modifi-

USAF photo by Gary Cutrell

cations take place. Around the building, wings are being disassembled, while stabilizers and tail assemblies are being inspected by technicians looking for signs of trouble.

"This is a moving line, much like a factory," said Keith Gilstrap, production chief of the 561st Aircraft Maintenance Squadron A Flight.

Indeed it is. Warner Robins Air Logistics Center, the principal enterprise at Robins Air Force Base, is also the front line of an unnoticed war—the fight to keep old, battle-worn aircraft in fighting trim.

From re-engineering obsolete parts to retooling avionics, technicians across the 2,200-acre complex are tackling problems rarely, if ever, faced before.

Gilstrap, a former F-15 crew chief, said the fighter fleet looks older and older every time a new airframe arrives and gets cracked open.

"The thing is, the airframe is fundamentally sound," he explained, next to the midsection of an F-15E. "You

Far left: A mechanic inspects the upper fuselage of a C-5 at Warner Robins Air Logistics Center, Ga. Left: One of many F-15 depot maintenance areas at the ALC. Below: A maintainer sprays paint-dissolving solvent on a C-130 as part of the programmed depot maintenance work flow.

USAF photo

USAF photo by Sue Sapp

James Skipper works on the No. 4 engine of a C-130 undergoing High Velocity Maintenance in depot.

just have to remember, you have to keep a close track of where stress and deterioration is happening."

No fighter category better embodies the maintenance challenge than the F-15 fleet—whose average age is pushing north of 26 years. Depot workers routinely find problems in the rudder controls during operations checks, increased wear and tear on the vertical stabilizers, and significant deterioration in the electrical wiring of the rear tail assembly.

"There's just a lot of rubbing and fraying on those components now, just as a result from how those parts move when flying," said Andree Zanders, a veteran aircraft electrician.

Overall, the situation often can be nightmarish.

Opening the Hiring Valve

It was to here, "Eagle Country," that the Air Force sent every one of its F-15s during the fleetwide stand-down imposed in the wake of the November 2007 breakup of a Missouri Air Guard F-15. The fighter broke in half during a training exercise, an accident caused by a faulty longeron. The depot workers here put in long hours to comb over all the aircraft and were able to clear the entire fleet through the depot in about six months.

Now, USAF wants to pare down its legacy fleet—retire older models and modernize the newest airframes to get more life out of them.

For the workers at Robins, this process began ramping up in November when work on modernizing components began for 178 of the Air Force's F-15Cs.

Gilstrap anticipated each effort—where workers will strip out all old wiring components from the aircraft and put in new wiring harnesses—to take about 195 days. While the largest feature of the upgrade is the installation of new active electronically scanned array (AESA) radar, a string of structural replacements will also go into each fighter eventually, including ribbing and parts of the flight-control system. New harnesses will help to get the aircraft back to their squadrons sooner.

"We're basically rebuilding these aircraft when they come in," said Robert Riggin, an F-15 A Flight chief. "We're going to fill up a lot of boxes with old wiring harnesses, but the end result is going to be a far better aircraft."

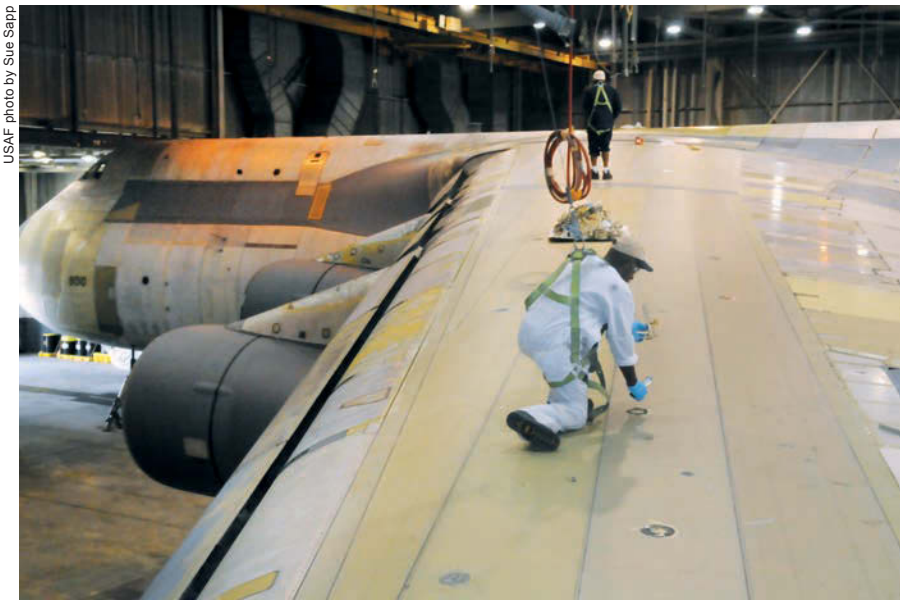
Warner Robins, much like its counterparts at Tinker AFB, Okla., and Hill AFB, Utah, is unusual as far as Air Force installations go. It is dominated by civil service employees rather than service members. Of the 402nd Maintenance Wing's 8,000-plus personnel, only 150 or so are military, said Brig. Gen. Lee K. Levy, the wing's commander.

Levy, a career maintenance and munitions officer, called the base's civilians "artisans," a term he admitted makes a few people's eyebrows rise. "When you see what they do with these airplanes, ... when you watch them take out a center wing box and put it back in for an aircraft that was built in 1964, ... that's an artisan," Levy said.

Some of the Air Force's most in-demand assets visit Robins for their PDM cycles, including all of Air Force Special Operations Command's C-130 variants, F-15s, C-17s (though the airlifter is maintained through a partnership with Boeing, different from a traditional PDM cycle), C-5s, and others.

Several factors have combined to increase the ALC's workload in the last few years: a raft of modernization initiatives, increasing labor costs as a result of more wear and tear on the

USAF photo by Sue Sapp



Painters from the 402nd Corrosion Control Flight prep the wing of a C-5 for the painting process.

systems, and the expansion of fields such as software engineering for newer systems such as the Global Hawk unmanned aerial vehicle program and the F-22 Raptor.

"We've seen a fairly significant increase in the workload requirements and we've been opening the hiring valve pretty wide," Levy said, adding that Fiscal 2010 will see an increase in work on all aspects of maintenance and sustainment.

Expansions in the C-17 program are under way, to keep pace with upgrades (such as the large aircraft infrared countermeasures, combat lighting modifications, and Ethernet upgrades for older blocks), the C-130 wing box replacement program, and the F-15 modernization effort.

Highlighting the C-5, Levy noted PDM hours have "expanded considerably" to get the aircraft up to spec—not a unique case among the assets his wing is responsible for.

"If an aircraft takes me 20,000 hours for a PDM, that equates to a certain number of people," he said. "But if the aircraft is now taking 25,000 hours, we have to buy the extra labor to do that work." The assessment is borne out in the Air Force's own readiness statistics, which show dollars marked for depot maintenance have steadily risen in the last few years, going from $33 billion in Fiscal 2007 to $43 billion in Fiscal 2009.

Down on the floor of one of the C-5 hangars at Robins, the mechanics and technicians relay the story behind the numbers. "We've definitely been spending more time on the aircraft when they come in," said Lamar Wallace, a 12-year veteran C-5 sheet metal mechanic. "More [work] on areas like the aft ramps, ... gears, and other places."

Daunting Workload

Oftentimes, "flow days"—the amount of time an aircraft spends in depot—are added on, so engineers can come down, consult with the sheet metal mechanics, and go back to remanufacture a part not readily available anymore, said Clay Scarborough, another sheet metal technician.

"You're starting to see parts fail that I've never seen fail," said Danny Hatcher, a C-5 flight-control technician. As a rule of thumb, once line inspectors went over the aircraft, Hatcher's section would routinely switch out about 25 parts or so flagged for replacement. "Now, it's routinely 50 or more." Spare parts are often a challenge when trying to cut down on flow days, Wallace noted, with a combination of availability and obsolescence often at fault. It is not unheard of for mechanics to install parts on the aircraft as it is about to taxi out to the runway for flight-test certification, he added.

At the far end of Robins' runway, a quartet of hangars houses the C-130 PDM shop, where the Air Force's in-demand tactical airlifters, as well as AFSOC's special mission variants and gunships, are stripped down.

George Hoffman, supervisor with the 560th Aircraft Maintenance Squadron C-130 shop, said that due to their high operations tempo and limited numbers, AC-130 Gunships and MC-130 Combat Talons are often pushed hard through depot cycles, with mechanics holding down 12-hour shifts to get the aircraft back in service. The workload is daunting, as the aircraft are progressively seeing more corrosion in areas such as the landing gear components, the bow beams, and ramps. One Combat Talon in the shop, nearly finished with its depot cycle in mid-November, had at least 100 parts repaired or replaced for corrosion since its arrival in April, said Robert Hall, a sheet metal mechanic.

Ramp corrosion is particularly acute in the C-130s operating in the desert,

USAF photo

A sheet metal mechanic with the 561st Aircraft Maintenance Squadron repairs damaged components in an F-15 engine compartment.

USAF photo by Tommie Horton

Mike Daley, an aircraft sheet metal technician, polishes the interior of an F-15 canopy.

Hall noted, pointing to visible deterioration on the rear ramp of a Hercules.

"We used to never change these," Hall said, indicating one of the aircraft's sloping longerons, a long beam on either side of the rear cargo door that essentially holds up the entire tail of the aircraft. "Now, we're switching out about 10 a year."

Aside from the metal being replaced on the aircraft, the avionics and components are posing their own challenges, said Mike Poole, the Group Control Center flight chief for the 402nd Electronics Maintenance Group. Responsible for components in 328 different systems, from laser guided bomb kits to transponders to one of the few remaining printed wiring board shops in the United States for reverse engineering obsolete circuit boards, Poole manages a wide range of experts.

As with aircraft mechanics, limitations often revolve around parts, where the shop will do "cross canning" (cannibalizing) in some cases—swapping out a part on one component to put in another one with a higher priority. "They're getting the job done," Poole said of his technicians. "We might not be able to repair one, but we can pull another one in and work on it instead."

For ALC leadership, the increasing time, cost, and manpower pressures on the depot workforce are receiving a great amount of attention—and they are being addressed with a range of new initiatives and experiments.

The Air Force is studying how it manages its funding strategies for weapons systems, said Maj. Gen. Polly A. Peyer, the Warner Robins ALC commander. "In the old days, we just looked at percent funded and we made a value judgment as to whether we were challenged or not," she said. "Now, we do it by portfolio—global reach, vigilance, and power."

Peyer's team at the ALC has devised a strategic plan to improve performance by better integrating the personnel, mission, and culture of the installation. Called P Cubed I—for people, process, performance, and infrastructure—it aims to integrate labor and management relations with process improvement efforts and innovations, develop leadership and training initiatives, better conserve resources, and improve customer support. "If you marry those together, that's where your performance comes from," said Peyer.

Becoming Proactive

Peyer also has high hopes for High Velocity Maintenance, an initiative where the inspection regime is spread out and advance teams more thoroughly diagnose an aircraft for PDM. Rather than a C-130 arriving in depot every five to six years, it will arrive every 18 months but stay only 45 days or so. Rather than long extended stays in depot, the aircraft will be back at its unit in less time. She estimated it will take five to eight years before a proven HVM philosophy can be applied to the whole fleet.

Similar to HVM, Warner Robins is beginning an effort dubbed Maintenance Steering Group 3, for its C-5 depot team. Based on commercial fleet standards, the program focuses on being more proactive during scheduled maintenance.

"We will probably see [a C-5] less, but we'll be working on it more when it comes in," Wallace said of the new process just getting under way. The C-5 team at Robins will add inspectors, mechanics, and warehouse space. Additional parts will be kept on-site to cut the time spent waiting for the parts pipeline to catch up with reality.

While leading the way on initiatives such as lean operations and AFSO21, the Air Force's depots are also facing some steep future challenges.

Of Robins' civilian workforce, 17 percent are already retirement eligible, Peyer pointed out. That figure is similar across the Air Force's depots.

Due to drawdowns in the 1990s and other factors, a "bathtub" of missing middle managers has appeared in the center's workforce. This is a dangerous liability for an ALC which is expanding rapidly to meet demands, she said.

As older systems are eventually phased out and newer systems such as the F-22, Global Hawk, and F-35 come into the force, more emphasis will be placed on managing advanced software design and stealth technology in the depot process.

Peyer said the challenge for Warner Robins—and the depots in general—is to prepare for a future force that will be very different from the one flying today. Peyer said that when she came into the service, the F-4 was a labor-intensive aircraft which took up to 60 maintenance man-hours per flying hour to keep in the air.

The F-15 incorporated improvements with diagnostics and maintainer accessibility, helping cut down on maintenance hours significantly by telling maintainers where the problem was located.

Systems such as the F-22 now use prognostics to predict when a system is degrading—improving some aspects of maintainability even further.

Investments need to be made in the personnel. "Better performance just doesn't come by whacking people and reducing your force," Peyer said. It comes through building a more sophisticated system with higher reliability and maintainability, and by making sure the people working on those systems are trained properly.

"These are pieces of metal that someone's son or daughter is flying in," Levy said. "They're going to take it out of here, and go commit aviation. We want to make sure it's as high quality as possible." ■

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Electronic Warfare Meets Austerity

The Air Force has abandoned big centerpiece programs and will go with modest enhancements.

By John A. Tirpak, Executive Editor

The Air Force's electronic warfare force, identified for years with traditional conventional military operations, is under pressure to alter its ways. Once focused on centerpiece aircraft and big-war concepts, the Air Force is planning on a smaller scale. Collapse of EW budgets, combined with high-level Pentagon emphasis on irregular warfare, is reshaping USAF's electronic warfare capabilities.

The Air Force now will contribute mainly a number of embedded elements to the overall EW picture. It will rely on its stealth capabilities, the Compass

USAF photo

An F-16C Block 52 aircraft equipped with Miniature Air Launched Decoys (in red) joins an exercise over Nellis AFB, Nev.

Left: An F-16CJ bristling with missiles (and an ALQ-131 ECM pod) turns hard over the mountains of Tennessee during a training mission.

USAF photo by TSgt. Lionel Castellano

USAF Maj. Jamy Sirmans (l) instructs US Army soldiers on the use of a new jammer system designed to cut in half the number of remote-controlled IED attacks in theater.

Call jammer aircraft, pod systems, and decoys, all the while depending on the other American services for crucial support.

"We've got to get out of our comfort zone," said Maj. Gen. David J. Scott, head of Air Force operational capability requirements.

In an October speech to the Association of Old Crows—an electronic warfare group in the Washington, D.C., area—Scott said the Air Force knows how to execute so-called major combat operations, and tends to see most challenges through that lens. In the past, that has usually meant big platforms with big budgets.

However, USAF must now find ways to add EW capabilities at low cost, "institutionalizing" irregular warfare, and better coordinating with its sister services, he asserted.

"We're going to need to ... sit down and say, 'Here are the things we really need to do ... with less money.'"

Toward that end, the Air Force in fall 2009 asked industry to offer ideas on a new EW pod that could be carried by A-10s and F-16s, as well as some unmanned aircraft, that would be effective against the kinds of low-tech, asymmetric threats that US forces are encountering in Afghanistan and Iraq.

"We know how to [defeat] the SA-20" air defense system, which is among the most sophisticated in the world, Scott said, but in many ways, it's tougher to neutralize low-tech systems.

"The difference in cost ... is significant" between Air Force systems and what unsophisticated adversaries use to "cause us problems."

He said that the Chief of Staff, Gen. Norton A. Schwartz, has instructed his budget programmers to consider what costs new systems will impose on adversaries rather than simply designing better widgets.

The new pods would not only provide a new jamming capability—chiefly against satellite phones and other local forms of communication—but could save the Air Force from having to build an aircraft, like the MC-12 Liberty Project Aircraft, dedicated to the mission, Scott said in a November interview.

Such an approach hews to the service's philosophy that it must seek multiple capabilities for all its systems, and not simply dedicate a single system to every requirement.

"Our intent is to try to see if there are any solutions that are readily adaptable in a shorter term," said Col. Stephen Brown, Scott's EW division chief.

Existing pods, he said, are oriented against the threats encountered in major theater wars. The new pods, ideally, would be based on systems already available off-the-shelf or adaptable from another system, that would work in a different part of the electromagnetic spectrum. The Air Force would like to field them by 2012.

A One-to-One Dwell

Using a pod would also give Air Force units greater flexibility, since the aircraft would be able to perform strike or intelligence-surveillance-reconnaissance missions.

"They'll still be able to do that, on a different day, or on the same day, if called upon," Brown said.

Moreover, the pods would relieve some of the demand being placed on the Air Force's EC-130H Compass Call aircraft, which jam enemy communications and can also disrupt the triggering of roadside bombs.

USAF's 14 Compass Call aircraft have been deployed almost nonstop for 18 years. Some haven't even come home once since the wars in Afghanistan and Iraq began eight years ago, Scott noted.

"It's been pretty tough" on the men and women involved with Compass Call, he said, adding that most are on "at least a one-to-one dwell," meaning they are deployed at least as long as the time they spend at home station.

