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AIR FORCE MAGAZINE

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Our mission is to promote a dominant United States Air Force and a strong national defense and to honor airmen and our Air Force heritage. To accomplish this, we:

Educate the public on the critical need for unmatched aerospace power and a technically superior workforce to ensure US national security.

Advocate for aerospace power and STEM education.

Support the Total Air Force family and promote aerospace education.

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About the cover: 1st Lt. Stacey Wadley, an E-3 Sentry navigator, prepares to marshal an AWACS piloted by her husband, Capt. Victor Wadley. See "ISR After Afghanistan," p. 22. USAF photo by MSgt. Scott MacKay.

FEATURES

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Editorial

By Adam J. Hebert, Editor in Chief

Who Will Stand For Defense?

DEFENSE has faded from the nation's political consciousness. Despite a shooting war in Afghanistan, myriad evolving threats to US interests worldwide, and critical strategic and financial questions for the Pentagon, defense was essentially a nonissue in last fall's elections.

Neither Barack Obama nor Mitt Romney devoted significant attention to defense in the Presidential campaign. It was also marginal in the vast majority of last year's House and Senate races.

This is partly to be expected. More than 11 years after the 9/11 terror attacks, the public is tired of hearing about war. In a general sense, America has moved on, and politicians are giving the public what it wants.

The nation's financial problems are now generating more attention. Recent months have been dominated by debates over tax rates, entitlement spending, and the threat of sequestration.

Yes, the nation must get its runaway debt under control, because the United States risks losing its economic strength, military power, and global influence if the deficit continues to balloon. But defense has fallen so far off the political scope that spending decisions made this year could cause long-term damage.

The military and its equipment are worn down by more than a decade of war. Not only does DOD need to execute a safe and effective drawdown in Afghanistan, it must reconstitute its worn-out equipment and reposture itself to address the types of threats most likely to threaten US interests in the future. None of this can be done carelessly or on the cheap.

Unfortunately, many of the Pentagon's most prominent supporters in the legislative branch are leaving office. Love them or hate them, the list of defense experts who will not be part of the next Congress is impressive in both its quantity and quality.

In the Senate, the Armed Services committee loses three veteran defense experts, each retiring this month: Joe Lieberman (I-Conn.), Daniel Akaka (D-Hawaii), and Jim Webb (D-Va.). Term limits also mean Ranking Member John McCain (R-Ariz.) will surrender his leadership post. The Senate defense appropriations subcommittee will say goodbye to Kay Bailey Hutchison (R-Tex.), who is retiring. The Senate Foreign Relations committee loses Ranking Member Dick Lugar (R-Ind.), who lost his re-election bid in the primary.

On the House side, the appropriations defense subcommittee will part with four members, including Jerry Lewis (R-Calif.) and Ranking Member Norm Dicks (D-Wash.). The House Armed Services Committee is losing 10 members from its roster. This turnover includes prominent defense supporters such as Roscoe Bartlett (R-Md.).

Very few lawmakers won re-election on the strength of their support for the military.

No lawmaker is irreplaceable, of course, but very few won re-election on the strength of their support for defense. Lawmakers now need to do what is best for the nation. As DOD shifts resources away from what was needed to fight grinding ground wars with largely uncontested control of space and the skies, the Air Force needs support.

"As chairman of this committee I have a responsibility that is national," noted HASC Chairman Howard P. "Buck" McKeon in a meeting with defense reporters last summer. "I'm still doing the work for people in my district, and we're still passing legislation, working on legislation that helps my district, but this is my focus."

McKeon managed to win re-election despite the extraordinary admission that he had become, in essence, a Washington insider.

McKeon, SASC Chairman Carl Levin (D-Mich.), and other legislative leaders must inspire other lawmakers to take this sort of national view and not narrowly fixate on the jobs the military and defense industry can bring.

Part of the challenge will be to properly manage an inevitable decline in military spending. The US needs less ground-centric spending going forward.

"The way President Obama has put it was, 'Give me fewer Iraqi Freedoms and more Desert Storms," said Adm. James Winnefeld Jr., vice chairman of the Joint Chiefs of Staff, Nov. 27. "Go in ... and get the job done. Don't end up there for 10 years trying to do nation building," he continued. "We're just not going to be allowed to do that. We can't afford it."

Tough decisions need to be made. "Every trade group, special interest, and corporate lobbyist is up on Capitol Hill clamoring that Congress solve the problem, avoid the fiscal cliff, and not default to sequestration—but don't touch my budgets," said David Langstaff, CEO of the defense contractor TASC, in a December speech. "We can't have it both ways," he said.

The nation's strategic rebalance toward the Pacific region and broader Middle East reflects where future interests and challenges lie. These regions require different military capabilities from those mastered in combat this past decade. Some military accounts will have to be cut to pay for what is necessary for the future. Priorities are key.

The aircraft, space systems, and cyber warfare capabilities needed to prevail in anti-access environments and across vast distances call for serious investment in this tough budget environment. Nations such as China, North Korea, Syria, and Iran are very different from Iraq or Afghanistan. They have hardened defenses and substantial anti-aircraft systems. Chinese and Iranian defenses may get even more formidable over time.

Hopefully the US will never have to fight any of those nations, but if it does, airpower can help keep the US out of the deadly force-on-force battles that have characterized Afghanistan since 2002 and Iraq since 2004.

Given the current lack of interest in defense outside of military circles, the new blood on the key Hill committees must step up, for the good of the nation. New members must become effective advocates for defense and find ways to make national security issues resonate with the public. These problems aren't going away.

When money is tight, the Pentagon budget is often looked at as a "discretionary" account, ripe for raiding. Who will advocate for national security on Capitol Hill? Who will stand for defense? ■

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Letters

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Sexual Misconduct

The Air Force suffered serious repercussions in the media and Congress from the sex abuse scandal at JBSA-Lackland *["Sexual Misconduct at BMT," November, p. 48].* Three basic military training instructors received prison sentences while 12 others remain under investigation. The story captured headlines and air time throughout the US, including all three network newscasts. An outraged Texas senator delayed the confirmation of Gen. Mark Welsh as Air Force Chief of Staff.

The news coverage affected me personally because I went through Officer Training School at Lackland in 1964. But nothing like this happened during my period of service (1964-1968) because the Air Force maintained gender segregation during all military training. Women MTIs led female flights, while men conducted training for male recruits. Integrating both sexes in training is a failed social experiment that led to a disaster. When you have male MTIs with total authority in charge of young female recruits who are powerless, it's an invitation for abuse.

The Air Force has taken corrective measures, including placing a female colonel in charge of basic military training at Lackland. But that's not good enough. Women MTIs must train all female recruits. Gender integration can wait until training is completed. Some women activists may complain about this, but they'll scream much louder if sex abuse happens again.

However, I commend the Air Force for fully reporting these incidents and giving news media virtually unrestricted access to cover the trials at Lackland. During my tenure as a public affairs officer, if I had suggested allowing the media to cover court-martials, I probably would have been discharged for psychiatric reasons or charged with insubordination.

Richard Reif
Flushing, N.Y.

As a former Lackland BMTS training officer and squadron commander I have watched the totally predictable incidents of sexual misconduct that have occurred since male and female trainees were assigned to the same units.

The problem is not difficult to understand if you know anything about human sexual response. Females are attracted to high-status males, which are males in leadership positions that are respected, admired, and have prestige in the group. Males are attracted by physical appearance such as females that are young, pretty, and sexy.

From the female trainees' viewpoint the male TIs are strong, mature, commanding, manly, high-status males. From the male TI standpoint, most females reach the pinnacle of their attractiveness between the ages of 18 and 21, and that is exactly the age range of most female trainees.

Now add the fact there are studies that indicate that sexual attraction is increased in high-anxiety environments. Plus basic training is specifically designed to tear down the trainees' old patterns of behavior and substitute a new pattern of behavior, so many of the old "values" are being challenged.

The statement announcing Colonel Palmer being relieved as head of basic training operations stated, "Palmer did not create the environment that resulted in the misconduct."

No, the environment was created by senior Air Force leadership who appear to lack a fundamental understanding of deep-seated human behavior.

Ted C. Hill
Wooster, Ohio

Classics, Hurrah! Classics, Boo!

I notice that, in the "Interesting Facts" about the F-5, you sidestepped the fact that the aircraft is basically a T-38 pooped up for combat *["Airpower Classics: F-5," December, p. 72].*

Another point of interest, probably too long for the page, is that the aircraft had a foreign object problem. Its profile was quite low to the ground and the intakes were low on the fuselage. When power was applied, vortices formed beneath the intakes and anything on the ground at that point was sucked in. I imagine the T-38 had the same problem, although the F-5E did have larger engines. In Southeast Asia screens were installed over the intakes before engine start. When the aircraft was positioned for takeoff, some guys in a pickup jumped out and removed the screens, and when the aircraft landed they jumped out and put them back.

I really enjoy the "Airpower Classics" series. I have them all in binders. I'll keep collecting them as long as you keep printing them. Thanks!

Joe Hodder
Westfeld, Mass.

Could you have entered any more demeaning terms and information about the Galaxy *["Airpower Classics: C-5," September, p. 140]?* Under "Interesting Facts," it was said that one of the C-5 nicknames was "Linda Lovelace"! How crude! How insulting! I was a pilot on the Galaxy from 1980 through 1996 and never heard that term used.

Other wonderful snippets include: "emerged from a 1970s morass of problems and cost overruns" and "suffered a thrown wheel and tire blowout on 1970 maiden operational landing," and we should all know that the C-5 "became

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first development program with $1 billion overrun." This is all true, but I thought the purpose of this magazine was to "promote a dominant United States Air Force and a strong national defense and to honor airmen and our Air Force heritage." Would it have hurt to mention a few more positive things concerning the Galaxy?

Perhaps a mention of the two C-5C space cargo module airlifters that were specifically retrofitted to carry the space shuttle cargo bay would have been nice. As a Life Member of AFA, I expect more and I was extremely disappointed with this coverage of our largest transport.

Lt. Col. Richard Benbow,
USAF (Ret.)
Charles Town, W.Va.

For the Want of Honeycomb

Reference the article "The Hercules of An Loc" by Sam McGowan *[October, p. 66],* here's [some more] of the story about the air-drop resupply of An Loc:

I was stationed at Langley Air Force Base in Headquarters, Tactical Air Command, Airlift Operations Division (DOALS). TSgt. John Limbach and I were sent to Vietnam to help with the high-altitude air-drop resupply of An Loc because we had extensive backgrounds in air-drop systems and operations. We were primarily sent to stop the bleeding deaths of our airlift forces that resulted from employing standard air-drop techniques at An Loc.

The first thing we did upon arriving at the 90th Parachute Maintenance and Delivery Base Unit was to have an already rigged parachute opened for inspection. The American advisors did not want us to do this for fear the Vietnamese might lose face if we discovered a rigging problem. So instead, we asked that they rig a parachute for us to see how it was done. This they did.

The riggers had placed a nail approximately 72 inches above the ground. Apparently, during their first efforts to rig the parachute, this nail was their method for measuring the 144-inch reefing line. They were supposed to bring the reefing line up to the nail and back to the ground. What they did in front of us was to bring the reefing line up to the nail and cut it at that point. When we saw this, we insisted they open the parachutes already rigged and ready for airdrop. This they did and every reefing line was 72 inches long instead of the 144 inches required for a successful airdrop. Unfortunately, so many CBS systems had been used at that point that not enough remained to provide the needed resupply.

Therefore, we came up with the idea of using a 15-foot ringslot extraction parachute as a main chute, and we established a high-velocity, high-altitude system with no reefing lines or cutting system. The 15-foot ringslot parachute would retard the cargo to approximately a 90 feet per second impact. However, what we needed was multiple layers of cardboard honeycomb to provide the needed energy absorption. Normally, two or three layers of honeycomb are used for standard 25 foot per second airdrops. We needed at least six layers of honeycomb and would have to accept some damage to the canned fruit if it were at the bottom of the stack. The USA advisors pointed out that, not having enough layers of honeycomb, they were sure some of the cans would burst open. We suggested they tell the Vietnamese defenders at An Loc to eat the burst cans first.

The next thing that happened was an acute shortage of honeycomb. We asked for an emergency shipment of honeycomb, which came within days on a C-5A aircraft. Plenty of honeycomb, but no place under cover to store it. The first rains destroyed much of it. We then asked for an emergency airlift of honeycomb wrapped in plastic. Soon a C-5A loaded with plastic wrapped honeycomb arrived in Vietnam. (I can only imagine these C-5A loads with their extremely low load weight probably caught the eye of the Military Airlift Command bean counters). The high-velocity GRADS airdrops were highly successful, and two satisfied Tactical Air Command people returned to the USA knowing [they had helped] save many lives.

A little side story is that the standard C-130s were eventually replaced by Adverse Weather Airdrop System (AWADS)-equipped C-130s brought in from a USA tactical airlift wing which provide self-sufficient C-130s, thus eliminating the need for a broomstick with a battery operated transponder and the MSQ mobile radar at Bien Hoa.

Col. Myles A. Rohrlick,
USAF (Ret.)
Carlsbad, Calif.

Many thanks to Sam McGowan and the editors of *Air Force* Magazine for "The Hercules of An Loc." Over the years, I have read articles in *Air Force* Magazine that were of personal interest, but this story moved me enough to want to thank you all for filling in the blanks.

After all these years, I discover the details of that damaged CCK Hercules parked across the way from the 360 TEWS and next to maintenance debriefing.

I have reread the article several times trying to glean details that I might have missed on previous passes.

Sam McGowan has given voice to the unsung airlifters that I watched fly in and out of Bien Hoa and TSN as a maintainer and to this particular Hercules with the crimson 781 forms that were hurled through our door in maintenance debrief-

ing with the destination and departure points that read "An Loc."

I am happy to have finally learned the story of Captain Caldwell and the brave crew of one of those CCK Hercs.

As another captain once said or meant to say: Yes! It sure was that kind of war.

MSgt. James E. Cullivan, USAF (Ret.)
Colorado Springs, Colo.

Fresh Pancake

We read with great interest your article entitled "Pioneers and Prototypes" *[October, p. 54]* by Thompson and Milberg. We thought your readership might be interested in knowing the current whereabouts of the strangest of your depicted collection of prototypes: the Vought V-173 "Flying Pancake."

Chance Vought designer Charles H. Zimmerman reasoned that an extremely low-aspect ratio wing design would allow the aircraft to fly at very low speeds and went about placing the large propellers at the wingtips to achieve this concept. With drag created by disturbed airflow near the tips of wings, the propellers would, at least conceptually, minimize this effect, thus providing for low speed takeoffs and landings but on the other hand, respectable high-speed performance.

The aircraft was built under a US Navy contract in 1940 and made its first flight on Nov. 23, 1942. Power was provided by two HP Continental A80 engines turning two huge 16-foot three-bladed props. The aircraft was the predecessor to the larger and more robust Vought XF5U.

We are happy to report that the V-173 has recently completed a comprehensive ground-up restoration at the hands of the venerable Vought Aircraft Heritage Foundation volunteers. Over 25,000 labor hours were required to complete the project, and no detail was overlooked. Transporting the aircraft on a flatbed truck to the Frontiers of Flight Museum at Dallas Love Field from Fort Worth, Tex., was no less of a feat. The final result is a breathtaking example of extremes in aviation design from the last century.

We invite the readership to include our museum in their travel plans, to see the V-173, many other Vought volunteer restorations, and other exhibits in this facility.

Lt. Col. Michael J. Opatowsky, USAF (Ret.)
and Neil Teitelman
Dallas

I always feel that I've learned something important when I read articles like "High Noon," "Slow Climb for the F-35," and "Game Changers in Space." They are well-researched, well-written, and cover a wide range of history through current events.

But my spirit really jumps and shouts over features like "Pioneers and Prototypes." Glorious images of an exceptionally exciting era. I know that you can't sustain the magazine with a steady stream of this type of feature, but I really do appreciate it when you give us a taste of the way we want to remember things—all excitement and no politics. Thank you!

Hank Caruso
California, Md.

We Even Got a Samovar

I am heartened to know that 2nd Bomb Wing B-52s will again visit Russia, but claiming to be "paving the way for a long-range bomber exchange program with the Russian Air Force" *["Air Force World: BUFFs To Visit Russia," October, p. 14]* does a disservice to the 58 Barksdale airmen who took two B-52s and a KC-10 to Dyagilevo AB, Ryazan, Russia, in March 1992, just months after the fall of the Soviet Union. This visit commemorated the 50th anniversary of Russian Long-Range Aviation. It was my honor to have led that historic visit, and representing this July 2012 trip to be something new fails to recognize the history recorded in both the former Eighth Air Force Museum, the history book *Defenders of Liberty, 2nd Bombardment Group/Wing 1918-1993,* and the wing commander's own showcase containing a samovar and model of a Russian bomber presented as gifts to the people of Barksdale. In May 1992, the Russian Air Force returned the visit by flying two Tu-95 Bear bombers and an An-124 tanker to Barksdale with 58 Russian airmen and maintainers. Those inaugural visits were followed in September 1994 with a visit to Ukraine in celebration of the World War II shuttle missions to Russia flown by the 2nd Bombardment Group.

I am sure Colonel Gebara, current 2nd Bomb Wing commander, is aware of the footsteps in which he follows and has more carefully fulfilled the promise created by 2nd Bomb Wing aviators and maintainers 20 years ago.

Col. James Phillips, USAF (Ret.)
Granbury, Tex.

Put Momyer on the First Airplane

It brought many memories when I read your article on General Momyer in your October 2012 issue *["Air Force World: William A. Momyer, 1916-2012," p. 21].*

In 1966 I graduated from ICAF, Fort McNair, and was assigned to the 315th Air Commando Wing at Tan Son Nhut, RSV. I was a navigator (second class in the Air Force) but through politics was vice commander. Most enjoyable flying with several crews; different squadrons each week. This was for two weeks, [then] I was told to report to commander, 7th Air Force.

I did so and was greeted with: "I understand you are not a volunteer for the job you now have."

I replied with the normal courtesy from a lieutenant colonel to a three-star. He acknowledged I had neither experience nor training! I bowed out with: "All I can do is my best with honesty, loyalty, and hard work." He reflected for a moment and replied: "I cannot want more than that."

I was now chief of protocol for 7th Air Force.

When General Momyer took over, 7th was a mess—men living in mud, very poor discipline, and no leadership. Almost instantly, his attention to detail and imposition of strict military discipline restored 7th Air Force to one of the finest in the Air Force.

I also served as executive officer frequently. I remember with amusement that in the first three months he found something to correct in my writings—thereafter never a comment!

This is atypical of most VIPs: Billy Graham was scheduled for 20 minutes, but spent over 40 [minutes] with General Momyer. Upon leaving, I escorted Reverend Graham from the headquarters, and his comment was: "Wow, what a man!" Later in the day, the general's comment was: "Wow, what a man." Remarkable that both used the same simple expression.

Another interesting remembrance is when General Momyer was called to report to President Johnson. Allotted was 20 minutes. He remained in the President's office for one and a half hours. He was dismissed with this: "I'll let you know when you can bomb Hanoi. I'll see you're in the first f***ing aircraft." (Usual Oval Office language for this President.) General Momyer had spent the entire time attempting to convince the President to win the war!

As you will remember we could not bomb Hanoi harbor nor the enormous supply depot just 20 miles north of the Vietnam border with China. [Momyer] was an anomaly, ace, and an intellectual.

I have enjoyed my recall of these days long ago; there are many more.

Col. Thomas P. Harrison, USAF (Ret.)
Springfield, Va.

Washington Watch

By John A. Tirpak, Executive Editor

Haunted halls for years; Adversaries doubling down; Going deaf and blind in space; Undersea cables vulnerable; Radar too hot to hold ....

SEQUESTRATION AND HANGOVERS

Regardless of whether Congress manages to avoid or postpone going over the "fiscal cliff" of automatic budget cuts that would lop more than 10 percent off defense and space accounts, there is a real risk of a "sequestration hangover" that could haunt the defense industrial base for years. So said Marion C. Blakey, president of the Aerospace Industries Association, in a December speech.

Blakey said the sequester, according to research AIA took great pains to ensure was "highly credible" and not exaggerated, would claim 2.14 million aerospace and defense jobs, exact a $215 billion hit on gross domestic product, increase national unemployment by 1.5 percent, and potentially lead the country "back into a recession." She spoke at the association's annual year-end review and future forecast for the press.

Although the aerospace industry saw an uptick in 2012 sales—driven almost entirely by demand for commercial aircraft—it would be "too easy" to think the industry is so healthy it could "withstand anything," Blakey said. And even if sequestration is averted, aerospace and defense will likely continue to be budget-cutting targets because such accounts are large and discretionary. If that gets to be a habit of lawmakers, "we should also begin to question whether some of the critical capabilities provided by this industry will still be there when we wake up in a year or two," she said.

She noted that new polar-orbit weather satellites funded by the National Oceanic and Atmospheric Administration would be hamstrung by sequestration. That's ironic, since without data from such satellites, Hurricane Sandy's recent turn into the mid-Atlantic seaboard would not have been predicted, she said, and the death toll from the storm could have been far worse.

She also said Congress has been slow to accept that the US will likely never again have the luxury of getting ready for an armed conflict on its own timetable.

"The new reality," she said, is that America's enemies tend to strike suddenly, without warning, and the "traditional" methods of mobilizing for war "no longer apply." The nation can no longer assume it will have months to prepare for a conflict and spool up defense production on an as-needed basis. There must be a routine, adequate investment in defense research and development and force structure for the nation to be ready for any contingency, Blakey asserted.

She also said that US adversaries are "doubling down" on investment in aerospace technologies and educating their youth for careers in science, technology, engineering, and mathematics.