Like all pre-C-130J variants, the Compass Call is a hard-used and old platform. The Air Force is conducting a fleet viability review to assess how much life the airframes have left in them, to help decide how much the aircraft can economically be upgraded with new capabilities.

The EC-130s are slated to receive a number of upgrades when they go in for programmed depot maintenance over the next few years. Brown said enhancements will be substantial. "We stand by this platform," he said. "It's one of our flagships; it's DOD's most capable [communications] jammer."

The Compass Call is not just for irregular warfare missions; it is also the Air Force's premier communications jammer in major combat operations.

The Air Force is not abandoning the ability to fight MCOs, Scott maintained.

"The United States Air Force believes we need a stand-in capability," he told the Old Crows audience. "We believe that we need to get into a place, ... fight in that place, kill things in that place, and get out."

Stealth features, he added, do not do that "completely," and EW support will be needed.

Scott hastened to add that his words are not meant to suggest that there is something amiss with stealth systems. It is just that, as technology advances and the nation's military foes develop increasingly sophisticated countermeasures to stealth, it would pay to give the adversary multiple problems to solve.

USN photo by Mass Comm. Spc. 3rd Class Torrey W. Lee

***A Navy EA-18G Growler maneuvers for a sea landing aboard the* Nimitz*-class carrier USS* Ronald Reagan.**

The loss of an F-117 in Kosovo was reason enough to add insurance in this way, he said.

The sister services will provide a significant part of the needed support, Scott said.

He pointed out that he and a Navy admiral co-chair the Joint Air Dominance Organization. Its purpose is to gather representatives of all the services to listen to what the others are pursuing in the air-to-air and air-to-ground domains, and then work together to avoid duplicating capabilities or creating conflicts—that is, to avoid "jamming ourselves."

The objective is to obtain "coherency and complementary pieces," Scott said. "We're parallel."

In this decade, the Air Force twice decided to focus its effort on a big EW centerpiece—a B-52 bomber fitted with a large standoff jammer. Twice, it has abandoned that plan.

Both times, the problem was that the project's requirements outstripped the available funds. As budgets seized up, Air Force officials were forced to seek a different way.

"I don't think we're bringing back the B-52," Scott told the Old Crows.

For the standoff jamming function, the Air Force will continue to depend on the Navy, which is in the process of transitioning from its EA-6B Prowler jammers to EA-18G Growlers. The latter is a variant of the carrier-based F/A-18 Super Hornet strike fighter.

The Air Force has no dedicated escort jammers of its own; compelled to pare back its fighter forces in the 1990s, it eliminated its two main penetrating electronic warfare platforms, the EF-111 Raven and the F-4G Wild Weasel.

A Service Exchange Program

The EF-111 had a capability very much like the Navy's Prowler. In fact, those two aircraft used variants of the same jammer for escorting strike aircraft into enemy territory. The Air Force justified the retirement of the EF-111 in expectation that, by now, most of the fighter force would be stealthy. However, it is not.

"We don't have the money to maintain a redundancy in these platforms," Scott told the Old Crows. "The EA-18 and EA-6 are both great platforms, and the EA-6 is going to be around a while."

Since the EF-111 and F-4G retired, the Air Force has sent exchange officers to the Navy to fly on the Prowler. The exchange proved highly useful to both services, Scott said, as there was a sharing of tactics and techniques, and both services had an intimate knowledge of how the other prosecuted airborne electronic attack.

Scott said he'd like to see a continuation of this two-service arrangement. He recognizes, though, that the Navy will at some point give up 120 four-seat EA-6s for only 90 two-seat EA-18Gs, meaning there would be fewer seats available for USAF electronic warfare officers.

"We would like to be jointly tied at the hip," Scott said. "If we don't get on the Growler, we may lose some of that [joint-mindedness]. ... We don't want to lose the experience and the knowledge."

It would not be feasible for the Air Force to buy EA-18Gs, Scott added. "It would be a small number, and we cannot maintain that kind of fleet."

In major combat operations, Scott said, the Growlers will "blow a hole" in the outer ring of enemy integrated air defense systems. From outside the enemy IADS, F-16s, B-52s, and possibly other legacy-type aircraft will shoot swarms of Miniature Air Launched Decoys, or MALDs, into enemy territory.

Plans call for the assault of 250-pound MALDs to confuse enemy radars, which will not be able to tell the difference between full-size aircraft and the expendable missiles. A variant, the MALD-J

USAF photo by SSgt. Rachel Martinez

Crew chief SSgt. Alex Rosales readies an EC-130H Compass Call aircraft for launch at Bagram Airfield, Afghanistan.

Raytheon illustration

Defense planners hope that 250-pound Miniature Air Launched Decoys (MALD), such as the one shown here in an artist's conception, will confuse enemy radar.

(for jammer), will also fly in to jam enemy radars at close range.

Meanwhile, Joint Air-to-Surface Standoff Missiles, or JASSMs, and other stealthy cruise missiles would also enter enemy territory to destroy air defenses or other high-value command and control targets.

Stealthy F-22 and F-35 fighters and B-2 bombers, by virtue of their low observability and onboard electronic countermeasures, will be able to fly through enemy airspace undetected, and help destroy enemy defenses, creating corridors for nonstealthy older fighters such as the F-15, F-16, and A-10 to come through.

They, too, will have a self-protection capability, in the form of updated versions of the ALQ-119 and ALQ-131 jamming pods.

Scott said the Air Force is "brainstorming" an armed version of the MALD, one whose warhead could destroy an enemy radar instead of simply jamming or confusing it.

"If they're not coming back, and they're going to land somewhere, and they do have a guidance system, then why not put a weapon in it?" When the strike force is departing, "and it's there, and it's done its job, can it hit a target?" Scott said the idea may bear fruit in "two or three years."

The Air Force is also looking at the inherent capabilities of the F-22 and F-35, with their active electronically scanned array (AESA) radars for radar-killing or jamming functions. It's not easy, Scott said, since any emission by an aircraft reveals its presence.

He allowed that the Air Force is also thinking hard about the role that unmanned aircraft will have in a future electronic attack concept of operations.

"We are looking at ... [an] MQ-X," he said, which would add stealthiness to the attributes of an unmanned aircraft in the class of the MQ-9 Reaper or MQ-1 Predator.

Learning From the Enemy

"We haven't defined that yet," he said, because the service is also rethinking some of its concepts and terminology. The terms "stand-in" and "standoff" jammer may become obsolete because such categories may not apply in a future battlefield.

As Scott put it, it might be worthwhile to think of "permissive, ... contested, [and] ... highly contested" airspace to describe the environment in which the systems will operate. Air Force Materiel Command chief Gen. Donald J. Hoffman has proposed such a different nomenclature.

It's also likely that the MQ-X would have to have internal jamming capabilities, because hanging a pod on the aircraft would detract from its stealthiness.

The Army has a role to play in the EW discussion, Scott said, because it conducts its own jamming function and wants to make it a bigger part of what its own unmanned aircraft do, the better to defeat buried roadside bombs.

With the broadened service involvement, some call for establishing an executive agent for EW and airborne electronic attack (AEA). Such status, conferred on a single service, gives that branch authority to direct the related activities of its sister services. Scott, however, opposes that move.

"This mutual organization that we've got" is sufficient to keep the services coordinating on AEA and EW, Scott said, and it's working "coherently."

It's not like space, he said, where the Air Force was executive agent. The domain is not as "huge" and neither are the budgets, he said.

"What you're going to have to do is cover the spectrum together, and do it in a manner that saves the taxpayers money," Scott said.

Despite the concerns over funds, Scott said the AEA and EW field is reasonably well-funded into the future. Schwartz has taken a personal interest in seeing a rational and effective electronic warfare capability, and in the Fiscal 2011 program objective memorandum, USAF took significant steps.

"We're very interested in helping out the EC-130," said Scott. "We're very interested in the capabilities of fifth generation radars, very interested in the capability of pods that enable us against the adversary threats that are out there."

Scott said USAF may also apply some of the adversary's tricks. "We can learn some things from them, too," he said.

Asked to look ahead and pinpoint electronic warfare's toughest nut to crack, Brown warned about what some have begun to call "hybridized" air defenses. These feature applications of new, powerful, and inexpensive electronics to update older air defense systems.

"A lot of commercial, off-the-shelf technology generates very quickly," Brown said. "It's just a very quick cycle of development to keep up with."

Scott, asked the same question, said, "It's everything. ... It's across the entire spectrum of operations."

Brown said the Air Force is laboring on an electronic warfare roadmap—one of several this decade—which will "break up our problem and look at near-term, midterm, and long-term approaches." It won't look simply at hardware, but "across doctrine, organization, training."

The Air Force should not have a major command focused on EW, Scott said, because the entirety of the electromagnetic spectrum is used by the entire service; it is not limited to an easily segregated mission area.

"We have ... a system of systems," Scott said. "That's what it is, a family of systems. It's not just AEA, it's aircraft that have AEA embedded in them." ■

Photo via National Archives

The Vanishing Arsenal of Airpower

USAF photo by SSgt. Jerry Morrison

Negative events have begun overtaking the once mighty and innovative US aerospace industry.

By Rebecca Grant

Industrial base studies nearly always cite the present moment as a critical period in which one faces decisions fraught with consequences. They are not always right about this, but, in the case of the industrial base supporting American airpower today, they are dead on. Momentous change did in fact occur in the year 2009, and that meant the United States military does face decisions fraught with consequences.

Back in 2008, a report from members of the blue-chip Defense Science Board outlined a coming crisis that would be felt across the defense industrial base. The key danger of that postulated crisis was that, "while competition still occurs between a few firms in each sector," the US federal government "can no longer benefit from a highly competitive defense market."

And that warning was issued well before Black Monday, April 6, 2009. On that date, the Defense Department announced a set of decisions affecting the Fiscal 2010 defense budget. These amendments called for termination of several critical defense aerospace programs, including the F-22 fighter, the C-17 airlifter, and the so-called Next Generation Bomber.

With these moves, the aerospace industry's top customer more or less decamped from a significant share of the fixed wing military aircraft market. As a result, major risk now suffuses the entire aerospace industrial base. The question is to what extent the nation can manage that dramatically enlarged risk and keep it from doing serious harm to future national security.

Consider the changes that now are in store:

- By 2012, the United States will have in operation just one fifth generation fighter line—the Lockheed Martin F-35 facility in Fort Worth, Tex.
- Pratt & Whitney could be the only US engine house producing advanced fighter engines.
- When the C-17 line in Long Beach, Calif., closes—and that appears to be a matter of a few years, at best—the Lockheed Martin C-130J facility in Marietta, Ga., will be the sole US military airlifter plant.

The reality could not be clearer. The American arsenal of airpower, once a massive and thriving entity, has passed through a permanent transformation. This fact of life will exert an outsize impact on the Air Force, not to mention the Navy, Marine Corps, Army, and allies, as more and more aerospace workers exit the industry.

The huge Bush Administration defense "spending spree" of the early 2000s did little to stimulate development of the next generation of military aircraft. Military spending was focused heavily on the here and now—the re-equipping and resupplying of forces, including air forces, fighting in Iraq and Afghanistan. It was money that was expended, intentionally, on the present, not on the future.

Elements for Success

Dwindling major programs will unravel the decades-long process used to sustain US airpower. It is not simply a matter of running fewer programs for a smaller force. Major programs lie at the heart of everything from design innovation to training and seasoning of engineers and production specialists to sustaining company profits and investment. They provide the core of design teams, highly skilled production workers, and line managers who know how to move projects from computer screen to flight line and who constitute the most precious resource of the industry. The loss of major programs—and the people who work on them—creates a new level of uncertainty about whether the core elements driving the industry will even survive.

For six decades, industry was able to draw from a rich pool of talent. This may be ending, because two major changes are in motion.

First, the number of major fixed wing aircraft programs will fall as production lines close.

Second, there are few plans for new starts, which will curtail the number of programs reaching "first flight" in the 2010-19 decade. Together these facts will significantly reduce capacity and output across the industry. They lead inexorably to a decline in number of programs, and programs are key. Programs engage prime manufacturers as well as a range of partners and suppliers in large, productive ventures.

To view the industry from the standpoint of its programs is to gather the elements for success: customer demand and manufacturer supply. As programs

A YB-49 Flying Wing shown during a test flight. In 1981, the contract for a stealth bomber—later the B-2—was awarded to Northrop Grumman, which had not built a bomber since the 1940s.

Top left: B-25 bombers on the production line during World War II. Left: A C-17 over the Atlantic Ocean.

USAF photo

Top: Two YF-23 prototypes, which later lost out to the YF-22 in the Advanced Tactical Fighter competition, head out over the Mojave desert.

diminish, jobs will also be lost and, with them, capacity. Major programs provide the primary conduit for extensive new hires of both professional and production personnel. Fewer programs will mean that fewer aerospace engineers and production specialists will be trained and gain the years of experience needed to generate new designs and run production lines efficiently. Education in science, technology, engineering, and math is an important part of this development, but equally critical is what happens to the individual worker long after he or she has left high school.

Over the century of US military aviation, business activity has been cyclical, with certain patterns coming, going, and then coming back again. However, the market has not seen indicators of a down cycle of this magnitude since 1920. That cycle lasted for some two decades, and ended only with the onset of World War II and its demand for vast numbers of military aircraft. Simply put, the model which has produced the American edge in airpower from P-51s to F-22s will start going out of business in 2011. Barring new serious and unforeseen threats, the program-driven model of innovation is unlikely to return.

The traditional model—innovation by competing major programs—actually evolved out of a pre-World War II period of aircraft development.

It is worth considering how World War II's rapid growth was achieved. In retrospect, it appears that the United States mostly got lucky.

First, the growth was led by strong government investment and clear-cut direction. Plans came from the top: It was President Roosevelt himself who gave the order, in a famous speech, for the US to begin producing 50,000 airplanes per year.

Second, the technology of the day permitted rapid transfer of personnel from one metal-bending industry to the next. Much of the growth occurred by transferring engineers and production specialists from other disciplines and factory lines. Perhaps the most dramatic example was that all production of cars for civilians stopped in 1942.

Third, the American economy had ample unused capacity and therefore lots of room to expand rapidly. The storied production surge was possible in part because of the latent manufacturing capacity in the American economy. The late 1930s were still recession years with lower production. The US also had a much bigger population base than most of the other belligerents.

First Flights

Fourth, aircraft producers were able to tap excess labor. The lingering effects of the Great Depression had kept unemployment high. The growing aircraft industry was able to absorb many of these workers. The aerospace industry also hired more than half a million women to fill out its workforce. Transferable skills and an ability to break jobs down into tasks for which workers could be trained quickly were key. Workers eventually rewarded their employers with significant productivity gains as hours required to manufacture aircraft types plummeted from 1943 onward.

The results were amazing. In 1939, the US produced a measly 5,865 aircraft. From January 1940 through Aug. 14, 1945, America produced 303,717. That stupendous growth gave birth to the aerospace industry of today.

The last 129 major military fixed wing aircraft programs (for the Air Force and Navy) have much to tell about the workings of the industrial base. Consider the tally of first flights from 1950 on.

Getting a new aircraft to first flight represents the prowess of a design team, notwithstanding the ultimate production decisions or the fact that many first-flight articles demanded months or years of additional work to achieve production readiness. However, the fundamental measure of merit, over time, is the ability to innovate and meet new requirements. In this, programs are a valid measure.

Overall trends are dramatic. Of the last 129 programs, only 20 achieved their first flights in 1990 or later. Among these are standouts such as the two Advanced Tactical Fighter competitors—the YF-23 and YF-22 (later F-22).

It gets worse. A mere nine of those 129 programs reached first flight in the 2000s, beginning with the two F-35 X-plane candidates in 2000 and ending with the Boeing P-8A Poseidon in 2009. There were four different companies represented in the 2000s, including relatively new entrant General Atomics.

(These programs included major designs and modified designs in which substantial alterations were made. For example, the F/A-18A/B/C/D, the F/A-18E/F, and the F/A-18G are posted separately. However, the F-16 is counted just once despite its numerous and highly effective block upgrades.)

The chief criterion for inclusion was that the aircraft made first flight. Accordingly, the ill-fated Navy A-12 is absent, while the secret Tacit Blue aircraft is included because it made 135 test flights in the early 1980s.

Pan wide and it is easy to see why the lack of programs moving ahead worries so many. Distribution of work in the past spread a few new programs nearly every year among a base of more than a dozen companies. Top suppliers delivered a large number of new models. Grumman, for example, delivered 12 aircraft to first flight, from the derivative F9F-6 Cougar in 1951 to the X-29 in 1984.

The diminished number of first flights represented the culmination of several

trends, and the impact of this dramatic slowdown can be seen by reviewing one of the most successful program-based rivalries of all time.

From the early 1970s through today, those two firms—Lockheed and Northrop—have squared off against each other in highly directed competitions to develop stealth aircraft. They dominated the race until Boeing re-entered the fray in the mid-1990s. The competition started with the first prototype stealth fighter in the 1970s and has continued with concepts for a next generation bomber for 2018 and beyond. Along the way, the two medium-size aircraft manufacturers founded prior to World War II became two behemoths, Lockheed Martin and Northrop Grumman.

Keeping them as competitors was deemed so important that the US government nixed their proposed merger in 1998. The competition between these two leaders of advanced aircraft development has illustrated the key role of program-based competition in the health of the aerospace industry. The government encouraged each contender through ongoing contracts and a steady pace of new program work.