If sequestration is allowed to go into effect for even a few months, Blakey said, it could push out of the business "a number of third- and fourth-tier suppliers," probably small businesses dependent on a single government contract. Some of these producers provide niche materials for which there is no alternative, and they simply don't have the resources to ride out losing such contracts.

These companies very well "may not come back," she said.

THINKING ABOUT COUNTERSPACE

If the US goes to war with a near-peer enemy, the conflict could spill out of the atmosphere and become a war against satellites as well. This is a near-inevitability that Air Force Space Command thinks about and USAF explores in exercises.

Adversaries know the US depends on its space assets, and will surely try to deafen and blind them at the outset of any armed conflict. But how the US could punch back is an open question, according to AFSPC chief Gen. William L. Shelton.

"In terms of active defense, we've looked at this seven ways from Sunday, and we cannot make that work," Shelton said in a November interview. Satellites doing battle is technologically unwieldy and fiscally prohibitive, he explained.

"The distances are too great. You would have to have exquisite intelligence, and by that I mean indications and warning that give you time [and] place, ... before you could be successful in defending," Shelton observed. Putting defensive capability on each satellite "or an escort satellite for each high-value satellite" is "simply unaffordable," he said.

Instead, he advocates having a sufficient number of satellites on orbit so that an enemy could not disrupt or destroy them all, thereby providing some resiliency to the force and deterring an enemy from even trying to knock out entire constellations.

However, anti-satellite capabilities are being pursued by a number of countries; China tested a kinetic system in 2007, and laser technology is advancing to where an enemy could "dazzle" the optics of a reconnaissance bird. Is there a more active, rather than passive approach to deter attack?

"If you talk about offensive capability, that is a tremendously difficult policy question," Shelton said, "and one that would have to go to the highest levels of government before we would consider those kinds of capabilities for the future."

The US is not handcuffed by treaty on this point, though, he noted.

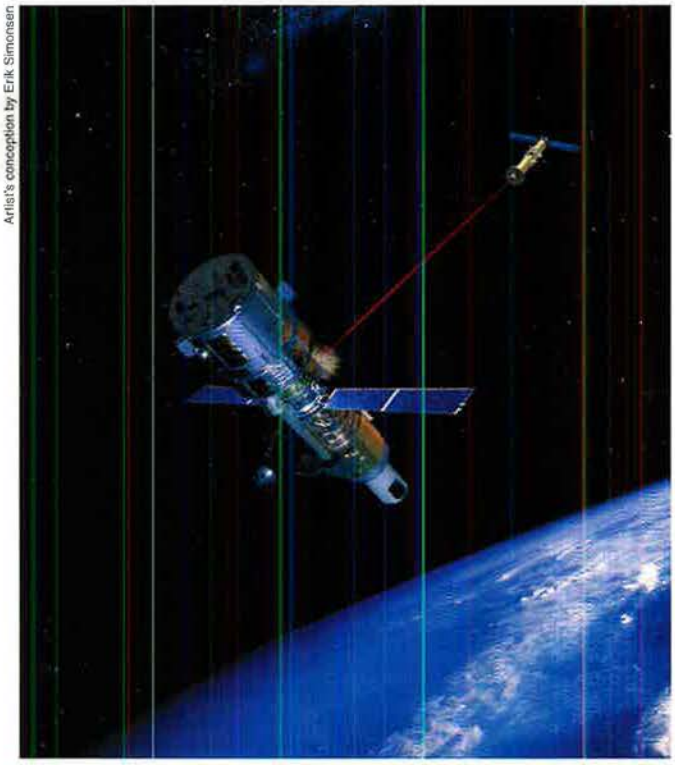
"National space policy is very permissive in this area. It very carefully talks about the United States defending its capabilities in space. They are vital assets and described that way. ... It's crucial." He declined to give any more specifics.

Given the threat of space denial, Air Combat Command has added elements to its exercises that assume a loss of space capability for some period of time, and AFSPC's space aggressor squadron is involved in a growing number of wargames.

Shelton noted that ACC even did a study a few years ago called "A Day Without Space," but he finds the idea unrealistic.

"I never liked that title," he said. "There would not be a day without space. There will be days with challenged space capability, but ... there's just too much capability on orbit and too much dependence on that capability."

He continued, "We practice with denied space—we practice with GPS jamming environments, SATCOM jamming environments, [and] we are developing tactics, techniques, and procedures" to get better at "buying back some of that capability" in a space-contested battlefield. However, "I think



Artist's conception by Erik Simonsen

You blinded me with science.

it's important we be realistic about what it's really going to be. It's not going to be 'no space'; it's going to be 'challenged space,' ... and that's exactly what we're practicing at Red Flags and other exercises."

In various discussions of AirSea Battle, the strategic planning construct for the Air Force and Navy, it's often postulated that any war in an anti-access, area-denial situation would begin with a "blinding campaign" on both sides. Shelton thinks that's likely.

"You've got to believe that would be included [at] the start, as a minimum," he said. And "I don't know exactly how the President might choose to react, but I don't think we would just sit back and absorb that."

When he was Chief of Staff, now-retired Gen. Norton A. Schwartz frequently voiced his belief that a broad network of space-based, airborne, and terrestrial systems, if it had enough nodes, would be practically self-healing and would provide deterrence by making any attack on the network futile and pointless. Shelton agrees.

"If we can combine all that ... into a network of capability," he said, "you might not have the exquisite capability that you had full-up, but you end up with 'good enough.' You're not deaf, dumb, and blind. I think that's the way we have to proceed." It's not acceptable to have known vulnerabilities that an enemy could exploit with what Shelton called a "cheap shot."

A thorny policy question, though, is how "to respond proportionately" to an attack on US satellites, he said.

"We always say this as a joke, but satellites don't have mothers," he observed. "They're just machines. So will the United States respond as we would if you included loss of human life in this attack? It will be a struggle for decision-makers to decide," he said.

BANDWIDTH HORIZONS

Not long ago military commanders could scarcely make a speech or offer congressional testimony without warning that the US military was maxed out on bandwidth and that a crunch was coming that might impair military operations. Those warnings have subsided, and the reason is the availability of commercial alternatives, Shelton said.

"We bought a lot of commercial capability," he noted, to the tune of 80 percent of the traffic in and out of Afghanistan.

Moreover, once those signals come down to Earth, they can travel over a vast network of commercial fiber-optics.

"So you don't have to do multiple satellite hops like you used to have do in the past," Shelton said. "We've increased the bandwidth capacity tremendously through commercial satellite communications, through fiber."

That's not to say the problem is solved, he pointed out.

"We still do sharing. ... We still have users that don't have their requirements satisfied. The advent of full-motion video and the tremendous [intelligence, surveillance, and reconnaissance] capability that we have has just really driven bandwidth needs through the roof. It's just more data than we can stand right now."

The situation is "not forever," given the drawdown in Afghanistan.

"I think the workload will certainly start to drop off in that part of the world," Shelton said, but the ISR assets that have been devoted to Southwest Asia will probably be redistributed to other areas of responsibility and potentially increase the burden elsewhere.

"So ... our bandwidth challenges are going to be interesting for us ... especially as we look at the shift to the Pacific."

Shelton said the increased reliance on fiber provides no insurance that communications won't be vulnerable to disruption.

"The physical locations of commercial fiber are well known," he warned. "So I would say the threat is less about jamming and more about severing the capability." Undersea fiber particularly is "something to be concerned about."

OFF THE RADAR

Another hot space topic that has cooled off in recent years is space radar, envisioned as a constellation of medium-altitude satellites providing all-weather radar imagery for both the intelligence and defense communities. It collapsed because there was no way to make it meet all the users' needs, Shelton said.

"It just got too hard," he said. The requirements of the intel community were for "high end, exquisite, very precise" sensors while defense sought "target indicators, ... a broad, synoptic look," and "it just got too difficult to put those two together—and too expensive. And we couldn't agree, frankly, to a compromise position between the two, because the needs were so disparate."

He added, "We certainly continue to be interested in radar technology from space," and the US has some access to a Canadian system, providing "all weather, day/night capability."

The technological Holy Grail for Air Force space commanders since the 1960s has been a single stage to orbit system—SSTO—wherein an airplane-like craft could take off from a runway, achieve orbit, release (or pick up) payloads, and return to Earth. However, it's likely to remain an elusive capability, Shelton said.

"Every time we've looked at that, ... we could build the ship but we were left with virtually no payload capability. So the real limiting factor here is propulsion technology. Until there's a real breakthrough, ... I just don't see it."

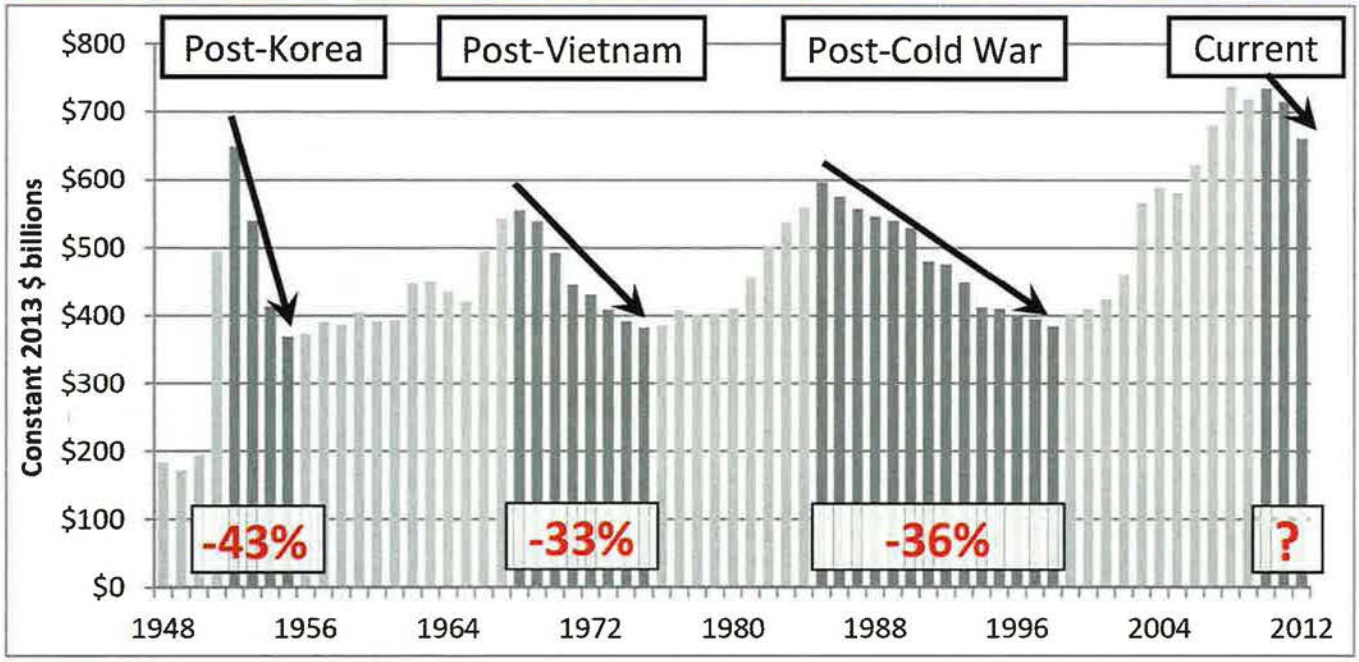
Shelton said the "greatest minds in the country," working with NASA, the Defense Advanced Research Projects Agency, and others have worked on SSTO and came close to succeeding with the National Aerospace Plane project in the 1980s. But in the end, the payload that could be carried was "negligible," Shelton said, and "if you can't carry anything, what's the point?" ■

chartpage@afa.org

Three Down and One To Go

Since World War II, the US defense establishment has lived through three major military budget drawdowns—post-Korea (43 percent), post-Vietnam (33 percent), and post-Cold War (36 percent). Each brought force cuts and reduced investment in new weapons. A fourth drawdown—call it "post Iraq-Afghanistan"—is under way. How deep it will go, nobody knows. However, it doesn't have to go as deep as the others to have a comparable impact on US capabilities, according to a new study by the Center for Strategic and International Studies. CSIS says cost inflation in certain defense sectors means that a nominal 20 percent cut today could "feel" like a 30-to-35 percent cut of bygone years.

Defense Budget Drawdowns Since World War II



Source: "Planning for a Deep Defense Drawdown—Part I," Clark A. Murdock, author, and Ryan Crotty and Kelley Sayler, contributing authors. Center for Strategic and International Studies, Washington, D.C., May 2012. Based on "National Defense Budget Estimates for 2013," Department of Defense, March 2012.

Air Force World

By Aaron M. U. Church, Associate Editor

Selva Takes Over AMC

Gen. Paul J. Selva took command of Air Mobility Command from Gen. Raymond E. Johns Jr. in a ceremony at Scott AFB, Ill., Nov. 30.

Selva now leads the nearly 134,000 members of the mobility air forces—including Guardsmen and Reservists—who provide airlift, aerial refueling, and aeromedical evacuation. Before taking charge of AMC, he served in Hawaii as Pacific Air Forces' vice commander.

Johns, who had led AMC since November 2009, retires from the Air Force after 35 years of service, on Jan. 1.

The command's NCOs inducted Johns into the command's Order of the Sword on Nov. 28, in recognition of his support for AMC's enlisted airmen.

Cody Selected as Next CMSAF

Chief of Staff Gen. Mark A. Welsh III has named CMSgt. James A. Cody to serve as the 17th Chief Master Sergeant of the Air Force, service officials announced.

Cody serves as command chief of Air Education and Training Command and will assume his new position on Feb. 1, following the Jan. 31 retirement of CMSAF James A. Roy, who has served in the post since June 2009.

"We are excited to welcome Chief Cody and [his wife] Athena to the team as they take the baton from the Roys," said Welsh. "The next few years will be filled with many opportunities and challenges, and our Air Force will greatly benefit from the leadership, experience, and wisdom they bring."

Cody joined the Air Force in 1984.

Defense Authorization Bill Passed

The Senate unanimously approved its $631.4 billion version of the Fiscal 2013 defense authorization bill Dec. 4, providing funds for national defense programs and the war in Afghanistan.

Sen. Carl Levin (D-Mich.), Senate Armed Services Committee chairman, told reporters following the bill's passage that the total amount authorized is about $230 million less than President Obama requested.

Those figures correspond to the bill iteration that the SASC approved in May. Levin said senators added 145 amendments to the full Senate's final version.

Among its many provisions, the bill provides a 1.7 percent military pay increase, fully funds efforts to train and equip Afghan security forces, and requires defense contractors to report classified cyber network breaches to the Pentagon, said Levin.

Other measures continue biofuel research, tighten sanctions on Iran, ban transfers of Guantanamo detainees to the United States, and require reports on the resources needed for the Pentagon's Asia-Pacific region pivot.

Spirit Tour

Starting this year, B-2 bombers will begin regular worldwide training deployments to each of the US combatant commands' areas of responsibility, according to 8th Air Force commander Maj. Gen. Stephen W. Wilson.

"Our B-2s will rotate to forward operating locations all over the world in small numbers for a few weeks at a time, a couple of times a year," Wilson said in an interview from 8th Air Force headquarters at Barksdale AFB, La., Nov. 7.

Air Force Global Strike Command pulled B-2s out of the recurring bomber rotations to Andersen AFB, Guam, in 2010. The move followed a serious engine fire that heavily damaged a B-2 earlier that year at Andersen and the total loss of another B-2 in 2008 following a crash on the Andersen runway. Instead, "we're going to put them into the 'new normal,'" beginning with a short Pacific deployment for an exercise in 2013, said Wilson.

"We're doing that with all the geographic combatant commanders," including those in Central and South America, Southwest Asia, and Europe, in addition to the Asia-Pacific region, he said.

Because US commanders for these regions have no permanently assigned bombers, "they want to exercise and train with them regularly," he said. As a result, "both of us will get better."

Photo by Jim Haseltine

The House passed its version of the bill in May, authorizing $635.2 billion. House and Senate authorizers must confer and agree to a final version of the bill before it can go to President Obama.

F-35 Price Halved

After about a year's worth of negotiations, the Defense Department in November reached a deal with Lockheed Martin for the fifth lot of F-35 strike fighters. The agreed unit price will be about half the cost of aircraft in the first lot.

Pentagon Press Secretary George Little, on Nov. 30, said the deal was the result of "a tough negotiation" but that DOD was "pleased that we've reached an agreement."

In this lot, Lockheed Martin is expected to manufacture 32 F-35s: 22 Air Force F-35As, three Marine Corps F-35Bs, and seven Navy F-35Cs.

"Production costs are decreasing, and I appreciate everyone's commitment to this important negotiation process," said Vice Adm. David J. Venlet, then F-35 program executive officer.

Lot 5 production actually began in December 2011 under an undefinitized contract action that enabled Lockheed Martin to begin work before the parties agreed to the final contract terms.

The unit-cost data for Lot 5 will be made available once the contracts are finalized and signed, according to Little.

Kelly Goes South

Marine Corps Gen. John F. Kelly received his fourth star and took charge of US Southern Command Nov. 19 from Air

12.05.2012

Two F-35s run through maneuvers during a training mission over the Gulf of Mexico. The aircraft belong to the 58th Fighter Squadron, USAF's first F-35 training unit. The 58th is in the process of training the first Active Duty pilots to start operational testing of the strike fighter.

Force Gen. Douglas M. Fraser, who had led the organization since June 2009.

Kelly comes to SOUTHCOM from the Pentagon, where he had served since March 2011 as senior military assistant to the Defense Secretary.

Joint Chiefs Chairman Gen. Martin E. Dempsey credited Fraser with assembling an impressive interagency team at SOUTHCOM to build partnerships with nations in Latin America and the Caribbean during his tenure.

SOUTHCOM oversees the US military's engagement in those areas, including counternarcotics activities.

Fraser retired from the Air Force Jan. 1, concluding a 37-year career in uniform.

Space Flights On Hold

Air Force Space Command has delayed all space launches using the Pratt & Whitney RL-10 upper-stage motor until command investigators find the cause of a recent anomaly, said AFSPC boss Gen. William L. Shelton.

"We have to find out what happened" during the GPS IIF satellite launch earlier this year, Shelton said, speaking at an Air Force Association breakfast in Arlington, Va., on Nov. 7.

With no alternative upper-stage motor supplier to Pratt & Whitney, "there is no plan B," he said, and AFSPC can't afford to risk the loss of a payload, such as the X-37 reusable spaceplane that had been slated to fly in November. (It launched Dec. 11.)

The RL-10 did not produce expected thrust, requiring "a bit of a diving save" during the Oct. 4 GPS mission, and command officials found items "in the data that we didn't like," said Shelton.

He explained that although "the upper stage got us to orbit," had the satellite payload been any heavier than it was, "we might not have made it."

Second Chinese Stealth Jet Flies

China's second fighter bearing apparent stealth design features has flown from an airfield in northeastern China, according to international press reports.

The Shenyang J-31 prototype flew for 11 minutes, with its undercarriage in the landing configuration, before touching down during the Oct. 31 sortie, reported Agence France-Presse.

The aircraft, alternately referred to as the F-60 or J-21, first appeared in photos leaked in June and bears a strong resemblance to the F-22 and F-35.

"The layout is similar, but the material and quality are inferior," said Andrei Chang, a military expert on China, quoted in AFP's report.

The first flight came only weeks ahead of Chinese President Hu Jintao's planned handover of power to his successor. "I think the regime is trying to show off ... that the Hu Jintao regime achieved a lot for China," said Chang.

First Operational F-35 Unit

The Marine Corps officially established its first F-35B operational squadron on Nov. 20 during a ceremony at MCAS Yuma, Ariz.

The service redesignated Marine All Weather Fighter Attack Squadron 121, formerly an F/A-18 squadron, as Marine Fighter Attack Squadron 121, the unit that will oversee F-35B tactical operational training at Yuma.

The transition marks the F-35 strike fighter's progress from a testing and training platform toward full-scale operations, said service officials.

Lockheed Martin transferred the first three operationally coded F-35Bs to the Marine Corps during the event, bringing the service's F-35B fleet to 16, according to the company. The other 13 aircraft are assigned to the joint service schoolhouse at Eglin AFB, Fla., where they support pilot and maintenance training.

F-35Bs are slated to replace legacy F/A-18, AV-8B, and EA-6B aircraft in the Marine Corps inventory.

Permanent Place in Poland

US and Polish officials established a

Col. Ralph S. Parr Jr., 1924-2012

Retired Col. Ralph Sherman Parr Jr., a Korean War double ace who was the only American pilot to receive both the Distinguished Service Cross and the Air Force Cross, died Dec. 7 in New Braunfels, Tex.

Parr flew P-38 Lightnings in the Pacific during the last year of World War II and then entered the Reserve. Reactivated for the Korean conflict, he flew F-80s at the beginning of the war and F-86s at the end; in between, he worked developing aerial tactics. Redeployed to Korea for the last weeks of the war, he shot down 10 enemy aircraft in just 51 days, including the last aircraft shot down during the conflict, an Il-12 cargo airplane.

He remained with the Air Force after the war, serving in a number of posts in the US and abroad. During the Cuban Missile Crisis, he was command post director at MacDill AFB, Fla.

In 1963, Parr was selected to be one of the first instructor pilots in the new F-4C Phantom II and helped bring that aircraft into the inventory. In the Phantom, he served two tours in Southeast Asia.

During the siege of Khe Sanh, diverted from escorting a C-130 cargo mission in bad weather, Parr repeatedly attacked and destroyed North Vietnamese mortar and gun positions. He pressed the attack despite heavy fire and severe damage to his aircraft, even after the commander of the Marine Corps troops he was protecting advised him to break off. Parr also orchestrated strikes on enemy positions by other aircraft. For this action he received the Air Force Cross. During the conflict he served as deputy commander and then commander of the 12th Tactical Fighter Wing.