Lockheed made early strides with faceted aircraft such as the concept demonstrator that became the F-117. Northrop pursued curved shapes that owed much to the design team's background in radar phenomenology and cruise missile shape reduction. Setting up a competition of facets vs. curves greatly oversimplified the problem but led to different approaches in significant features such as airframe design and application of radar absorbing materials.

The competition did not stop after Lockheed beat Northrop for the F-117 program. Northrop continued to work on a government contract for a battlespace control aircraft later named Tacit Blue. Each company had one win under its belt and felt it had narrowly lost to its rival when they squared off for a stealth bomber design.

In 1981, the B-2 stealth bomber program was awarded in great secrecy to Northrop—a contractor that had not built a bomber since it produced a few prototypes of the YB-49 Flying Wing in the 1940s. Production of the B-2 stimulated computer-aided design, composite fabrication, and a host of other developments across the aerospace industry.

An engineer on the winning Northrop team specifically credited the previous years of work as preparation for the victory. "We knew more about predicting radar cross section of three-dimensional shapes than anybody in the world because of the Air Force contracts experience," he said.

Lockheed Martin photo

The F-22 production line. Lockheed Martin was awarded the Advanced Tactical Fighter contract in 1991, and six years later the first production F-22 flew.

Immense Challenges

In the end, the Lockheed and Northrop bomber designs were distinct, just as intended. Lockheed gambled on a medium-size aircraft, while Northrop committed to a big, long-range bomber, and in those choices lay a key discriminator. "Because our airplane was designed to be smaller, the control surfaces on the wing were smaller, too, which meant we needed a small tail for added aerodynamic stability," Lockheed Skunk Works honcho Ben R. Rich later explained. "Northrop had larger control surfaces and needed no tail at all," Rich said, and that helped propel it to victory.

The momentum of competing design teams with nearly a decade of experience made it possible to then take on the immense challenge of a supersonic stealth fighter.

The Advanced Tactical Fighter was by far the toughest program in the stealth family. Both Lockheed and Northrop had studied the problem of a supersonic, stealth fighter in the late 1970s and found it to be extremely demanding. However, the Air Force took the plunge. In the early 1980s, it funded work on an ambitious set of requirements for the program later known as the F-22.

Industry was strong enough to handle it. The 1990 flyoff between Lockheed's YF-22 and Northrop's YF-23 again pitted two different philosophies against each other. Lockheed's fighter emphasized maneuverability. Northrop's elongated YF-23 offered significant stealth and range. In a mirror image of the airframe competition, the Air Force also tested a Pratt & Whitney engine against a General Electric engine.

The Air Force customer was left with a pleasant choice of aircraft with superb capabilities. Ultimately, the YF-22 was chosen in April 1991. The first production F-22 flew in 1997.

This time-proven system of keeping skilled competitors in the game is now in peril. Of course, the former rivals Lockheed Martin and Northrop Grumman are now teamed (along with BAE) on the F-35, but the decline in the aircraft procurement funding stream has been perhaps the single biggest factor leading to the recent narrowing of the aerospace industrial base. Beyond this, it illustrates that market forces are not given a free rein in determining procurement priorities.

The second factor that has undermined the power of market forces is the time lag from strategy development to program execution. In theory, national defense strategy drives spending (and shapes the market). In practice, there are more steps to the process, which takes more time, and they are critical to segments of the aerospace industrial base.

By the time programs reach production, national strategy often has become a blunt instrument to cut or curtail the program. The effect of termination is almost uniformly negative. Money and control dissipate. Program termination typically involves a contractual liability

Illustration by Peter A. Barnett, Northrop Grumman Corp.

An artist's conception of a hypersonic global strike and global persistence attack aircraft.

to pay fees to the prime contractor to defray costs. Cutting production short can involve similar contractual obligations. Termination frees up money, but it is typically production money that, by law, must be spent on production for other systems, sometimes in a very short time frame. In this case, there is little chance of taking large sums budgeted for production and transferring them to R&D accounts, for example.

Finally, it is important to note that this unusual "market" delivers not only aircraft but a second, vital byproduct. That byproduct is made up of the engineers, production workers, and experienced managers trained on a career of moving from one large program to the next.

Decisions under way will make it very difficult for the government to again compete two "dark titans" against each other to pursue distinct, innovative approaches to aircraft design. The problem is not just that firms may exit a market. Companies have moved in and out of fighter and bomber and transport production before. But the reason they could shift gears rested in part with having a pool of seasoned aerospace workers close to hand. Already, this capacity has shriveled.

Layoffs and retirements will shred much of the workforce, and major changes will start soon. Take the case of the C-17 production line in Long Beach, Calif. The line began in 1988 and has continued with constant improvements since. Much of the old tooling has been replaced, and just as important, workers continually evaluate better ways to accomplish tasks. The average worker on the C-17 line is more than 50 years old, with 20 years' experience in aircraft production. Layoffs will begin as production winds down, and those C-17 workers looking for jobs after 2011 will not have the choices available to their West Coast counterparts of earlier decades. Military production on UAV lines continues at Northrop Grumman, General Atomics, and others. Commercial aerospace work is under way on the 787 in Seattle. But for most, the options are limited. A permanent share of capacity will be lost as these experienced workers move on.

Sustaining Technologies

Most corporations that successfully brought disruptive technologies into the active Air Force inventory were also working on aircraft with direct market application and, hence, customer encouragement. Northrop committed to the B-2 while at the peak of its F-5 sales. It invested in Global Hawk in an era rich with work on B-2 modifications and with F/A-18 work as a major supplier. Lockheed saw the F-22 through while maintaining a robust F-16 line. The No. 1 disruptive aircraft of late—the MQ-1 Predator—was developed by one of the very few remaining privately held companies in the industry, General Atomics. Not that the senior management of General Atomics was blind to profit-and-loss considerations. But their diversified corporate structure and ability to invest and aggressively market the MQ-1 and later the MQ-9 more closely resembled the 1930s aerospace innovators.

From these examples, it is apparent that the tension between disruptive innovation and sustaining technologies is a major characteristic of the industry. It is also the breach into which the government customer must step with a balanced agenda.

Lack of programs has now put that assumption in doubt. While it is far too early to declare the industry to be in a death spiral, it is time to take a firmer hand in extracting the seeds of innovation from a much narrower base.

The best way to illustrate this is to conclude with a final story—an important one. It concerns the dawn of the jet age.

The jet age shaped military and commercial aviation more than perhaps any other single development since the Wright brothers took off on the morning of Dec. 17, 1903. Today, the advances of jet propulsion have definitively separated American fighters such as the F-22 from Russian or Chinese rivals, pushing US aircraft far ahead.

Yet the early history of the jet engine in America was a difficult one. The most advanced research took place in Germany and Britain. Research began in earnest on the eve of World War II. Germany had pulled far ahead and managed to fit jet engines on the Me 262 before the end of World War II. Desperate efforts to halt German jet fighter production drove US planners to strike at some of the toughest targets of the strategic bombing campaign in the European Theater of Operations. The US had secret prototype jet aircraft, yet no American-made variant flew in combat in that war. Basically, the jet engine was still so complex and raw that there was doubt about investing in it, given the wartime needs for immediate production.

Had airmen adhered to the standards of investing only for "the wars we are in," would the considerable research and development for the jet age have continued? While propeller-driven fighters such as the P-51 and the Marine Corps F4U Corsair saw service in Korea, it was the F-86 that matched the nimble MiG-15s over the Yalu River.

War is a mighty driver of innovation, yet it is not the only litmus test of sound aeronautical development. It takes a longer view of technology and military requirements to set a successful research and development program. That view resides in the various armed services. ■

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Verbatim

By John T. Correll, Contributing Editor

Leakers Beware

"I have been appalled by the amount of leaking that has been going on in this process. ... And frankly, if I found out with high confidence anybody who was leaking in the Department of Defense, who that was, that would probably be a career ender. ... Everybody ought to just shut up."***—Secretary of Defense Robert M. Gates on leaks to news media about the Ft. Hood, Tex., investigation and the additional troops to Afghanistan,*** **New York Times,** ***Nov. 13.***

Where Is the Luftwaffe?

"If you can see silver aircraft, they are American. If you can see khaki planes, they are British, and if you can't see any planes, then they're German."***—Attributed to German ground troops in Europe in 1944, Anthony Beevor,*** **D-Day: The Battle for Normandy,** ***Viking, released in October.***

All in Fun, Sort Of

"I was joking, ... but I do think that the Air Force is the most corporate of our armed forces and the least military in its feel. I think this is because it doesn't fight on the ground, and also because its enlisted don't control firepower. (But both those are true of the Navy, the most traditional of the services.) I also think that the Air Force may be, in cultural terms, the most 'American' of the services, reflecting our culture more than do the Army, Navy, and Marines."***—Thomas E. Ricks, author and journalist, explaining his earlier reference to "the military services, as well as the Air Force,"*** **Foreign Policy** ***magazine, Nov. 9.***

Poles Want Protection

"We would like to see US troops stationed in Poland to serve as a shield against Russian aggression."***—Polish Foreign Minister Radek Sikorski, London*** **Daily Telegraph,** ***Nov. 7.***

Reputations

"Reputations are hard to earn and easy to lose. So, every day, we, individually and collectively, must strive to sustain that reputation, which is that we are a trustworthy and reliable partner on the battlefield, that we will do what is needed."***—Air Force Chief of Staff Gen. Norton A. Schwartz, Airlift Tanker Association conference, Nov. 7.***

Big Space Shrinks

"The big space theory, like the big sky theory, kind of came to a close when that happened—the thought that we wouldn't have to pay attention to the movement of every satellite up there because there's so much space up there and such a low probability that they'll run into each other."***—Gen. Kevin P. Chilton, commander of US Strategic Command, recalling a collision in 2009 of US and Russian satellites, speech at Offutt AFB, Neb., Nov. 4.***

Dying for a Fad

"Our soldiers are dying for a fad, not for a strategy. Our vaunted counterinsurgency doctrine is the military equivalent of hula hoops, pet rocks, and Beanie Babies. ... Our counterinsurgency (COIN) theory—hatched by military pseudo-intellectuals and opportunists—has no serious historical basis. It ignores the uncomfortable lessons of 3,000 years of fighting insurgencies and terrorists. Its authors claim Vietnam and Algeria as success stories."***—Ralph Peters, former Army officer, author, syndicated columnist, and outspoken advocate of ground combat power,*** **New York Post,** ***Oct. 28.***

Missing Concept

"In Quadrennial Defense Review (QDR) documents, ... there has been no mention of forcible entry since the 2001 QDR. The 2002 edition of the Joint Strategic Capabilities Plan (JSCP) was the last mention of forcible entry as a required capability. There is no joint integrating concept on the subject. Thus, we now find a divergence of approaches being taken unilaterally to what are probably the most complex and complicated joint operations, and no comprehensive statement of the requirement in Department of Defense documents."***—Retired Army Gen. Carl W. Stiner and retired Lt. Gen. Daniel R. Schroeder,*** **Army Magazine** ***(Association of the US Army), November.***

Fat of the Land

"We have an obesity crisis in the country. ... Kids are just not able to do push-ups. And they can't do pull-ups. And they can't run."***—Curt L. Gilroy, Pentagon director of accessions, on physical unfitness for military service of 35 percent of American young people,*** **Army Times,** ***Nov. 3.***

Gravest Problem

"I worry most about proliferation of weapons of mass destruction in such a way that they could be acquired by nongovernmental organizations, like terrorist groups, especially the radical groups that we know are trying to get these weapons. We're convinced that if they were to get them, they would use them."***—US National Security Advisor James L. Jones, asked by*** **Spiegel** ***(Germany) about the gravest threat to the American homeland, Nov. 7.***

Limitations of Unmanned Combat

"It is one thing to receive coordinates, target a sensor, and shoot weapons at a given point in support. Predator unmanned aircraft do that now. Artillery can do that. It's not special. But it is an entirely different endeavor to locate a smart, moving enemy hiding among rocks or in an urban setting, while coordinating [with] other aircraft on multiple frequencies and recommending friendly ground movements, all the while optimizing orbit shape and climbing or descending in altitude as weather and terrain change over time to find and root out evil."***—Col. James Jinnette, former F-15E squadron commander who has completed three close air support deployments,*** **Armed Forces Journal,** ***November.***

An Excess of Outsourcing

"As we debate how many more troops to dispatch to Afghanistan, it might be a good time to also debate just how far we've already gone in hiring private contractors to do jobs that the State Department, Pentagon, and CIA once did on their own. ... We've fallen into a pattern of outsourcing some of the very core tasks of government—interrogation, security, democracy promotion. As more and more of this government work gets contracted and then subcontracted, ... the public interest can get lost and abuse and corruption get invited in."***—Thomas L. Friedman, noted author*** **(The World Is Flat)** ***and columnist,*** **New York Times,** ***Nov. 4.***

This secret 1960s study left its stamp on US nuclear forces for the next 40 years.

STRAT-X

USAF photo

Left: A time-lapse photo of Peacekeeper ICBM re-entry vehicles passing through clouds during a flight test. Above: USS* Alabama, *an* Ohio*-class nuclear-armed submarine, cuts through open waters.

By Peter Grier

In the mid-1960s, senior Pentagon officials became concerned about the state of the US nuclear deterrent force.

The Soviet Union for years had been churning out more and more heavy intercontinental ballistic missiles—long-range, fast-flying, silo-based nuclear weapons. At the same time, the Soviet Union had begun building anti-ballistic missile (ABM) defense systems around important homeland targets.

The two developments, either singly or in combination, had the potential to alter the strategic superpower balance.

The problems were fundamental ones. First, increasingly numerous ICBMs posed a threat to America's own weapons. How could the US maximize the portion of the nuclear arsenal to survive a Soviet first strike?

Second, ABM systems around Moscow, especially, generated doubts about US ability to hit key targets. How could Washington ensure that enough US weapons would get through in a devasting second strike, and therefore deter Soviet leaders from ever attempting a first strike?

To analyze this situation, Secretary of Defense Robert S. McNamara in late 1966 launched a study aimed at developing some answers. That study was called Strategic eXperimental, or STRAT-X, for short.

STRAT-X turned out to be an intense, nine-month-long national effort. Participants intended it to be a game-changing look at the question of what nuclear systems the US should deploy in coming years. Viewed with the benefit of hindsight, STRAT-X clearly succeeded.

Indeed, that was the conclusion of a 2006 Defense Science Board report on the future of US strategic strike capabilities. STRAT-X, it said, introduced into the national strategic debate a number of important system concepts and ideas. The very large Trident nuclear missile-carrying submarines, aircraft-launched cruise missiles, small and mobile ICBMs, and similar concepts all "have a STRAT-X legacy," said the DSB.

The STRAT-X study's emphasis on estimating and maximizing the damage US weapon systems could inflict upon the Soviet Union also inspired the development of multiwarhead ICBMs and submarine-launched ballistic missiles. STRAT-X led to greater US emphasis on hardened missile

DOD photo

silos and a new generation of sea-based nuclear systems. In that sense, it was the inspiration for both the Peacekeeper ICBM and the Trident SLBMs, although neither system explicitly was part of STRAT-X.

The Best and the Brightest

The STRAT-X study was a wide-ranging look at the future of US weapons that shaped the nuclear triad for decades, and remains a model for such efforts today. It was "one of the most influential analyses ever conducted" for the Pentagon, noted a 2002 RAND report on capabilities-based planning.

Strategic eXperimental drew on the talents of many of the best and brightest weapons engineers, nuclear planners, and strategic thinkers of the time. Lead contractor on the study was the Institute for Defense Analyses, a government-affiliated think tank run at the time by retired Gen. Maxwell D. Taylor, who had served as Chairman of the Joint Chiefs of Staff under President John F. Kennedy.

Military advisory groups oversaw the project, but the overall study was run by IDA's Fred A. Payne. He ran herd on a wide-ranging group of civilian and academic subcontractors—25 principals in all, from Boeing and Booz Allen Hamilton to Thiokol and TRW. Among those who took part in the effort was Freeman Dyson, an eminent physicist and later an anti-nuclear activist.

McNamara signed the order for STRAT-X on Nov. 1, 1966, specifying the study was to be a technological investigation "to characterize US alternatives to counter the possible Soviet ABM deployment and the Soviet potential for reducing the US assured-destruction force effectiveness during the 1970s."

Furthermore, study participants were to consider US alternatives from a uniform cost-effectiveness base, as well as from the point of view of possible Soviet countermoves.

The latter requirement led to an aspect of STRAT-X that today seems amusing. One of the volumes predicted USSR responses, and was written as if it were a staff study for Soviet Minister of Defense Gen. Andrei A. Grechko. It came complete with fulminations about the perfidy of capitalism and the inevitable triumph of the socialist will.

What McNamara really wanted from STRAT-X were path-breaking ideas about new weapon systems, either offensive or defensive—and he did not want the existing defense bureaucracy to get in the way. That was made clear in a January 1967 memo to IDA from the office of the Pentagon's director of defense research and engineering (DDRE).

AP photo by John Rous

Secretary of Defense Robert McNamara launched the wide-ranging STRAT-X study in 1966.