After Vietnam, Parr was posted to Iran, where he was chief of staff of the Military Assistance Advisory Group. He then served at Eglin AFB, Fla., as deputy chief of staff for operations at the Tactical Air Warfare Center, and then chief of staff of the Armament and Development Test Center. He retired as a colonel in 1976, having amassed 641 combat missions and more than 6,000 hours in fighters, as well as more than 60 decorations, which included the Silver Star, Bronze Star Medal, 10 Distinguished Flying Crosses, and 41 Air Medals.

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permanent US aviation detachment at Lask Air Base, about 100 miles southwest of Warsaw, during a ceremony there in November.

The small unit, dubbed the "Av-Det," represents the first full-time presence of US military personnel on Polish soil, according to a US Embassy news release issued Nov. 9, when the unit stood up.

The detachment's primary purpose is strengthening the US-Polish security partnership through regular bilateral—and eventual multilateral—training exercises and rotational deployments of US military aircraft, starting this year.

Poland has expansive training ranges and airspace less restricted than that of NATO allies in Western Europe, say US officials.

The Av-Det, reporting to the 52nd Fighter Wing at Spangdahlem AB, Germany, will comprise 10 personnel who will be joined by up to 200 visiting airmen and contractors during quarterly rotations by F-16s, C-130s, and other aircraft.

The United States and Poland concluded an agreement on the detachment in June 2011.

US-Australia Space Cooperation

The United States and Australia will establish a radar station and an optical telescope site on Australian soil to bolster the two countries' ability to detect, track, and identify space objects, such as satellites and debris, according to the Pentagon.

Australia will operate an Air Force C-band ground-based radar system that the two allies will set up at the Harold E. Holt Naval Communications Station at North West Cape in Western Australia, according to the Defense Department's Nov. 14 news release.

The US will deliver the radar in 2014, when it will become the first space surveillance sensor in the southern hemisphere designed to watch for objects in low Earth orbit. The radar will "significantly contribute to tracking high-interest space launches from Asia," said DOD.

The Defense Advanced Research Projects Agency's Space Surveillance Telescope will also bed down in Australia at a to-be-determined location. The SST is configured to monitor areas of deep space associated with satellites in geosynchronous orbits.

The SST finished testing at DARPA's New Mexico site in August.

The announcement came toward the end of Defense Secretary Leon E. Panetta's official visit to Australia, where he met with his Australian counterpart, Stephen F. Smith.

Iranian Frogfoot Fires on MQ-1

An Iranian Su-25 attack jet fired twice on an unarmed MQ-1 Predator remotely piloted aircraft flying in international airspace over the Persian Gulf in November, the Pentagon confirmed. The RPA wasn't hit.

USAF photo by SrA. Chris Willis

Doctor, Doctor, Gimme the News: *MSgt. Thomas Carpino, 455th Expeditionary Security Forces Group, patrols near a medical entry control point at Bagram Airfield, Afghanistan. Members of the 455th patrol and guard the base perimeter while local Afghan civilians visit the base to receive medical care.*

"The incident occurred over international waters approximately 16 nautical miles off of the Iranian coastline" on Nov. 1, said Pentagon spokesman George Little.

The MQ-1 was "conducting routine surveillance" and "was not hit and returned to its base safely," he stated.

"We believe they fired at least twice and made at least two passes," he said, adding that the RPA was stalked for a "period of time" after being fired on but had never entered Iranian airspace.

Pentagon officials believe that this was the first time an aircraft fired on an RPA in the gulf's international airspace.

Through Swiss intermediaries, the US told Iran it "will continue to conduct surveillance flights over international waters," said Little.

Iran recovered an American RQ-170 Sentinel RPA that came down on Iranian soil in December 2011.

F-35 School Passes Test

The F-35 schoolhouse completed a test run of its pilot training pipeline, completing its operational utility evaluation at Eglin AFB, Fla., Nov. 15.

The OUE was the last major hurdle before the 33rd Fighter Wing is cleared to begin full-up F-35 training, according to wing officials.

"We were able to conduct the flying portion in less than half the time than we planned for because things went so well with the flying; weather was good; maintainers were doing a great job," said 33rd Fighter Wing commander Col. Andrew J. Toth.

The initial cadre of four student pilots began transition training in September. After six weeks of academic instruction and 24 sorties, they graduated as fully qualified F-35A Lightning II pilots.

"Once we receive the Air Education and Training Command's approval stating we are 'ready for training,' we can begin our first class," said Toth.

After one year's normalized training, the schoolhouse plans to graduate about 100 pilots and 2,100 maintainers annually.

On Nov. 2, the school surpassed 500 joint service F-35 sorties since it began flight operations in March, according to F-35 prime contractor Lockheed Martin.

Second F-22 Crashes at Tyndall

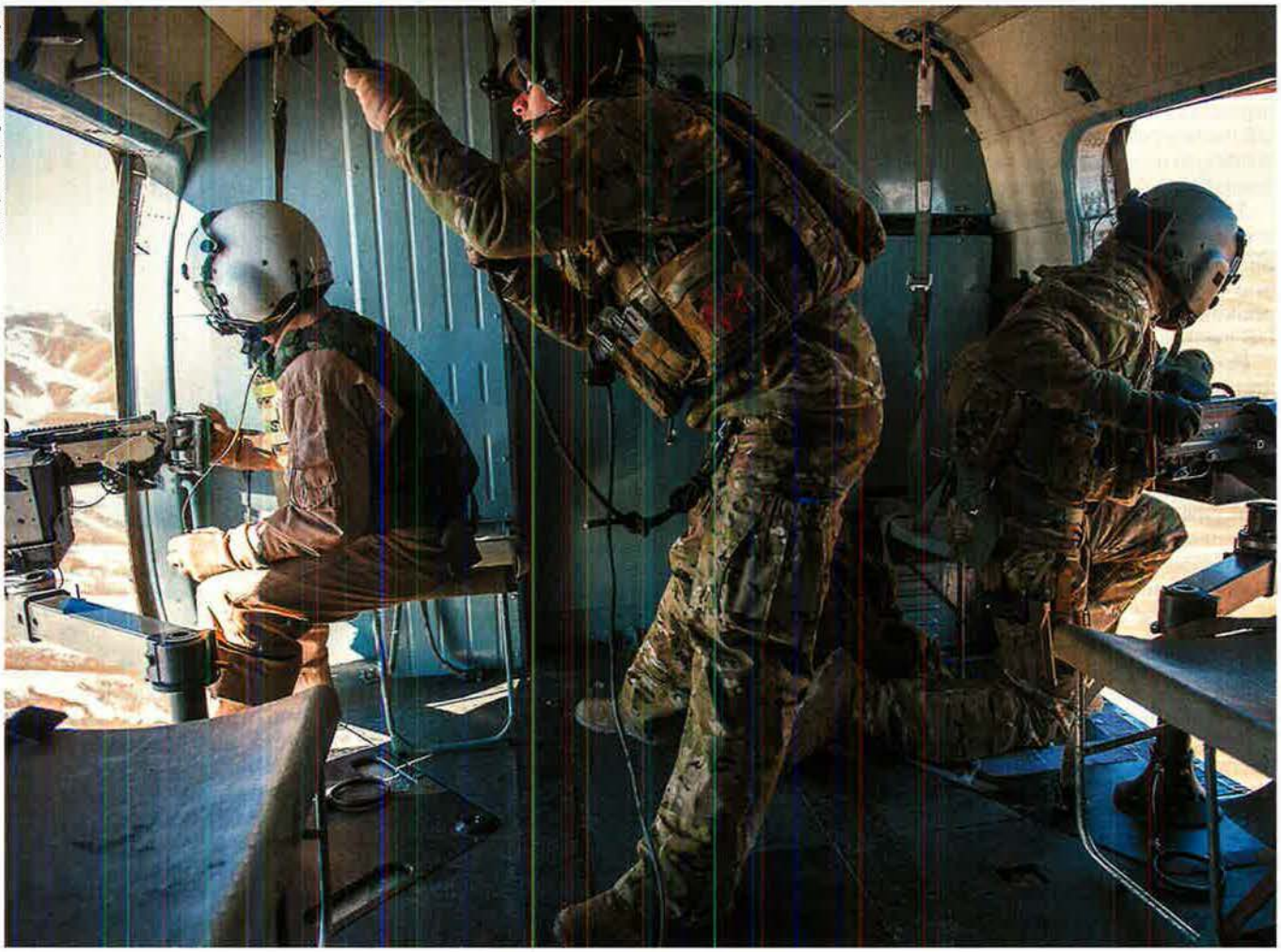
A second F-22 Raptor crashed at Tyndall AFB, Fla., in November, on the same day the Air Force released details of a previous F-22 mishap that had occurred at the base in May. (See below.)

The F-22 struck the ground about a quarter-mile east of the base's "drone" runway at 3:30 p.m. Nov. 15, according to a base statement that day. The fighter was consumed by flames within the base perimeter. The pilot, who ejected safely, was taken for medical examination on base. Local officials closed a nearby highway as a safety precaution following the crash.

After a four-day safety grounding of Raptors at Tyndall, fighter operations resumed.

"We will continue to accomplish our mission while the safety investigation board searches for the cause" of the accident, said 325th Fighter Wing commander Col. David E. Graff. He

USAF photo by TSgt. Donnie J. Henry Jr.



Someone To Watch Over Me: *USAF TSgt. Will Stimpson (center) and SSgt. Michael Dinicola (right) evaluate Afghan Air Force Sergeant Razeg as he provides overwatch during a check ride on an Mi-17 helicopter from Kabul, Afghanistan. Such missions allow Afghan airmen to train and qualify in their jobs.*

flew one of the first Raptor sorties on Nov. 19, when training missions got under way again.

The Air Force initiated a safety investigation board to ensure that no fleetwide issues contributed to the crash. Although Tyndall is home to USAF's Raptor schoolhouse, Graff said the pilot involved in the incident was not a trainee.

Too Low and Slow

A student pilot's failure to advance his F-22's throttles to full military power before retracting the landing gear on a touch-and-go was to blame for a belly landing at Tyndall AFB, Fla., on May 31, 2012.

"Without sufficient thrust, the aircraft settled back to the runway, landing on its underside," skidding along the runway

BMT Abuse Findings

An Air Force investigation into cases of sexual abuse in its basic military training courses has identified five major deficiencies in the program, along with 46 corrective measures.

Maj. Gen. Margaret H. Woodward, who led the investigation into sexual misconduct by military training instructors at JBSA-Lackland, Tex., outlined 22 findings from the review in a press briefing at the Pentagon, Nov. 14.

Her report highlighted insufficient oversight, poor instructor selection, lack of emphasis on responsibility, barriers to reporting, and inacequate policy and guidance as the key institutional factors contributing to the breakdown in discipline.

"Leadership stands out as the most important area to address," according to an accompanying report from Air Education and Training Command, which said good leadership would be able to "overcome weaknesses in institutional safeguards."

AETC plans to implement all but one recommendation: to shorten basic training. It was already being reviewed under a separate study, AETC commander Gen. Edward A. Rice Jr. explained during the briefing.

Officials decided not to segregate Air Force basic training, but will instead institute four-person instructor teams including at least one female MTI for every two flights to increase peer accountability.

Over the previous 60 days, Woodward's team conducted 215 interviews, surveyed 18,000 Air Force personnel and conducted focus groups with trainees, instructors, and spouses.

The team visited Air Force Officer Training School at Maxwell AFB, Ala., four Air Force tech schools, and an Army basic training site for comparison, in addition to conferring with Navy and Marine Corps training leaders before making their recommendations.

Operation Enduring Freedom

Casualties

By Dec. 12, a total of 2,158 Americans had died in Operation Enduring Freedom. The total includes 2,155 troops and three Department of Defense civilians. Of these deaths, 1,711 were killed in action with the enemy while 445 died in noncombat incidents.

There have been 18,137 troops wounded in action during OEF.

Details of the Drone War

As of this fall, USAF remotely piloted aircraft had dropped 1,160 weapons on ground targets in Afghanistan since 2009, according to newly released data from Air Forces Central.

Air Force RPAs operating over Afghanistan include the MQ-1 Predator, which can carry Hellfire air-to-surfaces missiles, and the MQ-9 Reaper, capable of carrying both Hellfires and 500-pound precision guided bombs.

The Air Force recorded a total of 225 RPA strikes in 2009, 278 in 2010, 294 in 2011, and 333 during the first 10 months of 2012, according to strike data released Nov. 7 for Southwest Asia through Oct. 31, 2012.

Dunford To Lead ISAF

The Senate approved the nomination of Marine Corps Gen. Joseph F. Dunford Jr. to lead US and NATO forces in Afghanistan, Dec. 3.

Dunford, who serves as the Marine Corps assistant commandant, will replace Marine Corps Gen. John R. Allen as the head of the NATO-led International Security Assistance Force. Allen has commanded it since July 2011.

Obama tapped Dunford in October for the post, saying at the time Dunford would "lead our forces through key milestones in our effort that will allow us to bring the war to a close responsibly" by the end of 2014.

Obama has nominated Allen to be the next NATO Supreme Allied Commander, Europe, and also lead US European Command.

Blue Sheriff in Town

Air Force security forces took over security responsibility for Bagram Airfield, Afghanistan, from the Army, standing up a new group for the task.

The 455th Air Expeditionary Wing at Bagram established the 455th Expeditionary Security Forces Group in a ceremony on base in November.

Comprising some 1,300 joint force and coalition personnel, the 445th is now in charge of protecting the nearly 35,000 US and coalition personnel and their equipment at Bagram, as well as the more than 300-square-mile security zone surrounding the base, according to the unit's Nov. 16 news release. "It is still the security forces mission, but our area of responsibility has increased," explained A1C Marlon Harris, an entry gate controller with the group.

The 455th AEW commander, Brig. Gen. Joseph T. Guastella Jr., presided over the ceremony for Col. Brian Greenroad, the group's first commander.

Manas Gets Expeditionary Group

The 9th Air and Space Expeditionary Task Force-Afghanistan activated the 466th Air Expeditionary Group at the Transit Center at Manas, Kyrgyzstan, to oversee the more than 2,300 airmen serving in Afghanistan on joint expeditionary tasks or as individual augmentees.

"The existence of this unit and our presence embodies and reinforces our solemn commitment to support joint expeditionary tasked airmen serving in harm's way, and we will not let them down," said Col. John Cline, who assumed command of the group during the Nov. 26 stand-up ceremony.

"I regularly visit our JET airmen in Afghanistan, and we could not accomplish the mission without their efforts," said Maj. Gen. H. D. Polumbo Jr., task force commander, presiding over the activation.

The 376th Air Expeditionary Wing is the host unit at Manas, a major air hub for coalition sustainment operations in Afghanistan.

to a stop, Air Education and Training Command officials announced in a press release Nov. 14 summarizing the accident investigation.

The pilot, assigned to Tyndall's 43rd Fighter Squadron, "was able to safely exit the aircraft, suffering only minor injuries," stated the release.

The student pilot was on only his second solo F-22 flight when the mishap occurred, according to a base spokesman.

The Raptor suffered damage that will cost an estimated $35 million to repair, AETC investigators said.

Global Strike Champs

Air Force Global Strike Command wings from Whiteman AFB, Mo., and Minot AFB, N.D., claimed top honors in the third annual Global Strike Challenge, command officials announced.

Airmen from across the command, along with members of Air Combat Command's B-1 units, competed in the challenge.

The 509th Bomb Wing from Whiteman took the Fairchild Trophy for best bomb wing, while the 91st Missile Wing from Minot claimed the Blanchard Trophy for best ICBM wing. The awards ceremony took place at Barksdale AFB, La., Nov. 7.

This year marks the second time the 509th has won top honors, while the 91st captured the ICBM title for the first time, officials said.

Among the other winners, Whiteman received the Ellis Giant Sword for best bomber maintenance group, Minot's 91st Security Forces Group won the Charlie Fire Trophy for best security forces group, and Minot's 54th Helicopter Squadron repeated as the winner of the Bourland Trophy for best helicopter squadron.

Pilot Error Felled Firefighter

The pilot's failure to identify dangerous weather conditions and abort in time was the chief reason for a fatal C-130 crash during firefighting operations in South Dakota last summer.

Air Mobility Command investigators said the North Carolina Air National Guard crew elected to continue dropping retardant on wildfires in the face of an impending thunderstorm in the area.

The Modular Airborne Firefighting System-equipped Hercules flew through a "microburst," causing the aircraft to hit the ground on July 1, stated AMC's Nov. 14 news release summarizing their report.

"If you add all the pieces up, it was very clear they shouldn't have attempted the second drop," said Brig. Gen. Randall C. Guthrie, quoted by *Stars and Stripes*.

Investigators said that poor communication with the spotter aircraft and

Senior Staff Changes

RETIREMENTS: Gen. Douglas M. **Fraser,** Gen. Raymond E. **Johns Jr.,** Maj. Gen. Thomas K. **Andersen.**

CHANGES: Maj. Gen. (sel.) Charles Q. **Brown Jr.,** from Dep. Dir., Ops., CENTCOM, MacDill AFB, Fla., to Dep. Cmdr., AFCENT, and Dep., Combined Force Air Component Cmdr., CENTCOM, Southwest Asia ... Brig. Gen. Scott L. **Dennis,** from Spec. Asst. to the Cmdr., 9th AF, ACC, Shaw AFB, S.C., to Asst. Dep. Cmdr., AFCENT, and Asst. Vice Cmdr., 9th Air Expeditionary Task Force, ACC, Shaw AFB, S.C. ... Brig. Gen. Sandra E. **Finan,** from Principal Asst. Dep. Administrator for Mil. Application, Office of Defense Prgms., Natl. Nuclear Security Administration, Department of Energy, Washington, D.C., to Cmdr., AF Nuclear Weapons Ctr., AFMC, Kirtland AFB, N.M. ... Maj. Gen. Garrett **Harencak,** from Cmdr., AF Nuclear Weapons Ctr., AFMC, Kirtland AFB, N.M., to Asst. C/S, Strat. Deterrence & Nuclear Integration, USAF, Pentagon ... Brig. Gen. Jeffrey L. **Harrigian,** from Asst. Dep. Cmdr., AFCENT, and Asst. Vice Cmdr., 9th Air Expeditionary Task Force, ACC, Shaw AFB, S.C., to Dep. Dir., Ops., CENTCOM, MacDill AFB, Fla.

SENIOR EXECUTIVE SERVICE CHANGES: Anthony J. **Baumann,** to Dir., Contracting, Warner Robins Air Log. Complex, AF Sustainment Ctr., AFMC, Robins AFB, Ga. ... Randall D. **Culpepper,** to AF PEO, Combat & Mission Spt., Office of the Asst. SECAF, Acq., Pentagon ... Jorge F. **Gonzalez,** to Dir., Engineering & Tech. Mgmt., AF Life Cycle Mgmt. Ctr., AFMC, Wright-Patterson AFB, Ohio ... Charles L. **Matson,** to Chief Scientist, AF Office of Scientific Research, AFRL, AFMC, Arlington, Va. ... George D. **Duchak,** to Dir., Info., AFRL, AFMC, Rome, N.Y.

CHIEF MASTER SERGEANT RETIREMENT: CMSAF James A. **Roy.**

conflicting storm avoidance guidelines also contributed to the mishap.

The aircraft and crew were assigned to the ANG 145th Airlift Wing at Charlotte/Douglas Arpt., N.C.

Aloha Raptor

The F-22 Raptor force comprising the Hawaii Air National Guard 199th Fighter Squadron and Active Duty 19th FS achieved initial operational capability at Joint Base Pearl Harbor-Hickam in November.

"This is a huge milestone for our combined 154th and 15th Wings. IOC means we are able to deploy a portion of our F-22 Raptors, anytime, anywhere, in support of theater operations," said Brig. Gen. Braden K. Sakai, commander of the Hawaii ANG's 154th Wing.

According to wing officials in a news release Nov. 9, the Hawaii-based Raptors were expected to reach full operational capability roughly a month later in December.

AEHF-2 Operational

Operational controllers at Schriever AFB, Colo., took charge of AEHF-2, the Air Force's second Advanced Extremely High Frequency satellite, in November.

After launching from Cape Canaveral AFS, Fla., last May, AEHF-2 spent several months maneuvering to its assigned orbit before undergoing a battery of on-orbit tests.

Air Force Space Command acquisition officials at Los Angeles AFB, Calif., began testing in August and handed off control authority to the 4th Space Operations Squadron at Schriever, Nov. 7.

"We are excited and proud to achieve this significant milestone along the path to full operations for the Advanced Extremely High Frequency system of vehicles," said Lt. Col. Scott Trinrud, squadron commander, at the formal transfer ceremony.

AEHF-2 joins AEHF-1, which arrived at its on-orbit station in October 2011. The AEHF spacecraft will complement and ultimately replace Milstar communications satellites.

"With a pair of AEHF satellites on orbit, we can now offer higher data rates for users via crosslinks between the satellites," said Lt. Col. Alistair Funge, the squadron's director of operations.

Airmen of the 4th SOPS will now control and operate the military communications satellite for the rest of its estimated 14-year service life, according to Schriever officials.

C-130 Fraternité

A pair of C-130Js from Ramstein AB, Germany, deployed for a joint training exercise with French Air Force C-130Hs at Air Base 123 near Orleans, southwest of Paris late last year.

"This is the first time that French and American C-130 crews have trained together in France," said French Air Force Lt. Col. Laurent Neumann, vice commander of Transport Squadron 2/61. "We regularly work together according to standardized procedures, but it is important to regularly upkeep the bonds of confidence that unite us," he said in the French Air Force's Nov. 19 news release.