The memo read: "The systems to be analyzed need not be limited to those recommended by the services, and the STRAT-X study group is encouraged to examine system concepts unrestrained by considerations of potential management problems or political influences."

Land-, water-, underwater-, and aircraft-based missile systems were all placed on the table for consideration, although the study's terms of reference specifically excluded the topics of manned bombers and orbital bombardment systems. Winning systems were to be those that provided an economic way to produce a surviving penetration payload for targeting against the urban and industrial base of the USSR.

"Cost per surviving kilo pound of payload ... as a function of Soviet costs to negate that payload should be the primary but not sole

USAF photo

A Minuteman III is launched during a test. STRAT-X encouraged the development of multiwarhead ICBMs.

economic evaluation criteria," concluded the DDRE memo.

That dry language launched a crash nine-month effort in which STRAT-X participants dreamed up and considered dozens and dozens of variations of ways to deliver the most powerful weapons man has ever known. These concepts were matched against the anticipated Soviet deployment of bigger and more-accurate ICBMs to see which produced the cheapest survivable options.

The name STRAT-X had been chosen because it was vague, and did not hint at any bias to land- or sea-based systems. In the end, the study looked at some 125 weapon basing ideas. Of these, nine were studied in some detail, according to a declassified and redacted copy of the first volume of STRAT-X's 20-volume final report.

The nine candidate basing systems were:

- Rock Silo, in which missiles would be based in hardened silos anchored in the granite bedrock of the nation's open western and northern ranges.
- Soft Silo, a similar system using silos more easily and cheaply constructed.
- Rock Tunnel, in which missiles would be shuttled by rail around a system of deeply dug granite tunnels, emerging at launch portals.
- Soft Tunnel, which would use a quicker and cheaper construction method than its rock counterpart.
- Canal-Based, which would entail sailing a missile about a network of canals in an attempt to confuse Soviet targeters.
- Land Mobile, a truck-based transporter system that would drive a missile at speed around a winding system of dedicated roads.
- Ship-Based, where surface ships with missile canisters would sail about the oceans, hiding amongst other maritime traffic.
- Submarine-Based, in which large, slow, and quiet submarines would cruise randomly beneath the seas, with missiles in canisters attached to the outside of their hulls.
- Air Launched ICBM, in which circling aircraft would be equipped with standoff ballistic weapons that could be fired at Soviet targets without having to approach USSR air defenses.

Capabilities-based Planning

The 2002 RAND report, prepared by Paul K. Davis, described STRAT-X as a foundational exercise in what has come to be called "capabilities-based planning." According to the RAND analyst, STRAT-X participants made a point of transcending the myriad details in which they could have become embroiled.

One of the study's enduring conclusions, according to Davis, was that US nuclear forces should be shaped with an emphasis on the number of arriving re-entry vehicles (RVs)—the number of warheads that would actually reach Soviet soil in a retaliatory attack. It was the bedrock manifestation of nuclear "capabilities."

To measure this, analysts had to take many factors into account, from the ability of a system to survive a Soviet first strike, to the reliability of all its components, and its ability to penetrate USSR defenses.

Interestingly, this measurement did not actually assess either the accuracy or the nuclear yield of the surviving American RVs. Analysts had figured out that the vast majority of targets in the USSR were vulnerable to pretty much any type of warhead the US was considering.

As Davis reported: "This, and concerns about air defenses and future intercontinental ballistic missile survivability, influenced the decision to move to multiple independently targeted re-entry vehicles and submarine-launched ballistic missiles ... with small weapons."

The final STRAT-X report was a massive document. Much of that work has never been declassified. The volumes that have been released, however, are testimony to the thoroughness and ingenuity of STRAT-X analysts.

The design of the land-mobile system, for instance, clearly presages that of the land-mobile Small Intercontinental Ballistic Missile, or "Midgetman," which the Air Force developed in the 1980s. The missile was canceled in 1992, following the collapse of the Berlin Wall and the end of the Cold War.

The STRAT-X land-mobile concept featured a rubber-tired transporter-launcher that carried one missile, capable of moving quickly around a system of dedicated roads in the western United States to complicate the job of Soviet attack planners.

STRAT-X analysts figured everything from the number of support personnel each wing of land-mobile missiles would need (5,606) to the percentage of each wing's transporters that would typically be down for maintenance at any one time (seven percent).

Transporters would need about a 20 mph average speed and a 35 mph "dash" speed to enable them to adequately perform their

STRAT-X considered a truck-based transporter system. It presaged the Midgetman system, whose mobile launcher is shown here.

USAF photo

A B-52 Stratofortress carries Air Launched Cruise Missiles. STRAT-X emphasized the importance of lots of warheads reaching their targets.

shell game-like task of moving quickly enough so that the USSR would not be certain of destroying enough of them in a surprise attack, according to STRAT-X.

These transporters would be scooting about 65,000 square miles of public lands in the southwestern states, STRAT-X figured. The study assumed that land-mobile roads would traverse national forests and parks.

Analysts foresaw a day, however, when people and missile transporters might clash. Camping, fishing, rock-hunting, and other recreations increasingly were spreading into the hinterland of the West.

"It is surprising how much activity occurs on [open western land]. ... To what extent such activities may not be compatible with land mobile/random deployment is an open question at this time," noted the 1967 study. This was a prescient statement, one borne out in the 1970s and 1980s by the intense local opposition to suggestions of vast "racetrack" roadways and rail systems in the West to move missiles.

Meanwhile, the design of the proposed STRAT-X submarine was like nothing that had come before.

One of the reasons for the study was the Pentagon's perception that the existing Polaris submarine force had started to become vulnerable. Thus, planners were told to design an undersea concept that would allow a large increase in ocean operating area.

Their solution was a submarine designed to be as difficult as possible for the Soviets to find. It would be extremely quiet and harder to hear on sonar, as it cruised randomly about the open seas.

"The new submarine is one designed especially as a missile launcher and is, therefore, considerably different from the [existing] SSBN, which is a converted attack submarine," said the STRAT-X summary volume.

The new sub would carry its missiles outside of the pressure hull, in canisters. To launch, the crew would jettison a canister, which would drift away from the ship before firing its missile. This concept allowed the sub to carry larger and longer-range missiles, increasing the amount of ocean it could use as a range. Missile launch could take place at all speeds and depths, and firing could be delayed, so that Soviet forces could not backtrack along the missile trajectory to find and destroy the submarine.

The Mixed Legacy of STRAT-X

Speed was not of the essence. The new sub was designed with a small and relatively inexpensive nuclear power plant, because STRAT-X analysis concluded that when it came to undersea warfare, stealth was the most important characteristic a boat could have.

"A high burst speed is a minor trail-breaking consideration against attack vehicles in comparison with radiated noise characteristics and sonar countermeasures," said the study.

Today's *Ohio*-class Trident SSBN differs from the STRAT-X's original undersea concept, of course. At the time, Adm. Hyman G. Rickover, director of Naval Reactors Branch and the father of the nuclear Navy, argued strenuously to Congress that any new sub should indeed be able to produce a burst of getaway speed. This led to a requirement for a much bigger nuclear power plant, and inevitably a much grander sub design.

In addition, further Navy analysis indicated that the unknown problems associated with the entirely new approach of carrying missiles outside the pressure hull might be too great. In the end, Trident adopted the more conservative approach of sticking with missiles carried inside the sub.

For land systems, the STRAT-X discussion of mobility pioneered years of work on the land-mobile Midgetman, and on mobile basing systems for the MX, which included the "racetrack" plan to transport the large multiple-warhead missile around a road loop.

The volume laying out the assumptions about how the USSR would respond to next generation US systems makes for fascinating reading. "It has become increasingly obvious that the United States is making a number of serious mistakes by setting some seemingly impossible goals which are perhaps generated by the computer dream world in which it so delights," claimed the faux-Soviet author writing in the voice of an advisor reporting to the Minister of Defense.

The USSR would need to make "considerable effort" to improve the accuracy of its missiles if it decides it wants a first strike capability against US silo-based counterparts, said this volume, adding that such an effort will "doubtless be worthwhile."

The report indicates the STRAT-X analysts felt Soviet planners believed they could reasonably expect to have success in targeting the land-mobile missile system proposed as an option. Sub-based systems, however, appeared to be another matter.

"Detection, location, and identification of very quiet, slowly moving submersibles is indeed a difficult problem," warned this "Soviet" analyst.

The legacy of STRAT-X is mixed. In the end, the Soviet empire collapsed, leading to a far-reaching reduction in American strategic weapons and strategy.

Two postulated STRAT-X-inspired road-mobile ICBM systems—the single-warhead Midgetman and a force of 100 multiple-warhead Peacekeepers—were never fielded as intended. USAF did field 50 of the Peacekeepers in stationary silos in a compromise brokered in 1983 by a commission headed by retired Lt. Gen. Brent Scowcroft. Even so, the silo-based Peacekeeper has since been deactivated.

On the other hand, USAF—encouraged by STRAT-X—went ahead with its Minuteman III ICBMs, the first missile to fractionate its payload with multiple, independently targetable re-entry vehicles. The Navy, for its part, went ahead with the "new submarine," the Trident. Both remain in service, and are cornerstones of the US strategic deterrent. ■

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Photo via Piotr Butowski

Embraer's Super Tucano (here) is currently in service with Brazil and Colombia, and has been ordered by other South American countries.

The Light Attack Aircraft

USAF reconsiders the mix of aircraft needed to provide CAS and armed overwatch in irregular conflicts.

By Marcus Weisgerber

In the US-led wars in Afghanistan and Iraq, jet-powered fighters have been a constant presence, striking critical targets and carrying out other missions. Soon, however, the thunderous roar of the jet engine could well be competing with the high-pitched wail of the turboprop.

The Air Force is pondering a return to the kind of light, prop-driven fighters and attack aircraft that carried out vital close air support and counterinsurgency missions in Vietnam and other spots in decades past. The potential shift stems from two major developments.

First, Air Force pilots find themselves dropping fewer and fewer bombs and instead performing more and more "armed overwatch" missions, in which fighters use precision targeting pods to gather and send live, full-motion video to troops on the ground and commanders in operations centers.

Second, a brutally high operations tempo since 2001 has taken a toll on high-performance aircraft, particularly F-15E and F-16 types. One year in Southwest Asia translates into five to seven years' worth of real degradation. Simply put, the jet aircraft fleet is wearing out too swiftly.

These trends, coupled with other factors, have prompted Air Force leaders to re-evaluate the mix of aircraft needed to provide CAS and armed overwatch in irregular conflicts of the future.

The Air Force believes that turboprop-driven light attack aircraft, combined with advanced unmanned aerial vehicles and the fleet of traditional fighters, could help solve the problem. The prospective aircraft, sometimes referred to as OA-X, would be loaded with Global Positioning System links, equipped with laser guided munitions, and rigged with advanced sensors capable of detailed scanning of terrain below.

The infusion of turboprop aircraft could slice billions annually from USAF's operation and maintenance costs, say service officials. In addition to consuming less fuel than jet fighters, the light attack airplanes could fly for hours without the need to refuel, translating into even more savings from reduced air tanker support sorties.

Moreover, say USAF officials, the service could use light strike aircraft as a bargaining tool in pursuit of partnerships with nations that have no need for, or money to buy, super high-performance jet fighters.

"Part of what we're trying to do is back away from putting blinders on, and only looking at Iraq and Afghanistan, because there is a global demand for this," Steve Day, the Air Force's deputy director of irregular warfare requirements, said in an interview. The two-seat attack aircraft will provide commanders with greater situational awareness than currently provided by single-seat fighters, according to Air Combat Command's "OA-X Enabling Concept."

In a fighter, a pilot's situational awareness is often reduced because one aircraft in a two-ship tasking is frequently getting gas from a tanker while the other performs the CAS mission. "In single-seat fighters, this creates an unacceptable burden of responsibility to low-time, inexperienced wingmen," the ACC document states. In addition to close air support and armed reconnaissance, the OA-X aircraft could perform forward air control, strike coordination and reconnaissance, air interdiction,

Air Tractor photo

Air Tractor, of Texas, has entered the light attack aircraft field as well. Shown here is its AT-802U prototype.

USAF photo

SSgt. Trevor Bradford (l) and SrA. Joshua Woeckener, members of a joint terminal attack controller team, coordinate with aircraft during a training mission.

intelligence-surveillance-reconnaissance, and joint terminal attack controller training if equipped with high-tech sensors. These capabilities could prove useful in Afghanistan, Iraq, and elsewhere.

"In this fight, [what] we need is a bunch of light attack, observation, and transport airplanes, and a bunch of great young lieutenants and captains who are out there [fighting] everyday, working with the ground forces, working with the partner nations, learning this business, and getting really, really good at it," one field grade officer opined. "That will allow us to stabilize some of this massive turmoil that we've seen in our traditional fighter and bomber forces and allow those guys to get better at what they do," the officer said. "I think this is a real opportunity if we embrace it."

Fostering New Relationships

The new airplanes could also find a home in the Air National Guard, which is slated to lose a large number of fighters as the Air Force moves toward a leaner fleet. Partnered with local and state law enforcement agencies and the Department of Homeland Security, the Guard could operate OA-X aircraft for US-based search and rescue, border security, and maritime patrol missions.

While the service expechawkerts the new airplane to play a key role in the Air Force's irregular warfare operations, it will also help foster partnerships with developing air services. Some officials see the service turning the attack aircraft over to a partner nation at some point, similar to the way the Air Force gave OV-10 Broncos to the Colombians and Indonesians in the early 1990s to help combat insurgencies. In some scenarios, a pilot from a partner nation could fly the aircraft with a US airman in the backseat, assisting during the mission, officials claim.

The effort has been met with mixed reactions from blue-suit officials. In April 2008, Col. Gary L. Crowder, then commander of Air Forces Central's Combined Air and Space Operations Center, made a serious pitch for using light attack aircraft for missions over Iraq and Afghanistan and detailed an international partnership building program, similar to what has recently been adopted by senior service leadership. Crowder has spent much of his Air Force career studying irregular warfare and counterinsurgency, similar to the current wars in Afghanistan and Iraq. Crowder's argument, which came at a time when the Air Force was fighting to buy more F-22A Raptors, was met with resistance from service leadership, with some claiming light fighters could become vulnerable to surface-to-air missile attacks.

At that time, numerous Air Force officials refused to discuss the potential for a light strike program. Those who would, did so only under the condition of anonymity. Much more is being said since Air Force Chief of Staff Gen. Norton A. Schwartz embraced the program soon after taking the service's reins in mid-2008. Schwartz believes the program will work best if the aircraft chosen can fulfill multiple missions, namely pilot training, light attack, and reconnaissance missions.

"My angle on this is, if you can do this in a way that isn't single-purpose, the chances of making it work are much better," the air Chief said. While the Air Force plans to reduce its fighter footprint in 2010, the OA-X aircraft could help keep pilots proficient until a significant number of F-35 Lightning IIs enter service in the next decade, the ACC document argues. "Assignment of pilots to OA-X units" will help assure expertise in a number of missions is preserved within the combat air forces when legacy aircraft are retired, the paper states. "This will enhance the USAF's ability to source F-35 units with properly experienced aircrew it will have fewer of otherwise."

While the program has been fast tracked, the Air Force will not rush the requirements process. Air Force Maj. Gen. David J. Scott—director of operational capability requirements and champion of the OA-X initiative—said in October that the attack program would move more slowly than a separate initiative to buy small mobility aircraft. The service is more familiar with the small cargo haulers, since Air Force Special Operations Command already flies some of these airplanes. However, a flyoff competition for a light fighter is not unlikely, he said in November. "Light attack, I think, is a different animal because we don't have anything off the shelf," Scott said. "There are things that are already built and designed that can do that, but to figure out better which one we want, there will probably be a competition in that one."

In an attempt to speed up the aircraft acquisition process, the service will likely select an in-production platform, at least

Hawker Beechcraft photo

The Hawker Beechcraft AT-6B, shown here, is a modified version of the T-6 trainer used by the Air Force and foreign nations.

Photo by Ted Carlson

Boeing is working on reopening a production line to manufacture OV-10 Bronco aircraft such as this one.

for initial buys, according to Air Force Materiel Command chief Gen. Donald J. Hoffman. "If it's a nondevelopmental [aircraft], it allows us to go enter the process at a later date, at a later phase than having to go through a lot of the bureaucratic processing," he said in September. Currently, the Air Force has plans to buy 15 attack airplanes in Fiscal 2011. Of those, 12 will be combat-coded. A request for information presented to industry this past summer said the Air Force could purchase as many as 100. ACC officials have conducted an OA-X cost competitive analysis and are developing an initial capabilities document, according to Scott. A request for proposal will follow once approval is granted. By spring 2010, "we'll come up with some kind of aircraft that we're going to buy, or the one we're going to need," Scott said.

A number of Air Force officials say they envision the service buying a family of aircraft since the capabilities of one airplane may fit the geographical terrain and mission needs of a particular region of the world better than another. The requirement ultimately "might be three or four airplanes," said one Air Force official about the effort. However, there are no plans to buy multiple aircraft right now, Scott said.

The light fighter initiative could also spur purchases of different aircraft that could address both near- and long-term threats, according to Lt. Col. Michael Pietrucha, ACC's Joint Air-Ground Combat Division's irregular warfare action officer and co-author of the command's enabling concept. While the initial aircraft could be propeller driven, future variants could feature a jet engine. "There might be a single-engine variant. There might be a two-engine variant," Pietrucha said, noting these airplanes could "fill overlapping but different missions."

While the specific airframe has yet to be determined, the Air Force has laid out a few essentials for an ideal OA-X aircraft. Most notably, the aircraft will boast a forward-firing Gatling gun, and the ACC blueprint calls for a weapon pilots could rearm quickly after landing at an austere forward operating base. The pilot could then take off and continue the mission without returning to home base. The fighter must also have four weapons stations and be capable of carrying two 500-pound bombs, laser guided weapons, and rockets. The aircraft must have countermeasures and a laser designation system. For ISR, each aircraft must have an internal or pod-mounted electro-optical-infrared system "at least equivalent to current advanced targeting pods," according to the ACC document. The aircraft must be capable of recording the information gathered from the pod.

Looking at a Wing Construct

ACC officials are engine agnostic when it comes to the OA-X. However, the service will likely choose a turboprop since small partner nations will have an easier time maintaining it, according to service officials. "There are plenty of second-, third-, and fourth-class air forces out there that are going to have a hard hurdle with jet engine maintenance, but will still be able to handle something that's less complex and that requires a lower level of training and instrumentation and everything else," Pietrucha said.

The Air Force has not determined how it will organize the light fighter and its other irregular warfare aircraft within the fleet. However, Schwartz has suggested a wing construct could be a solution.

The Air Force has not operated a propeller-driven attack aircraft since it retired the Vietnam-era OV-10 Bronco in the early 1990s, and only a few immediate candidates are in production right now.

"We don't have anything [available] off the shelf," Scott said. "To better figure out which one we want, there will probably be a [flyoff] competition."

Some of the aircraft possess advantages over others, depending on the region where they are employed. "If somebody's looking to find the perfect OA-X, they're not going to," Pietrucha said. "There are a variety of potentially useful things that will fall under an OA-X umbrella." The two front-runners are the Hawker Beechcraft AT-6B—a modified version of the T-6 trainer used by the Air Force and a number of foreign nations—and the Embraer Super Tucano, flown primarily by South American countries.

Hawker Beechcraft has been working on its AT-6B for more than a year and in September announced it has aligned itself with defense giant Lockheed Martin, which will integrate avionics into the attack airplane. A souped-up Pratt & Whitney engine also is in the works. "We're very optimistic about the role that that airplane can play in IW," Hawker Beechcraft Chairman and CEO Bill Boisture said of the AT-6B.

The Navy has leased a Brazilian-built Super Tucano as part of its Imminent Fury program, an effort to develop SEAL-support aircraft. The Air Force has observed this closely.

Boeing has also quietly assembled a plan to remanufacture its still popular OV-10. Company officials believe their aircraft's cargo capability and twin-engine design give it an advantage to its single-engine competitors. But the company has to reopen a production line, which is no small feat.

Italian aircraft maker Alenia has taken a different approach from its competitors, proposing a weaponized version of its M-346 jet aircraft trainer. It would perform better than its propeller-driven competitors in mountainous regions such as Afghanistan, according to Alenia North America President and CEO Giuseppe Giordo.

Some lesser-known companies have proposed solutions, also. Crop duster manufacturer Air Tractor has crafted a light attack airplane out of one of its rugged airframes and showed off its AT-802U prototype at the Paris Air Show this past summer. Defense start-up Stavatti Aerospace has shown off designs of aircraft it would like to enter in the OA-X contest.

If all goes as planned, one of these new light fighters could head to the battlefield by 2013. ■

Marcus Weisgerber is managing editor of the Washington, D.C.-based online news service Inside the Air Force. His most recent article for Air Force *Magazine, "Team Airlift," appeared in the June 2009 issue.*

Dassault photo

Left, the Dassault Rafale, a French-built fighter. Below, the Eurofighter Typhoon at an air show.

World air forces are on pace to buy more than 3,000 fighters over the next decade.

By Marina Malenic

Fighters Far and Wide

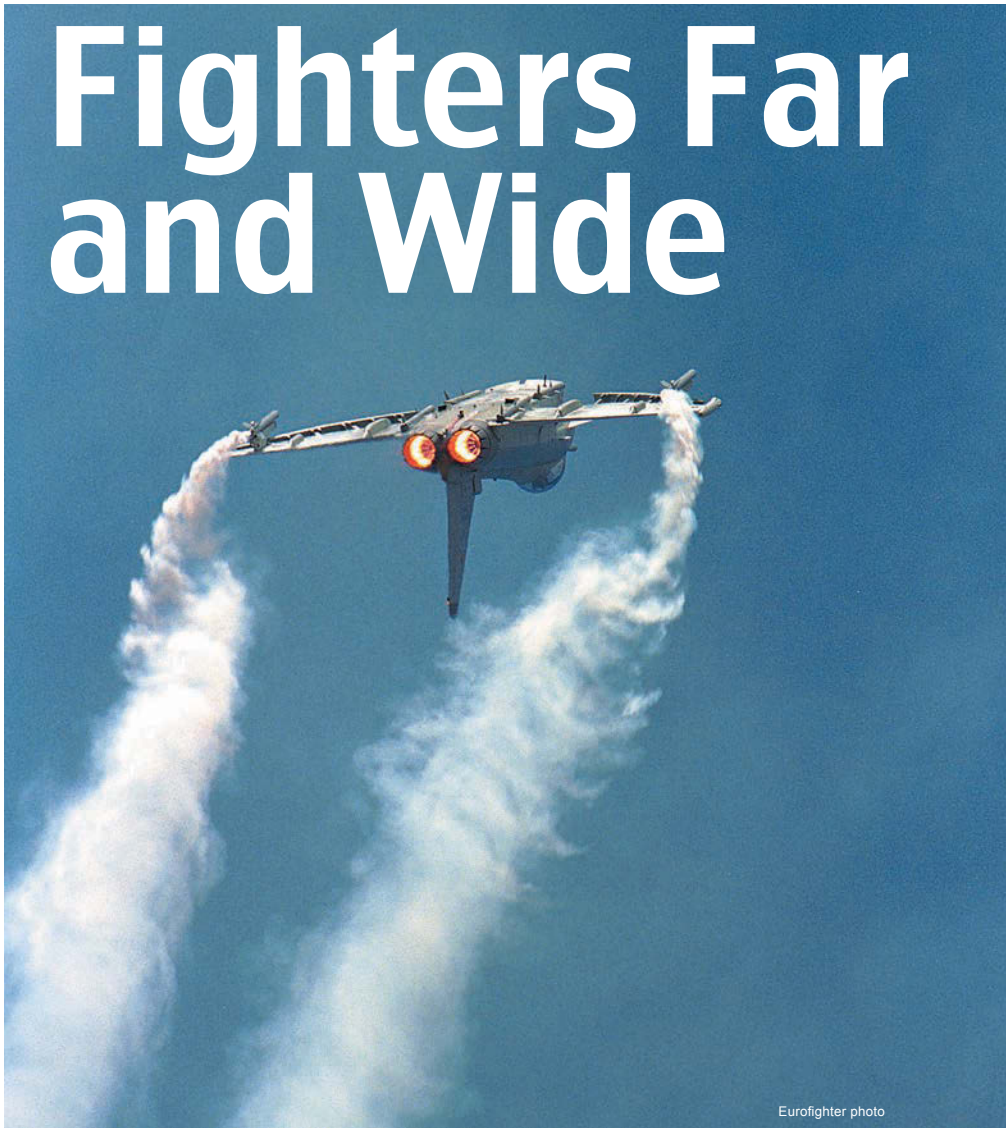
The world's military air arms, intent on preserving and strengthening their fighter forces, have touched off what could prove to be a decade-long global aircraft sales upsurge.

Wealthy and developing nations alike are turning their attention to fighter recapitalization. Their efforts might well send thousands of new and advanced units into global fighter forces. At stake: scores of billions of dollars in sales.

Experts maintain that the newest US fighter, Lockheed Martin's F-35, is poised to dominate sales in the latter years of this "growth decade" of roughly 2010-19. However, the initial years will see fierce competition among many manufacturers.

Fueling the demand are pressures created by deferrals of modernization and the desire for emerging technologies. It is a combination felt by many nations—from Britain to India, from Japan to Israel, not to mention the United States.

What will this boom look like? Opinions vary, but reputable industry watchers Forecast International and the Teal Group consultancy of Fairfax, Va., reported that sales may rise as much as 35 percent, and be worth a whopping $164 billion, during the period 2008-17. In their analyses, FI and the Teal Group projected sales of between 2,909 and 3,345 fighters. The average per-fighter cost works out to about $52 million.



Eurofighter photo

FI, a consulting firm specializing in market research for the aerospace and defense industries, contended in 2008:

"Although the production of fighters will hover around the 300-aircraft-per-year line through 2013, FI projects that production levels will jump by more than a third from 2014 to 2017, as fighter manufacturers are forecast to produce more than 400 new fighters in each of the final two years of the forecast period."

Customers for US fighters—there are many—are generally acquiring the latest versions of legacy designs such as the USAF F-15 and Navy F/A-18 (built by Boeing) and USAF's F-16 (built by Lockheed Martin).

Boeing has a stake in several international competitions. Thomas A. Bell, the firm's vice president of business development for military aircraft, sees two primary demand drivers for new fighters worldwide: the need to recapitalize old fleets "simply from the standpoint of aircraft life span and fatigue issues" and a desire for the latest technology.

"No matter how much capability you put into the aircraft that were bought in the '70s or '80s, at a certain point they're just not capable of engaging in the kind of conflicts that NATO and other allied nations are getting into," Bell said.

Bell said lessons from modern warfare are prompting a greater interest from "almost every corner of the Earth" in Boeing's two fighter offerings—the F/A-18E/F Super Hornet and the F-15 Eagle.

Indeed, Bell noted, Boeing has not been involved in so many international fighter contract competitions since McDonnell Douglas (acquired by Boeing in the 1990s) marketed its F-4 Phantom fighter around the world, beginning in the 1960s.

The First Step

"We feel we're really able to hit the sweet spot in terms of price and capability with both of these aircraft," he said.

Neither Boeing nor Lockheed Martin is a sure thing in these international duels, however.

Outside the traditional US customers, the competition is fierce. Dassault, Saab, Sukhoi, Eurofighter, and Mikoyan-Gurevich all have advanced aircraft on offer to clients who are not eligible for the F-35 or who are unwilling to wait for it.

The top international fighters include France's Dassault Rafale, Russia's MiG-35 and Sukhoi Su-35, Sweden's Saab Gripen and the EADS-BAE Eurofighter Typhoon, produced by a consortium of British, German, Italian, and Spanish companies.

Late last year, France and Kuwait signed a defense pact that appears likely to lead to a sale of 60 Rafale fighters to that Gulf nation. Dassault has been making overtures to at least two other regional players, Saudi Arabia and the United Arab Emirates.

In South America, Boeing's Super Hornet, the Rafale, and the Gripen are finalists in a competition to replace Brazil's Dassault Mirage fleet. Brazil in mid-December had not yet chosen a manufacturer for what could ultimately become a 120-aircraft buy, although the Brazilian government has indicated that it favors the Rafale.

Robert E. Gower Jr., Boeing's VP for F/A-18 programs, said Brazilian officials have "been insistent" that "they do not want to buy an aircraft, they want to buy technology." Last summer, Obama Administration officials traveling in Brazil outlined a proposal for unprecedented transfers of F/A-18 technology, in order to give Boeing a better shot at the multibillion-dollar contract.

"The transfer ... would be something that we had never done before, and specifically because [the relationship] with Brazil is so prized, so significant for us," said Ellen O. Tauscher, undersecretary of state for arms control and international security, during the trip.

Top Pentagon weapons buyer Ashton B. Carter, also on the trip, said "this is just the first step" in a technology relationship with Brazil that "gets deeper and deeper with ... time."

Boeing's Gower said industrial offsets are a significant part of the Boeing package. For example, all of the final assembly work will be done in Brazil, if Brazilian officials choose to go with the Super Hornet.

India has made clear that technology transfers would be part of any deal to replace its aging fighter fleet.

Photo via Piotr Butowski

Above, the Su-35 is the newest and most advanced version in Russia's Su-27 family of fighters.

Saab photo

The Swedish-made Saab Gripen, shown here, is already in service not only in Sweden but Hungary, the Czech Republic, and South Africa.

New Delhi last year began long-flight evaluations for the purchase of 126 multirole fighters, with a firm option for at least 50 percent more. A contract could ultimately be worth up to $20 billion, according to Boeing's Gower.

"This is by far the largest campaign going on around the world right now—potentially one of the largest international buys of all time," he said. "And with six competitors, it is going to be a real shoot-out."

India plans to replace hundreds of MiG-21s with 126 aircraft that would fit somewhere in between its high-end Russian Su-30MKIs and its low-end indigenous Tejas Light Combat Aircraft fighters.

The Rafale, Gripen, Eurofighter Typhoon, F-16, Super Hornet, and MiG-35 are competing for the contract. India's changing requirements have created repeated delays, and a decision is not expected until later this year.

Elsewhere in Asia, South Korea and Japan, both preparing for their competitions, already fly variants of the F-15. Mark Bass, Boeing's F-15 program vice president, said in the future these nations will likely require some amount of radar cross section reduction, and that's why Boeing developed the Silent Eagle.

The F-15SE, under development with company funds, would be capable of internal weapons carriage and would have some radar absorbent coatings, Bass explained.

Japan is contemplating replacement of its 80 F-4 Phantoms. Industry watchers say a competition could be opened sometime this year. "We believe the No. 1 requirement [for Japan] will be air superiority," said Bass. "No. 2 will probably be cruise missile defense."

Australia, meanwhile, has ordered 24 two-seat Super Hornets, with deliveries to be completed by 2012—the only international Super Hornet sale to date. The purchase was a hedge against possible delays in the F-35 program, which it remains committed to.

"The Australians know that the worst time to buy a fighter is during the initial stages," Gower said in a veiled reference to the F-35, before implicitly acknowledging that Boeing will have trouble competing with the Lightning II in later years.

"The capability will improve, and the price will almost inevitably go down over time," he said.

Indeed, it seems only a matter of time until the F-35 becomes the big dog on the world fighter market. With the United States Air Force, Marine Corps, and Navy all in line to buy the Lockheed fighter, US purchases alone would make the Lightning II among the largest fighter acquisitions in history, in terms of cost.

How many F-35s will go to US services over the next 10 years? Figures are still in flux. However, a rough, back-of-the-envelope estimate holds that the US will buy 700—some 400 for the Air Force and 300 for the sea services.

There is likely to be a huge export market for the F-35, which is the first US stealth fighter built for export.

Australia, Britain, Canada, Denmark, Italy, the Netherlands, Norway, and Turkey are all participating in the development effort, and these international

Lockheed Martin photo

The F-35 Lightning II prototype, with its weapons bay doors open. The F-35 will soon be the only true fifth generation fighter in production.

Boeing illustration

An artist's conception of Boeing's F-15SE Silent Eagle, now in development. The fighter's radar cross section will be smaller than that of earlier F-15s.

partners are expected to purchase approximately 750 aircraft.

Singapore, while not a consortium member, maintains an interest in acquiring up to 100 F-35s, said Jon Schreiber, the Pentagon official in charge of the program's international efforts. Israel, which has not been involved in development, announced plans last year to purchase 25 airplanes in early production and perhaps 50 more if a deal can be worked out to insert indigenous electronic warfare technology into those aircraft.

"The Israelis have some unique requirements, ... and we have basically been able to accommodate those," Schreiber said in November. Should Israel accept the Pentagon's pricing offer sometime early this year, it would be in line to receive some of the first F-35 production models.

Schreiber said discussions with Japan have also moved forward "now that the F-22 is definitely not going to be exported anywhere outside the United States." Tokyo had long expressed interest in purchasing the F-22 Raptor, Lockheed Martin's faster and higher-performing fighter. Defense Secretary Robert M. Gates early last year decided to cancel additional F-22 production, instead putting all the department's money on the F-35.

"They're looking more seriously now at the only real fifth generation fighter available, which is the F-35," Schreiber said of the Japanese.

He added that Japan and South Korea are the next countries likely to become F-35 customers, and they "could come on board pretty quickly." Both nations are expected to open fighter contract competitions this year.

For some in the Pentagon, the F-35 is as much an alliance-building tool as it is an airplane. Lockheed Martin executives emphasized that vision.

"The F-35 is a state-of-the-art platform, but more importantly, it is a means to shared security," George Standridge, Lockheed's vice president for business development, said in an interview late last year.

Not a Typical Offset Program

The spreading of the F-35's industrial largesse helps, too. Schreiber, who has been the F-35 international director since 1996, hails his program's competitive industrial participation effort as an effective way of providing offsets. He headed the US negotiating team that helped craft an agreement whereby international companies bid for work on the program.

"Our basic principle going into those negotiations was that this is not a typical offset program," Schreiber said. He wanted to avoid the "false economies" he believes are inherent to traditional guaranteed offset programs.

"They're good for a short period of time, but it doesn't sustain the countries' industries over the long term, ... and it adds cost to the program," he said.