The aircrews practiced low-altitude formation flying, joint airdrops, and airborne assault tactics during the week-long exercise that ran from Nov. 12 to Nov. 16.

About 40 aircrew members and support personnel from Ramstein's 37th Airlift Squadron participated in the event. The units plan to build on it with more training in the future.

Indian Air Force at Charleston

Maintenance instructors at JB Charleston, S.C., trained the Indian Air Force's initial cadre of C-17 maintainers ahead of delivery of the country's first Globemaster IIIs later this year.

"These Indian airmen are going to be the ones standing up the initial C-17 unit," explained TSgt. Paul Higgins, an instructor with the 373rd Training Squadron Det. 5.

"We are learning the basics of the aircraft as well as the technical manual," said Junior Warrant Officer Prakash Chand, an IAF student, according to a Charleston release.

India ordered 10 C-17s to replace its elderly fleet of Il-76 airlifters. Boeing plans to deliver the first airframes this year and expects to complete the order in 2014.

In the meantime, the detachment overseeing C-17 training at Charleston is teaching some 100 Indian airmen every aspect of the new airlifter's use.

The first students graduated from the program Nov. 8.

F-35 Nuke Tweak

Boeing is designing a new B61 nuclear free-fall bomb tail-kit assembly, under a recent $179 million contract, as part of the B61 Mod 12 Life Extension Program.

The redesigned tail will enable the F-35 strike fighter to carry the B61, while the overall LEP is to improve the safety, security, and use control of the decades-old weapon.

"We will apply our proven experience in tail kit production to this platform to effectively upgrade a vital deterrent capability," Debbie Rub, Boeing general manager in charge of missile programs, said in a company press release Nov. 27.

The contract covers the three-year design, development, and qualification phase for the new tail kit, and Boeing said the design will replace many obsolete parts to improve the bomb's reliability.

B-2 Spirits also carry the B61 as part of its nuclear armament package.

300th Drone Phantom

BAE Systems recently completed conversion of the 300th QF-4 Phantom II Full-Scale Aerial Target for delivery to the Air Force, company officials said.

The company modified the former RF-4 Phantom recce variant with autonomous controls and other changes over several months in their hangar at Mojave, Calif.

"We have been the sole provider of QF-4s for the Air Force since 1996," said Gordon Eldridge, company Aerospace Solutions vice president in BAE's release Nov. 12.

BAE's drone conversion line "now has more than 35 years of combined experience and a solid track record of success," he said.

The complex rework and refurbishment requires approximately six months, according to BAE.

Work began on the final QF-4 in May, and BAE plans to deliver 14 more QF-4s, according to the news release.

USAF's prototype QF-16 drone, which will succeed the QF-4, flew for the first time this spring. (See box "QF-16 Drone Enters Test," at right.)

Winglets for the Galaxy

Lockheed Martin recently tested new wingtip designs aimed at improving the fuel efficiency of the C-5M Super Galaxy. Engineers evaluated two separate winglet designs fitted to a 10-foot-long C-5 model in the 16-foot transonic wind tunnel at the Arnold Engineering Development Complex in Tennessee.

"The kinds of savings we're talking about ... is reducing the fuel burn of a C-5 by something on the order of 166 gallons per hour" with the addition of features such as winglets, said Jack O'Banion, company mobility improvement director. "The largest consumer of jet fuels is air mobility" in the US military, so the possibility for savings is huge, he explained.

Lockheed Martin is testing winglet designs as the first of several improvements it hopes to make to the Air Force's C-5 fleet, if service funds permit, according to an AEDC release Nov. 14.

Bone Boost

Work began on the most expansive B-1 Lancer upgrade project since the bomber entered service, officials at the Oklahoma City Air Logistics Complex on Tinker AFB, Okla., said in November.

Every B-1 in the fleet will be fitted with new Integrated Battle Station modifications over the next eight years, according to Tinker officials in a Nov. 27 press release.

Tinker's 76th Aircraft Maintenance Group will add a fully integrated data link, upgrade the bomber's vertical situation displays, and incorporate a central integrated test system into the Lancer.

The new gear will replace the B-1's now-obsolete flight instruments and significantly increase the aircrew's real-time situational awareness and communications ability with other forces, according to the Air Force.

The first B-1 arrived at Tinker to begin modifications in September, and as of late November two of the bombers had already received the new equipment, leaving 61 airframes to go, according to Tinker.

The Air Force retired three B-1s in September, leaving a total of 63 still in service.

Boeing is prime contractor for the Lancer IBS project.

More C-5Ms

The Air Force awarded Lockheed Martin another $489.4 million for ongoing upgrade work installing new engines and improvements on the service's C-5 Galaxy airlifters.

The most recent installment covers Lot 6 of the C-5 Reliability Enhancement and Re-engining Program which has an overall estimated value of some $4.5 billion, according to Lockheed Martin spokesman Chad Gibson.

The company had delivered nine upgraded C-5M Super Galaxys to the Air Force by early December.

Overall, the Air Force intends to modernize 52 of its C-5s (one C-5A, 49 C-5Bs, and two C-5Cs) to the new C-5M standard by 2016. These aircraft

QF-16 Drone Enters Test

The first batch of QF-16 Full-Scale Aerial Targets arrived at Tyndall AFB, Fla., in November to begin developmental testing.

"In the imminent future, the QF-16 will take air-to-air testing and evaluation to the next level," said Lt. Col. Lance Wilkins, Tyndall's 82nd Aerial Targets Squadron commander.

The QF-16 is designed to be flown manned or unmanned, depending on mission needs. The aircraft arrived at Tyndall Nov. 19, under pilot control.

The QF-16 prototype was set to undergo six months of trials at Tyndall with the 53rd Weapons Evaluation Group to ensure the airplane's compatibility with the Gulf Range Drone Control System, according to base officials.

Activities then move to Holloman AFB, N.M., where the QF-16 will undergo four months of additional testing.

The aircraft will then return to Tyndall for the workup to the full-scale target's initial operations there.

Boeing is under contract to convert up to 126 early model F-16s to the QF-16 configuration to supercede USAF's current QF-4 Phantom drone fleet.

The QF-16 prototype first flew last May and Boeing expects to deliver the first production drone in 2014.

USAF photo by 1st Lt. Angela Martin

The Proof Is in the Pudding: *Capt. Brenda White, a flight nurse with the 43rd Aeromedical Evacuation Squadron, secures medical equipment aboard a KC-10 at Travis AFB, Calif., during a "proof of principle" mission intended to evaluate the efficiency of KC-10s as an aeromedical evacuation aircraft.*

USAF photo by Lisa Norman

feature new engines and other performance improvements installed under the RERP, along with new cockpit avionics from a previous, separate modernization initiative.

The RERP is scheduled for completion in 2016.

Next Gen Logistics System Axed

After spending more than $1 billion on the Expeditionary Combat Support System since 2005, the Air Force notified Congress in November that it is canceling it.

ECSS was the supply chain management tool that service officials thought would transform the Air Force's logistics enterprise, but the effort hasn't panned out, the *Dayton Business Journal* reported.

Service officials confessed that the ECSS program has not yielded any significant military capability and announced on Nov. 8 that it cannot meet the Pentagon's Fiscal 2017 financial-improvement and audit-readiness requirements, according to the newspaper.

After three restructures of the ECSS program in the past three years, "it became apparent the Air Force will be better served by developing an entirely new strategy," they said, noting that the Air Force will do that by moving forward with other options.

Another $1.1 billion would have been necessary to field ECSS capability by 2020, but that amount would have resulted in much less capability than originally envisioned with ECSS, officials said.

Personnel Records Test

The Air Force postponed indefinitely an upgrade of its central personnel records database to allow thorough testing of the changes before implementation, the Air Force Personnel Center announced.

"It's critical we ensure our airmen have the best possible personnel data system, and to do that we need to complete testing on the new system before we upgrade MilPDS," the Military Personnel Data System, Air Force's assistant deputy personnel chief Robert E. Corsi Jr. said in a release Nov. 2.

Service officials originally intended to take MilPDS—which provides information for pay, career progression, and retirement functions—offline for upgrade in December.

However, "despite the best efforts of many, we must delay the upgrade," said Corsi. Effects of the delay were expected to be "minimal" on airmen, and AFPC kept a November early retirement and separation application deadline in place.

Raptor Remains: ***The wreckage of an F-22 Raptor blackens the crash site at Tyndall AFB, Fla., on Nov. 15. The pilot safely ejected from the aircraft, which was consumed by flames. Officials are investigating the incident. (See "Second F-22 Crashes at Tyndall," p. 15.)***

Maj. Gen. Frederick Blesse, 1921-2012

Retired Maj. Gen. Frederick C. "Boots" Blesse, a top US fighter ace of the Korean War, died Oct. 31 in Melbourne, Fla., at age 91, according to his obituary.

Born in the Panama Canal Zone in 1921, Blesse graduated from West Point in June 1945.

He flew more than 220 combat missions in the F-51, F-80, and F-86 during the Korean War, scoring 10 confirmed aerial kills between April and October 1952.

Blesse later penned the book *No Guts, No Glory* that served as a basis of Air Force fighter combat tactics for years, proving influential with other air arms as well.

Blesse also flew numerous combat missions during the war in Vietnam. Prior to retiring in April 1975, Blesse served as the Air Force's deputy inspector general.

He earned numerous military honors including the Distinguished Service Cross during his 30-year military career. ■

Verbatim

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By Robert S. Dudney

Money for Nothing

"The Air Force has lost confidence in the Expeditionary Combat Support System (ECSS) and has canceled the program. After spending more than a billion dollars, the Air Force determined that the ECSS program has not yielded any significant military capability. ... From what we know to date, this case appears to be one of the most egregious examples of mismanagement in recent memory. We believe that the public and the taxpayers deserve a clear explanation of how the Air Force came to spend more than a billion dollars without receiving any significant military capability, who will be held accountable, and what steps the department is taking to ensure that this will not happen again."—***Sen. Carl Levin (D-Mich.) and Sen. John McCain (R-Ariz.), Senate Armed Services Committee, letter to Secretary of Defense Leon E. Panetta, Dec. 5.***

***Washington Post* Goes to War**

"Obviously, those who serve, or served, their country deserve generous health benefits. But Tricare goes well beyond that. The service is free for Active Duty service members and their families except for some prescription copayments. For retirees under the age of 65, many of whom are in the work force and eligible for employer-provided benefits, Tricare costs at most $1,000 per year out of pocket—less than a fifth of civilian plans, according to the Congressional Budget Office."—***Editorial,* Washington Post, *Dec. 3.***

New Generation

"We're already looking at what defines the sixth generation [fighter]. It'll be some kind of game-changing ability. Don't yet know what it is, but we're out there looking at it carefully. ... We're trying to decide what [a sixth generation technology] is. We're looking at technologies that hold promise to potentially define sixth gen, but we haven't said, 'That's it, we're going down that path.'"—***Gen. G. Michael Hostage III, head of Air Combat Command, remarks at the Center for Strategic and International Studies, as reported in* Air Force Times, *Nov. 30.***

Destroying Villages To Save Them

"To Save Congo, Let It Fall Apart."—***Actual headline on op-ed in the* New York Times, *Nov. 30.***

The Dumbo View ...