Early in the F-35 program, according to Schreiber, various international companies significantly overbid with high prices for F-35 component contracts because "they heard what we said about real competition, but they didn't believe us."

With the next round of requests for proposals, "they sharpened up their pencils and started becoming more competitive," Schreiber explained.

His assessment is that the program office did indeed manage to build a better mousetrap. He said each F-35 aircraft will be less expensive than it would have been had the program incorporated guaranteed offsets.

The F-35 program certainly still faces obstacles. The program is on the verge of "significant" cost increases, according to an independent assessment ordered by the Pentagon. The joint estimate team's latest financial projection for the program is "pessimistic" and "clearly raises concerns about the course the program is on," Defense Department spokesman Geoffrey S. Morrell said late last year.

"This is the biggest, most expensive, and arguably most complicated program this department has ever pursued," he said. "We have a great deal riding on the success of this program."

Still, the setbacks, while significant, don't spell inevitable doom for the program, said Richard L. Aboulafia, a fighter-market expert at the Teal Group. "The fact that the international partners have kept the faith is a sign of program health."

The next five to seven years, according to most experts, are Europe's and Boeing's window of opportunity to export fighters or to create new alliances to forestall F-35 market dominance. But in the end, many say that this is all but inevitable, and the fighter market will neck down to the F-35 and perhaps a few Sukhoi products.

US allies are still intensely interested in flying US fighters, with two caveats, according to Standridge: "They need to be multirole, and they need to be affordable." He predicted that the F-35 "will become the new F-16," in the world fighter marketplace.

Aboulafia agrees. Unless a new generation competitor to the F-35 emerges, the world fighter market will eventually fall to Lockheed and Sukhoi, he said, adding that everyone else is "merely on borrowed time." ■

Marina Malenic is the Pentagon correspondent for Defense Daily, *a Washington, D.C.-based defense newsletter. This is her first article for* Air Force *Magazine.*

With 200 combat missions as a PJ in Vietnam, Duane Hackney was the most decorated airman in the Air Force.

A Habit of Heroism

By John T. Correll

Air Force pararescue jumper Duane Hackney on duty in Southeast Asia, checking the jungle penetrator on his HH-3 helicopter.

Duane Hackney was not one to make much of his own accomplishments and adventures. Anything but. He claimed that he joined the Air Force "on a whim" to "get out of cutting the grass back home." He said he wound up in the pararescue specialty because that was the shortest line at the career counseling center when he was in basic training. Hackney married in 1982, but did not tell his wife—a post-Vietnam generation member of the Air Force—about his combat record. She discovered that her husband was a war hero when she read about him while studying for a promotion test.

Even for heroes, heroism is usually a one-time event, but Duane D. Hackney made a habit of it. He was the most decorated airman in the Air Force. Eight rows of ribbons stretched from the top of his pocket up to his collar. Many of them were for individual acts of valor, earned during 200 combat missions in Vietnam. They included the Air Force Cross, the Silver Star, the Distinguished Flying Cross with three oak leaf clusters, the Airman's Medal, and the Air Medal with 18 oak leaf clusters. In later years, Hackney favored long-sleeved uniform shirts, which covered some of the burn scars on his arms.

Hackney was born in Flint, Mich., in June 1947. He lettered in football, baseball, and swimming at Beecher High School and joined the Air Force in June 1965. Qualifying as a pararescue jumper, or PJ, took about a year. It included medical and scuba training, combat survival school, jump school at Ft. Benning, Ga., Army Ranger school, topped off by "goat lab" at Eglin AFB, Fla.

He was smaller than some in his PJ class, but Hackney was stronger than he looked. At Ft. Benning, a contingent of Navy SEALs lost money betting that their champion could outlast Hackney in one-handed push-ups. He was the honor graduate of his group and got his choice of assignments. He chose Vietnam. "The top graduates got lucky and could pick Vietnam," he said. "Others got stuck with Bermuda or England. We all knew where the action was."

He began his first combat tour Sept. 27, 1966, at Da Nang, the northernmost US air base in Vietnam, 85 miles south of the Demilitarized Zone. Da Nang was already known as "Rocket City" because of the frequent Viet Cong and North Vietnamese mortar and rocket attacks.

It was also home to the 37th Aerospace Rescue and Recovery Squadron

Hackney (l) and TSgt. Phil Resos, snapped with their mascot, the Jolly Green Giant.

whose mission was to go get pilots who had been shot down or other troops stranded behind enemy lines. The conspicuous stars of ARRS were the PJs, who went down on jungle penetrators, often under fire, to bring out the wounded. The squadron flew the HH-3E, most famous of the rescue helicopters and called the "Jolly Green Giant" because of its green and brown camouflage. The rescue helicopters flew in pairs. The "low bird" picked up the survivor. The "high bird" waited nearby, ready to help if needed, or to extract the low bird crew if they were shot down themselves.

Into the Fray

Hackney was an airman second class, as the two-stripe E-3 grade was then called. He flew his first rescue mission within a week of arriving in Vietnam. On Oct. 2, he was the PJ on Jolly Green 36, an HH-3E that recovered a fighter pilot on the ground eight miles southeast of Sam Neua in Laos.

It was a surge time for traffic on the Ho Chi Minh Trail, the infiltration route that ran down the western side of the Annam Mountains, through the Laotian panhandle into South Vietnam and Cambodia. Access to the trail from North Vietnam was through several mountain passes, the main one being the Mu Gia Pass, about 75 miles above the DMZ. It was there that Hackney flew his most famous mission on Feb. 6, 1967.

Early that morning, Capt. Lucius L. Heiskell, a forward air controller from Nakhon Phanom, Thailand, flying low and slow in a Cessna O-1 Bird Dog, was shot down just north of Mu Gia. He parachuted into a small valley several miles to the east, an area of rugged karst and thick jungle growth. Heiskell made contact on his survival radio with circling aircraft but signed off after a few minutes because he heard enemy search parties approaching.

Two Jolly Green rescue helicopters scrambled from Nakhon Phanom, just across the Laotian panhandle from Mu Gia, at 10:05 a.m., and reached the pass half an hour later. The high bird, Jolly Green 36, remained on orbit, while Maj. Patrick H. Wood threaded the low bird, Jolly Green 05, along the valley, avoiding 37 mm guns firing from the north ridge. Wood

Hackney (l) and a fellow PJ, Sgt. William Flower, in a photo from the early 1970s.

Hackney (above and lower right), when he was Military Airlift Command's 1967 Airman of the Year.

hovered above Heiskell's last known position and sent down his PJ. That was Hackney, who was on temporary duty at NKP. He climbed on the penetrator and descended through three levels of jungle growth. On the ground, he saw footprints but could not find Heiskell, so the helicopters returned to NKP to await further developments.

Heroism Runs in the Family

At 4:30 that afternoon, a fighter pilot at Mu Gia picked up a radio message from Heiskell. The two Jolly Greens launched again and got there an hour-and-a-half before dark. Two A-1H "Sandy" attack aircraft were at the scene and in radio contact with Heiskell. However, the mountaintops were hidden by overcast, so the Sandys could not fly into the valley to provide protection for the helicopter. The entire crew of Jolly Green 05 wanted to try the rescue anyway, and Wood decided to go in without escort. The helicopter crew raised Heiskell on the radio. He had some abrasions and minor injuries but was able to direct the Jolly Green to his location. Hackney went down for him and three minutes later, Wood reported that Heiskell was aboard.

Back at NKP, Heiskell's fellow FACs gathered around the radio at squadron operations, cheering as they followed the news. The jubilation did not last long. Jolly Green 05 pulled out under heavy ground fire and almost immediately radioed that "we've been hit, we've been hit!" A burst of 37 mm flak had torn into the helicopter amidship, causing severe damage and setting off a raging fire.

"I was bending over him [Heiskell] doing a medical evaluation when flak hit us," Hackney said. "There was smoke and flames everywhere. The survivor reached out for help. I kept my emergency parachute hanging on the forward bulkhead near the left scanner's window. I grabbed it and helped the survivor put it on. I left the survivor by the crew entrance door and headed aft to find another parachute. I found one hanging by the ramp and began to put it on. That's when the second burst of flak hit us. There was an explosion and I was thrown backwards—hard. I felt a sharp pain in my left arm. I tried to get my balance and was surprised to see my helicopter flying away from me. I had been blown out the aft ramp of the HH-3. I did not have the parachute completely on yet, and was only a couple of hundred feet above the treetops."

He pulled the ripcord and held tight to the parachute harness. The parachute was still opening when he hit the trees, but it slowed his fall and left him suspended several feet above the ground. He freed himself and climbed down. The helicopter, out of control, crashed into a karst outcropping at high speed. The high bird dropped down to pick up Hackney, but found no trace of Heiskell or the other members of the Jolly Green 05 crew.

Hackney was in shock and badly burned, and when the helicopter landed at NKP, he was exhausted and went "out like a light" on the hospital stretcher. He awoke when he heard a medical technician say he thought Hackney was dead. "That really scared me," he said.

He would later receive the Air Force Cross for his actions that day. "With complete disregard for his own safety, Airman Hackney fitted his parachute to the rescued man," the citation said. "In this moment of impending disaster, Airman Hackney chose to place his responsibility to the survivor above his own life."

"Heroism seems to have run in Duane's immediate family," said Robert L. LaPointe, a former PJ, author of *PJs in Vietnam,* and keeper of the USAF Pararescue Association historical archive. "His father won the Silver Star and Purple Heart in World War II. He had kicked a Japanese grenade out of a foxhole and jumped on three soldiers to protect them from the blast. Duane said, 'My father told me to keep my head down in Vietnam. While I was [there] in the hospital, I got a letter from dad. He wrote, I told you to keep your head down.'"

Hackney was back in action before the end of the month and took part in another extraordinary mission several weeks later. On March 13, two marine troop transport helicopters went down just south of the DMZ, and Hackney was a PJ on one of the HH-3Es sent to get the survivors. The crash site was on the slope of a mountain ridge in jungle so thick that the rescue hoist cable had to be fully extended 240 feet to reach the ground. As Hackney rode up from his last descent, "bullets began to pepper the aircraft like popcorn popping," the pilot's mission report said.

As Hackney worked on the wounded in the helicopter cabin, a bullet grazed his helmet and knocked him out. He regained consciousness shortly and resumed setting fractures and applying tourniquets. His own injuries would have been worse, but the emergency radio in his pocket had stopped a piece of shrapnel. Both he and the marine wounded were treated at the field hospital at Dong Ha.

An Oct. 11, 1967* Air Force Times *recognition of Hackney's rescue exploit, for which he had the month before been awarded the Air Force Cross.

A Star Turn

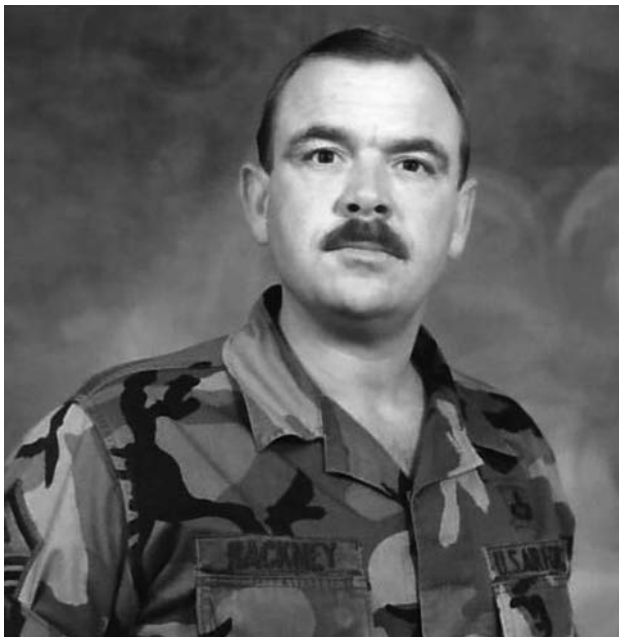
His Air Force Cross was presented in September and, at the same ceremony, he received the Silver Star for bravery during a rocket attack on Da Nang July 15. "Airman Hackney entered the most heavily damaged area while the attack was occurring and was personally responsible for saving the lives of six men," the citation said. Hackney "unhesitantly approached burning aircraft and exploding ordnance to rescue wounded personnel."

His combat tour ended in October 1967, and he was assigned to the 41st Aerospace Rescue and Recovery Squadron at Hamilton AFB, Calif. He made the rounds of network television programs interested in his story. He appeared on "The Tonight Show" with Johnny Carson, and on the Ed Sullivan, Art Linkletter, and Joey Bishop shows, and spent Christmas 1967 in Monaco as the guest of Prince Rainier and Princess Grace.

Detroit, in his home state of Michigan, put on "Hackney Day," at which he was guest of honor. He was Military Airlift Command Airman of the Year in 1967 and in 1968, he received the Cheney Award, named for an airman killed in Italy in World War I and given for "an act of valor, extreme fortitude, or self-sacrifice."

Hackney returned to Vietnam for a second combat tour in 1970. His name shows up regularly on reports of air rescue missions in North and South Vietnam and Laos. One of the more eventful of these was a foray into Laos April 9, 1971, to bring out four South Vietnamese soldiers who were encircled by the enemy. Three HH-53Cs—larger than the HH-3 and with more range—responded to the call. Hackney, by then a staff sergeant, was one of three PJs on Jolly Green 70.

Heavy ground fire stopped the first attempt to lower the jungle penetrator, and the lead PJ, A1C Ervin A. Petty, took out a .51-caliber gun site with the helicopter's left window minigun. The South Vietnamese were on the slope of a hill, and Hackney suggested a low hover and pulling them straight into the door rather than using the hoist. Petty straddled Hackney in the door, and Hackney pulled the soldiers high enough for Petty to get them the rest of the way inside.



Chief Hackney as he neared retirement.

The exchange of fire was withering. An A-1H Sandy was shot down. The three miniguns on Jolly 70 were spitting out 6,000 rounds a minute, and the helicopter had been hit in No. 1 engine and other critical areas. PJ A1C Donald J. Pecoraro saw Petty and Hackney go down. Hackney's helmet had been hit, but he appeared to have only a flesh wound, along with loss of balance and difficulty standing and walking. Petty's wound was worse. He was hit by a .51-caliber round that ripped away the back of his right bicep.

Petty's fellow PJs insisted that he be taken to the Army hospital at Da Nang. They had been there for medical proficiency training and believed the doctors less quick to amputate than at some facilities. Petty survived—and kept his arm. Meanwhile, the medics noticed a bullet hole in Hackney's helmet and feared trouble. Incredibly, though, the bullet had gone in at the front, looped across the top of his skull inside the helmet, and exited at the back.

"He did not want a Purple Heart," said James Scott, a PJ who roomed with Hackney for a while at Da Nang. "He did not want any recognition. He just wanted to pull his share and do his job."

In 1973, Hackney was a tech sergeant with a line number for promotion to master sergeant, but he decided to leave the Air Force. For the next four years, he was a deputy in the Genesee County Sheriff's Department in his hometown of Flint. In 1977, he returned to the Air Force, even though he had to take a cut in grade. "The main reason I came back to the Air Force was because I missed the traveling and camaraderie," he told *Airman Magazine*. "When I had an opportunity to get back in uniform as an E-4, I jumped at it."

A Sadly Short Retirement

He moved back through the ranks quickly, making staff sergeant and tech sergeant at his first eligibility. He went through rescue training again and became a PJ instructor. He also served with special operations forces in Turkey and Grenada.

While stationed in England in 1980, he took part in the rescue of two British civilians who had been mountain climbing in Wales. He sustained several injuries, including a broken hip and a fractured skull, during that operation. In 1981, he had a heart attack in England and that was the end of his days as a PJ.

Back from England, Hackney was assigned to the 23rd Air Force intelligence division at Scott AFB, Ill. It was there that he met Carole Matlack one day at the soda machine. She was a senior airman at the Military Airlift Command Rescue Communications and Control Center, and she had never heard of Duane Hackney. When he was first at Da Nang, she said, "I was five years old and did not really follow the news of Vietnam." They were married in 1982.

He did not talk about Vietnam, and it was from studying Air Force history for her promotion test that she learned of what her husband had done. Their son, Jason, was born in 1984.

Hackney did not like the intelligence work. He cross-trained into the security police field and, in 1985, moved to K. I. Sawyer AFB, Mich., a Strategic Air Command base, where he was first sergeant of the security police squadron. He found the responsibility of working with 450 airmen satisfying. Hackney was First Sergeant of the Year in 8th Air Force in 1987, and was a chief master sergeant when he retired in July 1991.

The Hackneys built a new home in Trout Run, Pa., and moved there in November 1992. He attended Lycoming College in nearby Williamsport, planning to become a nurse anesthetist.

Hackney had completed one full semester and was in his second semester when he had another heart attack and died in September 1993. He was 46. Visitors packed the funeral home in Flint for three straight days to pay their respects. The *Flint Journal* reported that the funeral procession was five miles long.

He is not forgotten. In 2006, the Air Force Basic Military Training Center at Lackland AFB, Tex., dedicated buildings to nine enlisted heroes. One of them was named for Duane Hackney. In 2009, he was inducted into the Michigan Aviation Hall of Fame.

"When I arrived in Vietnam in 1971, Duane and others had set high standards for us to follow," says LaPointe of the USAF Pararescue Association. "When one reads the facts concerning Duane's actions on the day he earned the Air Force Cross, many would call his survival miraculous. Some claimed it was instinctive, the result of intensive training. Regardless of how Duane survived, he became an Air Force legend. Being a legend after the Vietnam War was not an easy task. When asked about his Air Force Cross, Duane often stated, 'I was just doing my job. Any one else in my situation would have done the same.'"

"Duane lived life to the very limit," says Carole Hackney Bergstrom, who now lives in Williamsport. "It seemed to me that he lived every single day as if it might be his last. Every single day he did as much as he could jam into one day. ... He never did anything halfway. It was all or nothing. ... There is no doubt in my mind that this all or nothing attitude is what got Duane through Vietnam." ■

John T. Correll was editor in chief of Air Force *Magazine for 18 years and is now a contributing editor. His most recent article, "A Small War in Panama," appeared in the December 2009 issue.*

Chennault at the Bat

Photo courtesy of retired Maj. Gen. John R. Alison. Text by Andrea K. Dudney

Well, it was not all drudgery in unoccupied China during World War II. Even Claire Lee Chennault, commander of the legendary Flying Tigers, found time to play a little ball. In this undated photo, Chennault steps to the bat during a pickup baseball game as American and Chinese troops look on. Chennault was not only a world-class combat commander but also a fine athlete. He was a better-than-average baseball player and when scheduled to pitch, drew quite a crowd. Chennault went to China in 1937 to help the Nationalist Chinese fight the Japanese invasion. He retired after the war as a major general. ▪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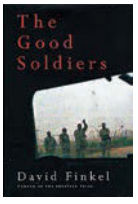
Books

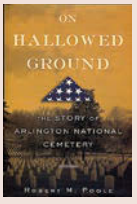
Compiled by Chequita Wood, Media Research Editor

Aircraft of the Luftwaffe, 1935-1945: An Illustrated Guide. Jean-Denis G. G. Lepage. McFarland & Co., Jefferson, NC (800-253-2187). 402 pages. $65.00.

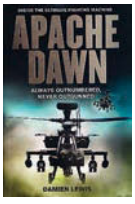
The Good Soldiers. David Finkel. Farrar, Straus, and Giroux, New York (888-330-8477). 287 pages. $26.00.

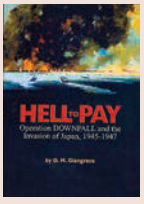


On Hallowed Ground: The Story of Arlington National Cemetery. Robert M. Poole. Walker & Co., New York (888-330-8477). 352 pages. $28.00.

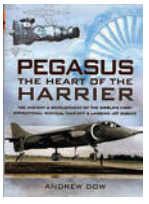


Apache Dawn: Always Outnumbered, Never Outgunned. Damien Lewis. St. Martin's Press, New York (888-330-8477). 288 pages. $25.99.

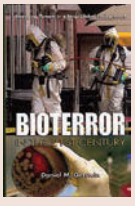




Hell to Pay: Operation Downfall and the Invasion of Japan, 1945-1947. D. M. Giangreco. Naval Institute Press, Annapolis, MD (800-233-8764). 362 pages. $36.95.

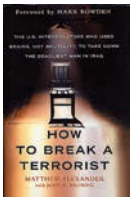


Pegasus: The Heart of the Harrier. Andrew Dow. Casemate Publishers, Havertown, PA (610-853-9131). 543 pages. $60.00.

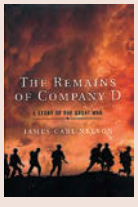


Bioterror in the 21st Century: Emerging Threats in a New Global Environment. Daniel M. Gerstein. Naval Institute Press, Annapolis, MD (800-233-8764). 256 pages. $49.95.

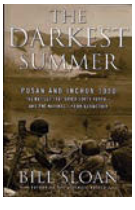
How to Break a Terrorist: The US Interrogators Who Used Brains, Not Brutality, to Take Down the Deadliest Man in Iraq. Matthew Alexander with John R. Bruning. Free Press, New York (800-223-2336). 288 pages. $26.00.

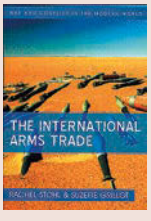


The Remains of Company D: A Story of the Great War. James Carl Nelson. St. Martin's Press, New York (888-330-8477). 363 pages. $25.99.



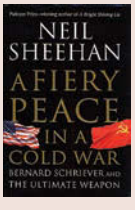
The Darkest Summer: Pusan and Inchon 1950: The Battles That Saved South Korea—And the Marines—From Extinction. Bill Sloan. Simon & Schuster, New York (800-223-2336). 385 pages. $27.00.





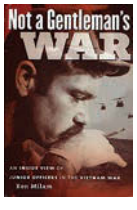
The International Arms Trade: War and Conflict in the Modern World. Rachel Stohl and Suzette Grillot. John Wiley & Sons, Hoboken, NJ (877-762-2974). 278 pages. $22.95.

Targeting the Third Reich: Air Intelligence and the Allied Bombing Campaigns. Robert S. Ehlers Jr. University Press of Kansas, Lawrence, KS (785-864-4155). 422 pages. $39.95.

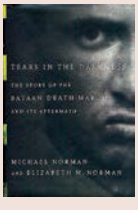


A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon. Neil Sheehan. Random House, New York (800-726-0600). 534 pages. $32.00.

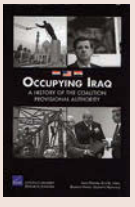
Not a Gentleman's War: An Inside View of Junior Officers in the Vietnam War. Ron Milam. University of North Carolina Press, Chapel Hill, NC (800-848-6224). 238 pages. $35.00.



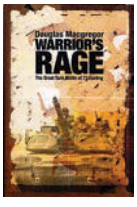
Tears in the Darkness: The Story of the Bataan Death March and Its Aftermath. Michael Norman and Elizabeth M. Norman. Farrar, Straus, and Giroux, New York (888-330-8477). 464 pages. $30.00.



Gil Cohen: Aviation Artist. Gil Cohen. Firefly Books, Buffalo, NY (800-387-5085). 144 pages. $49.95.



Occupying Iraq: A History of the Coalition Provisional Authority. James Dobbins, Seth G. Jones, Benjamin Runkle, and Siddharth Mohandas. RAND, Santa Monica, CA (800-462-6420). 364 pages. $40.00 (also available at http://www.rand.org/pubs/monographs/2009/RAND_MG847.pdf).



Warrior's Rage: The Great Tank Battle of 73 Easting. Douglas Macgregor. Naval Institute Press, Annapolis, MD (800-233-8764). 244 pages. $29.95.

AFA National Report

natrep@afa.org

By Frances McKenney, Assistant Managing Editor

Veterans Day in Texas

At the Frontiers of Flight Museum in Dallas, AFA was front and center during a Veterans Day ceremony that recognized World War II WASPs, Women Airforce Service Pilots.

US Sen. Kay Bailey Hutchison (R-Tex.) asked AFA Texas State President Kelly M. Jones, from the **Abilene Chapter,** to take the lead on the event. As the sponsor, AFA Texas chapters raised $5,000 and brought together some 20 WASPs from around Texas, as well as arranged for an Air Force ROTC color guard, choral music, and a luncheon for the guests of honor.

Jones was master of ceremonies for the event, where keynote speakers were Hutchison and **Alamo Chapter** member Col. Jacqueline D. Van Ovost, commander of the 12th Flying Training Wing at Randolph AFB, Tex.

Hutchison had sponsored a bill—signed into law in July—that awarded WASPs the Congressional Gold Medal. At this Dallas Veterans Day ceremony, she presented each WASP with gold-page replicas of Public Law 111-40. (The actual medal is still being made by the US Mint.)

During World War II, WASPs worked as test pilots, towed targets, flew weather reconnaissance missions, flew student navigators and bombardiers, and instructed pilots.

As for the Texas tie-in: Houston Municipal Airport and Avenger Field in Sweetwater, Tex., were the earliest sites for WASP training.

Photo courtesy the White House

AFA Board Chairman Joe Sutter and his wife, Geri (both in the back row, left), met President Obama (second from right) and Michelle Obama (fourth from right) at a White House breakfast on Veterans Day. At their table were representatives of other veterans organizations. They later attended a memorial service at Arlington National Cemetery, where Joe Sutter laid a wreath at the Tomb of the Unknowns.

Are You Ready for Some Football?

The Nov. 16 nationally televised Monday Night Football game began with Fred Kubli Jr. from Ohio's **Steel Valley Chapter** tossing the ceremonial coin into the air.

The Baltimore Ravens won the coin toss and went on to shut out the Cleveland Browns, 16 to zero. The game, held in Cleveland, was televised in prime time.

How did AFA get into the picture?

The 910th Airlift Wing, Youngstown ARS, Ohio, nominated Kubli—longtime Steel Valley Chapter president and now its VP—to represent the World War II veterans being honored at this game. The 910th personnel are a main focus of the chapter, which holds many events at the Air Reserve Station and recently recognized outstanding wing members with an annual awards banquet in May.

In its coverage of the coin toss, a feature article in the *Tribune Chronicle* newspaper of Warren, Ohio, highlighted AFA several times.

It noted that the wing nominated Kubli because of his World War II Army service with the 139th Semi-Mobile Evacuation Hospital "and for his more than 40 years of work with the Air Force Association."

To Its Former Glory—Again

Chapter VP Ransom Meriam calls it a "long-term **Gold Coast Chapter 351** project." Long-term in this case spans nearly 40 years.

On Veterans Day in Fort Lauderdale, Fla., the chapter led the formal rededication of an F-86H Sabre, with retired Maj. Gen. Frederick C. "Boots" Blesse, a Korean War double ace, as guest speaker. It was the second, if not third, time the fighter aircraft has been dedicated.

The saga began in 1970 when then-chapter leader Robert M. Rawls persuaded the city to acquire F-86H, #53-1255, from the Maryland Air National Guard.

By 1999, the aircraft had corroded from being displayed outdoors. With the city's blessing, chapter members organized a complex restoration effort that involved trucking the Sabre down the coast to Homestead Air Reserve Base.

Reservist volunteers, some from as far afield as Tinker AFB, Okla., and Hill AFB, Utah, worked for five years on the restoration. The chapter raised funds for materials and supplies.

In 2004, the chapter dedicated the restored F-86 at Fort Lauderdale's Holiday Park.

Staff photo by Eric Chang Lee

AFA Board Chairman Joe Sutter (standing) conducts the Region and State Presidents Meeting in October. In the foreground (left), Jim Lauducci, AFA's Vice Chairman of the Board for Field Operations, takes notes.

AFA's Field Leaders Attend Annual Orientation

The Air Force Association's 14 Region Presidents and 29 of its State Presidents attended the annual Region and State Presidents Meeting in Arlington, Va., in October. Many field leaders were new to the position; some, as AFA Board Chairman Joseph E. Sutter noted in his opening remarks, were there "on a second tour." All were on hand for an orientation to AFA operations.

During two days of information sessions and workshops, the field leaders took in "AFA 101," a detailed briefing on region, state, and chapter requirements; learned about the aerospace education component of AFA's mission; were briefed on the USAF Year of the Air Force Family program; and listened to department directors and representatives from AFA's national headquarters describe the functions of their sections. AFA President-Chief Executive Officer Michael M. Dunn spoke about the association's strategic focus and direction. AFA Vice Chairman of the Board for Field Operations James R. Lauducci conducted a field operations session.

Pointing out the importance of this Region and State Presidents Meeting, Lauducci said, "If we just want to listen to briefings, we can do that by teleconference." He said meeting face-to-face gives field leaders a chance to learn informally from each other.

During one session, for example, Mark J. Dierlam, the South Central Region President, mentioned the importance of building a long-term relationship with Congressional staffers. Arizona State President Harry Bailey said he studied AFA's Top 10 Issues and boiled them down to one, for a quick soundbite. Louisiana State President Paul LaFlame told attendees that always being ready to list AFA's benefits has helped him recruit new members.

Several of the presentations from the Region and State Presidents Meeting are available online at: http://www.afa.org/members/field.asp.

The next year, Hurricane Wilma knocked it to the ground.

The chapter prevailed on the city for repairs, and in September—restored yet again—the F-86 was raised back on to its 12-foot-high pedestal.

In Fort Lauderdale, the Veterans Day commemoration began with a chapter-hosted breakfast and culminated with the rededication.

The restoration and rededication were organized by chapter officers Harvey D. Bennett, Fran C. Shaw, Milton Markowitz, Joseph H. Roberts, Loretta Young, Meriam, and chapter member Ron Edmunds.

Meriam reported that this time, three massive footers around the pedestal, with fittings for guy wires, will tether the aircraft in future storms.

Veterans Day in Iowa

In Iowa, the **Fort Dodge Chapter** carried out its annual observance ceremony for Veterans Day, with an Air Force Outstanding Airman of the Year as guest speaker.

AFA National Director Justin M. Faiferlick explained that as soon as the Outstanding Airmen for 2009 were announced, he sought out the one located closest to Iowa: ANG MSgt. Tyrone F. Bingham, a host aviation resource management superintendent with the 170th Operational Support Squadron at Offutt AFB, Neb., and an **Ak-Sar-Ben Chapter (Neb.)** member.

Bingham agreed to speak at the November ceremony, so Faiferlick and his wife, Iowa State President Deann Faiferlick, kept in touch with him over the summer and met him in person at AFA's Air & Space Conference and National Convention in September.

In the meantime, a chapter committee made up of both Faiferlicks, Chapter President Luke T. Ascherl, and VP Jason Kolacia arranged for the 133rd Test Squadron (ANG) to provide a color guard and to conduct a POW-MIA memorial ceremony for the Veterans Day remembrance. They called on Veterans of Foreign Wars and Marine Corps League representatives for a rifle detail and to carry out a flag ceremony. They contacted local media and printed color programs to be handed out at the event.

Ascherl was master of ceremonies for the Nov. 11 service. It took place at St. Edmond High School, whose students handed out programs, ran the sound system, and performed music.

Bingham spoke to an audience of 125 guests about the World War II "greatest generation" veterans and today's young vets of the war on terror.

Justin Faiferlick wrote afterward that Bingham told him the Veterans Day ceremony was "definitely a highlight of the year" for the Guardsman from Nebraska.

C2ISR Summit VII

Retired Gen. John P. Jumper returned to the podium for the eighth annual C2ISR Symposium and Technology Exposition, co-sponsored by the **Paul Revere Chapter (Mass.)** and Electronic Systems Center of Hanscom AFB, Mass.

As Air Force Chief of Staff from 2001 to 2005, Jumper had been a keynote speaker for the inaugural

USAF photo by SrA. Katie Hickerson

Sen. Kay Bailey Hutchison, R-Tex., addresses Women Air Service Pilots and their families at a ceremony in Dallas honoring the World War II pilots. On the podium with her are (l-r) Col. Jacqueline Van Ovost, 12th Flying Training Wing commander, and Kelly Jones, the Texas state president.

C2ISR summit in 2002. In his opening address this September, he said that lean defense budgets mean that "the next generation of advancements and transformation in combat power will be more about how we integrate the stuff we've already got."

Air Force Secretary Michael B. Donley, Chief of Staff Gen. Norton A. Schwartz, and commander of Air Force Space Command Gen. C. Robert Kehler were among other guest speakers at the summit, held at a resort in Ledyard, Conn. Other presenters included C2ISR operators, budget and acquisition experts, and industry leaders.

The Revere Chapter—at the time led by Angela M. Dupont—hosted several events held in conjunction with three days of symposium activities: a golf tournament on the resort's championship course, an opening reception, and an Aerospace Education Scholarship Dinner.

"Around Smart, Young Cadets"

AFA's North Central Region, headed by James W. Simons, held its annual conference in October in Minneapolis and St. Paul, Minn., home of the **Gen. E.W. Rawlings Chapter.** The meeting was timed to coincide with an AFROTC conclave sponsored by the Arnold Air Society—an AFA affiliate—and Silver Wings, the AAS partner organization.

As guest speaker for the AFA meeting, AFA Vice Chairman of the Board for Aerospace Education S. Sanford Schlitt updated the region's field leaders on association activities.

Other presentations covered AFA support for the Total Force, AFROTC, AFJROTC, the Civil Air Patrol, and Visions of Exploration. Visions is a joint AFA-*USA Today* newspaper program that encourages students' interest in studying science, technology, engineering, and math.

Schlitt later addressed AAS and Silver Wings members, informing them about AFA's history and mission and promoting membership in the association.

A joint AFA-cadet banquet on the last evening featured Maj. Dave Skalicky as guest speaker. The Minneapolis native is the Air Force's F-22 Aerial Demonstration Team commander, based at Langley AFB, Va.

Minnesota State President Glenn M. Shull commented that the cadets

"stole the show" during the three-day conference. After all, he asked, "Who doesn't want to be around smart, young cadets?"

More Chapter News

■ In Texas, the **Alamo Chapter,** headed by Gary L. Copsey, hosted 400 guests at its 39th annual Combat Breakfast Nov. 3 at the Kendrick Enlisted Club, Randolph AFB, Tex. As is tradition for this event, which emphasizes the Air Force role in combat, the Airman Battle Uniform, Battle Dress Uniform, or a flight suit was the uniform of the day. Brig. Gen. Leonard A. Patrick, commander of the 502nd Air Base Wing at Ft. Sam Houston, Tex., was guest speaker. The Combat Breakfast is part of San Antonio's Celebrate America's Military Week.

■ The **Lexington Chapter (Ky.)** celebrated the Air Force's anniversary in September, with more than 80 guests at a dinner at the Aviation Museum of Kentucky. James R. Jenkins and Vaiden Cox, state AFA officials, presented $1,500 to the museum. Keynote speaker, Lt. Col. Kevin J. Raybine from the University of Louisville's AFROTC unit, is a former B-2 pilot and spoke about the stealth bomber's capabilities. Also that evening, the chapter presented a memorial plaque to Russell McElroy and Mary McElroy Perry. Their father, Kentucky native Maj. John L. McElroy, was a C-130 navigator in the Vietnam War. His aircraft was shot down near Da Nang in 1968. His remains were identified and buried in Arlington National Cemetery a year ago.

■ On Oct. 26, the **Lt. Col. B. D. "Buzz" Wagner Chapter** in Johnstown, Pa., held a birthday anniversary dinner for its namesake. Wagner was born in nearby Emeigh in 1916 and became the first AAF ace of World War II on Dec. 16, 1941 in the Philippines. After eight aerial victories, Wagner returned to the states, but died in 1942 in a P-40 Warhawk crash near Eglin AFB, Fla. His remains were then buried near Johnstown, but in 2008 and 2009, James E. Moschgat, researching a book on Wagner, found more remains and several personal items at the crash site. At the October chapter dinner, Boyd Wagner Gilbert, Wagner's nephew, updated chapter members on DNA testing now being conducted on the newly discovered remains.

■ The **Langley Chapter (Va.)** sponsored a bus trip that enabled more than 50 AFJROTC cadets from Hampton High School to attend AFA's Air & Space Conference and Technology Exposition in September. Retired Maj. Paul A. Willard II, the cadets' senior

aerospace science instructor—and also a chapter member—requested help from the chapter for this field trip, and chapter members Keith Ebert and Randy Hobbs made the arrangements. Willard reported that one cadet, dazzled by the expo, said, "This is a tech geek's paradise."

■ AFA Nebraska Vice President for Education Diane R. Bartels, from the **Lincoln Chapter,** and **Ak-Sar-Ben Chapter** President John D. Daly presented the 2009 Nebraska State Teacher of the Year award to Pamela Galus at a schoolwide assembly. Galus is a science teacher at Omaha's Lothrop Magnet Center. The school specializes in science, technology, and Spanish, with some 400 students in grades pre-K to fourth grade.

■ With help from the Civil Air Patrol's Siouxland Composite Squadron, the **Richard D. Kisling Chapter** in Iowa participated in the annual Pioneer Valley Days parade in August in Sergeant Bluff, Iowa. The parade celebrates the town's history. Chapter President Kenneth E. Watkins led the chapter contribution, with help from Chapter Treasurer Sandra Watkins, chapter member Ronald E. Lenz, and other volunteers. A CAP color guard marched behind a truck decorated with an Air Force Association banner, while other cadets handed out candy to parade viewers along the two-mile route. Lenz said it was the latest effort by the chapter to include the CAP while raising AFA's profile in the community.

■ When an Honor Flight operation from Ocala, Fla., needed help, the **Donald W. Steele Sr. Memorial Chapter** in Virginia stepped in. Honor Flights take World War II veterans to Washington, D.C., so they can see the new memorial commemorating their wartime service. Honor Flight from Ocala learned just days before an October trip that those who were to meet the vets' airplane to help the wheelchair-bound had to cancel out. **Red Tail Memorial Chapter (Fla.)** President Michael Emig immediately contacted Air Force Association chapters in the D.C. area. Steele Chapter External Affairs VP Kevin Lewis and members Robert Keighery and Col. Robert Colella were among those who responded. So did University of Maryland AFROTC cadets and some 40 other volunteers. Emig said US Rep. Clifford Stearns (R-Fla.) and former US Republican Senator Elizabeth Dole even went to the memorial to greet the veterans. AFA, Emig said, saved this Honor Flight.

■ AFA Chairman of the Board Joe Sutter attended the 313th Recruiting Squadron's annual awards banquet in Tannersville, Pa. AFA member Lt. Col. Thomas Rudy heads the unit, based in North Syracuse, N.Y. Sutter spoke about Air Force role models and said his current heroes are the service's 12 Outstanding Airmen of the Year. "Where do we find them?" he asked the recruiters. "You're the people who find them," he said, and he challenged them to keep it up. ■

AFA's National Committees for 2009-10

Executive Committee. Joseph E. Sutter (Chairman), Peter J. Hennessey, James R. Lauducci, Steven R. Lundgren, S. Sanford Schlitt, Joan Sell, Michael M. Dunn (ex officio).

Finance Committee. Steven R. Lundgren (Chairman), James F. Diehl, Stephen J. Dillenburg, John J. Murphy, Nora Ruebrook, Thad A. Wolfe, Joseph E. Sutter (ex officio).

Membership Committee. Justin M. Faiferlick (Chairman), Karen Halstead Babcock, Timmothy M. Dickens, David Dietsch, Dennis Drayer, Angela M. Dupont, William R. Looney III, Ronald W. Mielke, Gayle White, James R. Lauducci (ex officio).

Strategic Planning Committee. Scott P. Van Cleef (Chairman), John T. Brock, Tom Cavalli, Stephanie A. Dye, John W. Hasson, Grant Hicinbothem, Pete Robinson, James Hannam (advisor), Joseph E. Sutter (ex officio).

Audit Committee. Leonard R. Vernamonti (Chairman), Wayne R. Kauffman, Michael H. McLendon, Kent Owsley, Charles G. Thomas, Lance S. Young, Joseph E. Sutter (ex officio).

Force Capabilities Committee. Richard E. Hawley (Chairman), Bruce Carlson, John D. W. Corley, Monroe W. Hatch Jr., Paul V. Hester, John P. Jumper, Ronald E. Keys, William R. Looney III, Lance W. Lord, Gregory S. Martin, Thomas G. McInerney, Thomas S. Moorman Jr., T. Michael Moseley, Gerald R. Murray, Lloyd W. Newton, Michael E. Ryan, John A. Shaud, Lawrence A. Skantze, Charles F. Wald, Joseph E. Sutter (ex officio).

Senior Leadership Advisory Group. John R. Alison, L. Boyd Anderson, David L. Blankenship, John G. Brosky, Stephen P. "Pat" Condon, O. R. "Ollie" Crawford, George M. Douglas, Michael J. Dugan, Richard B. Goetze Jr., Martin H. Harris, Gerald V. Hasler, Monroe W. Hatch Jr., James M. Keck, Victor R. Kregel, Robert E. Largent, William V. McBride, James M. McCoy, Thomas J. McKee, John J. Politi, Jack C. Price, John A. Shaud, R. E. "Gene" Smith, William W. Spruance.

Aerospace Education Council. S. Sanford Schlitt (Chairman), William D. Croom Jr., Emil M. Friedauer, Edward W. Garland, James Hannam, Rodney J. McKinley, George K. Muellner, Michael J. Peters, John A. Shaud, Marvin L. Tooman, Charles P. Zimkas Jr.

Field Council. James R. Lauducci (Chairman), Ron Adams, John T. Brock, Terry Cox, Justin M. Faiferlick, Donald R. Michels, I. Fred Rosenfelder, James W. Simons, William A. Williams.

Development Committee. Larry Lawson (Chairman), David R. Cummock, Angela M. Dupont, George M. Douglas, Clarence N. "Buster" Horlen, Mary Ann Seibel-Porto, Lester L. Lyles, David L. Vesely, Jerry White, Joseph E. Sutter.

Nominating Committee. Robert E. Largent (Chairman), Michael J. Bolton, Stephen P. "Pat" Condon, William D. Croom Jr., Julie Curlin, John W. Hasson, Grant Hicinbothem, Thomas J. Kemp, Ronald E. Keys, Donald R. Michels, Michael J. Peters, John J. Politi, Victor Seavers, Richard C. Taubinger.

Reunions

reunions@afa.org

37th SPS/12th SPS, Phu Cat AB, South Vietnam. April 29-May 1 in San Antonio. **Contacts:** Pete Piazza (405-921-8900) (wpiazza@aol.com) or Marvin Hiller (414-336-9105) (mhiller775@charter.net).

91st Strategic Recon/Bomb/Missile/Space Wg, including all units and McGuire, Yokota, Barksdale, and Lockbourne personnel. May 12-17 at the El Tropicano Riverwalk Hotel in San Antonio. **Contact:** Jim Bard, 3424 Nottingham Rd., Westminster, MD 21157 (410-549-1094) (jimbardjr@comcast.net).

622nd ARS (1955-64). April 26-30 in Fort Walton Beach, FL. **Contact:** Bob Cleckler (334-365-2108) (cleck1933@yahoo.com).

Air Force Public Affairs Alumni Assn., including current and former public affairs personnel, all fields. April 22-24 at the Caribe Royale Hotel in Orlando, FL. **Contact:** John Terino (703-239-2704) (termino@afpaaa.org).

Albrook air police, Albrook AFB, Panama Canal Zone (1951-55). April 27-29 in Gettysburg, PA. **Contact:** Bob Carlson, 29 Rainbow Pond Dr., Apt. A-1, Walpole, MA 02081-3460 (508-668-1655) (bandjc2@verizon.net).

B-58 Hustler Assn. May 17-21 at the Gold Coast Hotel in Las Vegas. **Contact:** Bill Shunney (702-896-3400) (bshunney@cox.net).

Bunker Hill/Grissom AFB firefighters (1960s). 2010 at Grissom ARB, IN. **Contact:** Bob Breckel (rfbreckel@comcast.net).

Doolittle Tokyo Raiders. April 16-18 at the National Museum of the US Air Force in Dayton, OH. **Contact:** National Museum of the US Air Force (937-904-9881).

Pilot Tng Class 65-F, Webb AFB. March 2-4 in Cocoa Beach, FL. **Contact:** John McNamara (904-373-0583) (msvickie56@yahoo.com).

Ramey Air Force Base Historical Assn. April 13-17 at Robins AFB, GA. **Contact:** Ted Raymond (623-271-9619) (elmirageted@cox.net).

Red River Valley Assn.-NAM POW. April in Orlando, FL. **Contact:** Bruce Slasienski, 7240 Coventry Ct., #317, Naples, FL 34104 (239-352-3242) (slas51@hotmail.com).

Undergraduate Navigator Class 63-1, James Connally AFB. April 29-May 2 at the Embassy Suites Hotel in Destin, FL. **Contacts:** Jack Brennan (850-897-1163) or Ken McNair (425-226-5501).

Seeking **620th TCS** and supporting units' personnel, Monkey Mountain, Vietnam (1970-73) for a reunion. **Contact:** Craig Lovell (281-992-4914) (clovell@aol.com). ▪

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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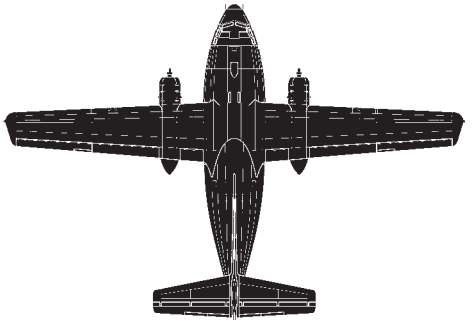
Airpower Classics

Artwork by Zaur Eylanbekov

C-123 Provider



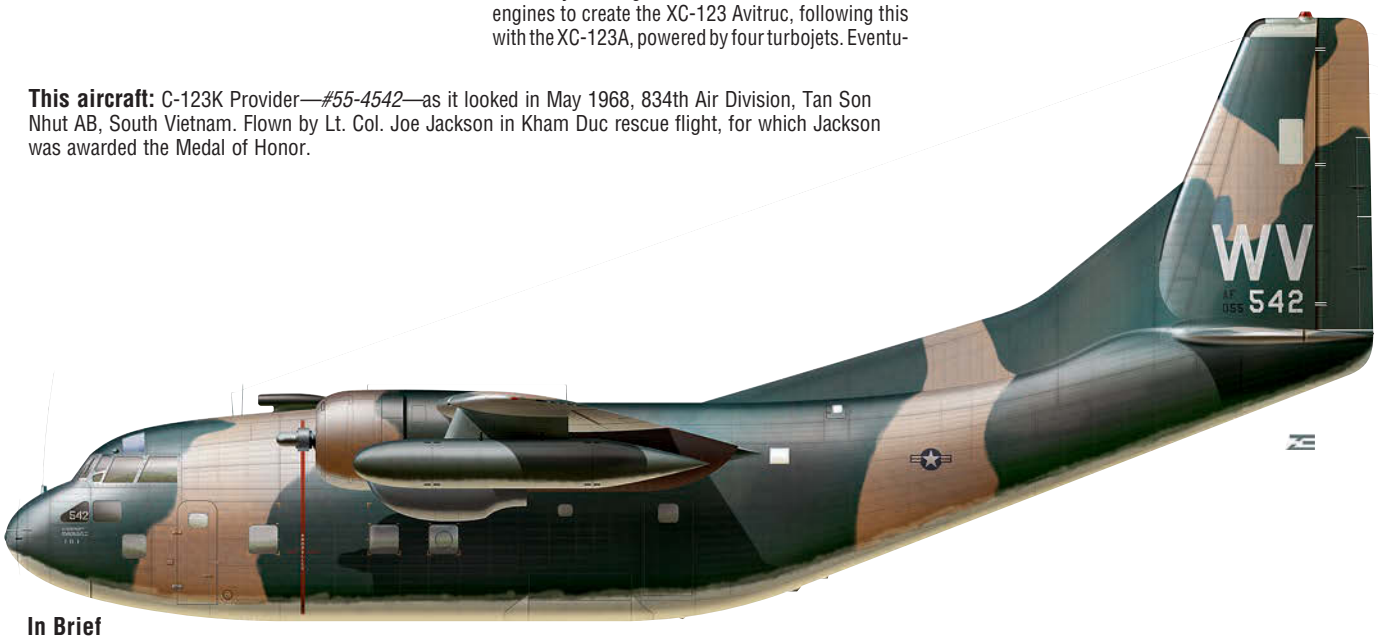
The rugged C-123 Provider, one of USAF's most-used tactical transports, was a workhorse of the long US war in Southeast Asia. The Fairchild airlifter many times proved its worth in Vietnam, where it carried troops and supplies into combat zones as hot as the encircled US Marine base at Khe Sanh in 1968 and provided the capability for Operation Ranch Hand, the US program of defoliant-spraying to eliminate jungle cover and thus unmask enemy troop movements.

Strangely enough, the C-123 began life as a glider, although designers drew it up with every expectation that, eventually, it would be powered. Russian expatriate engineer Michael Stroukoff, who had built a series of wooden gliders, shifted to metal in 1946, ultimately building the XG-20A. He added two radial engines to create the XC-123 Avitruc, following this with the XC-123A, powered by four turbojets. Eventually, Fairchild wound up with a contract to build 300 production aircraft. A small number were delivered to Saudi Arabia, Taiwan, Venezuela, the Philippines, and, of course, South Vietnam.

These C-123s went on to fight harder, longer, and better than anyone could have imagined in the early 1950s. C-123s contributed a great deal of in-country airlift in Vietnam and Cambodia. They carried out combat airdrops of troops, supplies, and ammunition, search and rescue teams, and special forces. Even now, one can find old C-123s hauling freight in South America.

—Walter J. Boyne

This aircraft: C-123K Provider—*#55-4542*—as it looked in May 1968, 834th Air Division, Tan Son Nhut AB, South Vietnam. Flown by Lt. Col. Joe Jackson in Kham Duc rescue flight, for which Jackson was awarded the Medal of Honor.



In Brief

Designed by Stroukoff, built by Fairchild ★ first flight Sept. 1, 1954 ★ number built 304 ★ crew of four (two pilots, flight engineer, navigator) ★ no armament ★ capacity 61 troops or 50 stretchers, six seated patients, six medics. **Specific to C-123B:** two Pratt & Whitney R-2800 engines ★ max speed 245 mph ★ cruise speed 205 mph ★ max range 1,450 mi ★ weight (loaded) 60,000 lb ★ span 110 ft ★ length 75 ft 9 in ★ height 34 ft 9 in.

Famous Fliers

Medal of Honor: Joe Jackson. **Air Force Cross:** Jesse Campbell, Richard Nagel Jr. **Other notables:** Rollen "Buck" Anthis, Claudius Watts III, Vernon Kondra, Anthony Burshnick, Bruce Fister.

Interesting Facts

Nicknamed "Bookie Bird" ★ operated from land, water, ice, snow, sand ★ flown by Air America, CIA proprietary airline ★ used for night bombing of Ho Chi Minh Trail ★ sometimes capsized when taxiing in strong crosswinds ★ used as personal transport by Gen. William Westmoreland, MACV commander ★ featured in films "Air America" (1990), "Operation Dumbo Drop" (1995), and "Con Air" (1997) ★ displayed motto, "Only we can prevent forests" (defoliation aircraft).

A Provider on the ramp in Southeast Asia.

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