"We've crossed a line ... from using drones against known terrorists to using them more broadly against whole groups of militants. It plays into the narrative that portrays the United States as an enemy of Islam. ... We're in danger of creating more enemies than we are removing."—***Robert L. Grenier, a former CIA station chief in Pakistan, questioning use of remotely piloted aircraft to kill terrorists,* Los Angeles Times, *Dec. 2.***

... and the Smart View

"The drones are not machines that make decisions on their own. They are not robots. They are piloted; the pilots are simply thousands of miles away. The fact that those pilots are safe and they are not engaged in a 'fair fight,' which troubles some critics, has always struck me as positive. As an American, I do not like putting our military personnel at unnecessary risk."—***Former White House counterterror advisor Richard A. Clarke, op-ed* New York Daily News, *Dec. 2.***

Under the Big Top

"By the third siren, I wasn't scared at all, just fascinated by it. It was all surreal, the notion that rockets were being fired towards me, and that I wasn't really in danger."—***Ossie Ravid, Tel Aviv resident, referring to the work of Israel's "Iron Dome" anti-missile defense system in the recent Gaza-Israel violence,* Washington Post, *Dec. 3.***

Al Qaeda for Optimists ...

"I do believe that, on the present course, there will come a tipping point—a tipping point at which so many of the leaders and operatives of al Qaeda and its affiliates have been killed or captured and the group is no longer able to attempt or launch a strategic attack against the United States, such that al Qaeda as we know it, the organization that our Congress authorized the military to pursue in 2001, has been effectively destroyed. At that point we must be able to say to ourselves that our efforts should no longer be considered an 'armed conflict' against al Qaeda and its associated forces, rather a counterterrorism effort against individuals who are the scattered remains of al Qaeda ... for which the law enforcement and intelligence resources of our government are principally responsible."—***Jeh C. Johnson, then DOD general counsel, speech in Oxford, UK, Nov. 30.***

... and for Pessimists

"You have a well developed infrastructure [of al Qaeda in Iraq] that is only getting stronger. It's not like the 'underwear bomber,' where al Qaeda enlists amateurs in sophisticated terrorist operations. You're talking about people with experience. Perhaps not the 'A Team,' but close to it."—***Bruce Hoffman, former CIA counterterrorism expert and now Georgetown University professor,* Washington Post, *Dec. 3.***

Syria's Red Line

"This is a red line for the United States. I'm not going to telegraph in any specifics what we would do in the event of credible evidence that the Assad regime has resorted to using chemical weapons against their own people. But suffice it to say, we are certainly planning to take action if that eventuality were to occur."—***Secretary of State Hillary Rodham Clinton, press conference in Prague, Czech Republic, Dec. 3.***

Doing Less With More

"All through the George W. Bush and first Obama terms, we witnessed dramatic growth in the Pentagon's 'base' budget, adding about $1 trillion to planned DOD spending for nonwar basics—that is, not including the additional monies spent on the wars in Iraq and Afghanistan. With 44 percent more money, the Navy's fleet shrank by 10 percent; with a budget 43 percent larger, the Air Force's air combat fleet shrank 51 percent. ... The Army grew by a grand total of two brigade combat teams as its base budget grew 53 percent in real terms. How on earth is a Pentagon that permits most of its forces to shrink and age with increased budgets going to be a healthy asset for national defense with smaller budgets?—***Winslow T. Wheeler, director of the Straus Military Reform Project, op-ed in ForeignPolicy.com, Nov. 30.***

USAF is adapting its global intelligence, surveillance, and reconnaissance network to a new security environment.

ISR AFTER AFGHANISTAN

By Marc V. Schanz, Senior Editor

For more than a decade, the demands of the wars in Afghanistan and Iraq have shaped the Air Force's intelligence, surveillance, and reconnaissance enterprise. The unique demands of those conflicts have pushed USAF toward an "airborne-centric" ISR architecture—exemplified by flying platforms from the Predator to the U-2—but that's not necessarily the ISR structure needed for the future.

So said Lt. Gen. Larry D. James, the Air Force's ISR chief, in his November address to the Air Force Association's Global Warfare Symposium, held in Los Angeles.

The Air Force has established a "gold standard" in ISR, James said, but the service is rethinking its perpetual pursuit of an ever-increasing number of combat air patrols by ISR platforms. The ISR mission is evolving rapidly, now that the US exit from Afghanistan is in view, he said.

USAF now focuses on data: where it comes from, where to put it, and how to use it quickly and decisively.

"We don't care about the platform [or] the sensor," James said. "We just want the information to feed into this apparatus we've created" for the processing, exploitation, and dissemination of battlefield information.

As a result, priorities have changed. The service has slowed its pursuit of the MQ-X, a putative stealthy successor to the MQ-9 Reaper. It has proposed retiring the Block 30 version of the Global Hawk fleet of remotely piloted aircraft and has openly debated whether it should go forward with its stated commitment to building 65 CAPs' worth of remotely piloted aircraft.

Rather, the Air Force is now leaning forward to adapt its global ISR network to a new security environment, service leaders and others noted at the symposium.

USAF photo by SrA. Shawn Nickel

A pilot flight checks a USAF MC-12 Liberty aircraft at Beale AFB, Calif. The new ISR aircraft can collect two football seasons' worth of video in one day—and that's still not enough to meet the ISR demand in CENTCOM.

The force of the near future will have to respond to needs outlined in the 2012 Defense Strategic Guidance. The strategy demands an ISR capability that can function in a range of scenarios, concentrating on operations in US Central Command and the Asia-Pacific region—from the permissive environment of Afghanistan to countries sheltered behind formidable anti-access, area-denial systems.

In Afghanistan, the Air Force continues to provide enormous amounts of ISR to ground combatants and the Distributed Common Ground System, which has nodes around the world. Predators and Reapers covering some 59 CAPs operate in Southwest Asia, James said.

Over the last year, the lion's share of U-2, Global Hawk, and RC-135 Rivet Joint missions has been carried out in US Central Command's area of responsibility. USAF's MC-12 fleet, rushed into theater to fill the demand for full-motion video and sensor data, collects two football seasons' worth of video in one day, and requests still pile up, James said. Airmen in the ISR field gather and use data in new and innovative ways every day, bringing together information from all sources—signals, imagery, geo mapping, and others.

"We're not one 'int' focused. ... Our teams utilize all these domains to create information," James said, and the demand testifies to the effectiveness airmen have brought to the mission. But future battlefields will not likely offer the benign airspace of Afghanistan.

The Air Force's "global vigilance" enterprise faces demands on multiple fronts, as the US shifts its strategic priorities. Its moves to cut force structure indicate the Air Force has some tough choices to make.

While the Air Force and DOD draw down involvement in Afghanistan, a "broader range of challenges and opportunities"

USAF photo by Capt. Tristan Hinderliter

Above: SSgt. Tony Deaton, an MQ-9 crew chief, runs maintenance on a Reaper engine at Kandahar Airfield, Afghanistan. Right: A Reaper is manually taxied at Kandahar. The aircraft is launched and recovered from there, but controlled from Creech AFB, Nev., while in flight.

now rises from the strategic guidance, Air Force Secretary Michael B. Donley said in his symposium address. The Air Force is rebalancing its priorities as they might have stood had events such as 9/11 and the Iraq war not intervened, he observed. Those conflicts got top priority in an era of finite resources in procurement and force structure.

The joint force must be "agile, flexible, ready, and technologically advanced," Donley said, and these characteristics are well-suited to airpower.

Drawing a historical analogy, Donley said "island hopping" during World War II often provided a means to gain access to and control of airfields—highlighting the centrality of air superiority and long-range strike to strategic plans.

Congressional deadlock, however, has now paralyzed force planning, Donley said. Defense officials at all levels have warned repeatedly the sequester mechanism set up by the 2011 Budget Control Act would slash hundreds of billions of dollars from future DOD budgets and make the strategic guidance nearly unworkable.

"The days ahead will call for us to fine-tune our strategic decisions," Donley said, and "as we follow through on ... planning and execution, ... we [are] staying focused on readiness and modernization."

While there's little disagreement on the need for readiness and modernization, there remains "real resistance" in Congress to reducing force structure.

Carpe Diem

Still, uncertainty in the budget has helped spur a renewed push for innovation. James believes the Air Force should seize the opportunity. USAF's force structure for ISR will not see significant change in the near term, he said, and many of the assets used in US Central Command also see a great deal of use in the Asia-Pacific region—a trend that will accelerate in the future.

For example, of the U-2 fleet's 1,400 sorties since November 2011, nearly 300 were in response to taskings in US Pacific Command. As forces become available from Afghanistan, many senior officials anticipate the number of PACOM taskings to grow steadily.

The heavy lifting needed for the ISR mission's problem solving will take place inside the DCGS network, where USAF's analysts, data specialists, and others sort through a massive daily stream of information.

"That's where the magic happens, ... and frankly, there are a lot of challenges," James said, noting that DCGS processes more than 1.3 petabytes of data a month—equivalent to 1,000 hours a day of full-motion video—and better sensor technology will only add to these figures.

The next generation of the Gorgon Stare wide-area sensor, a podded system fielded on the MQ-9 over Afghanistan, will soon see action. It will provide overwatch of a 6.2-mile by 6.2-mile square swath for as long as a Reaper can remain airborne. While not providing the same resolution as high-definition full-motion video, it will give an analyst or ground commander effective surveillance of wide areas.

All this information, however, still requires human eyes to sift through it. As a result, fusion, storage, and use of this torrent of data is becoming a larger problem, particularly as USAF copes with shrinking manpower levels.

A visitor to a DCGS node might see an NCO sitting in front of a row of screens watching video. That airman "may be supporting a task, a 'pattern-of-life' development—it could be a lot of things," James said. "But if he's watching video, ... I would offer that's a lousy use of the human brain."

Machines and artificial intelligence tools have to help the Air Force get control of all this information. Commanders, analysts, and others should have access to a fused product of cyber and human intelligence as well as other data from across the network, "as opposed to having eyeballs watching a video," James said.

Below: An RQ-4 Global Hawk is readied for takeoff on the flight line at Andersen AFB, Guam. USAF has proposed retiring the Block 30 Global Hawk.

Data management and movement are vital to operations where control of air, sea, and space is contested, USAF leaders said. The Asia-Pacific region, much like the operating environment of the Cold War in Europe, has a host of potential cases in which adversaries would contest access to airspace, James said. The Air Force must fuse and leverage its vast data capabilities in new ways.

"We need to fundamentally change ISR," said Bran Ferren, co-chairman of Applied Minds LLC and a veteran of DOD and government advisory groups, such as the Defense Science Board, for more than 20 years. The US military needs to change ISR "so we never look at a single sensor again; we look at how it contributes to all the other sensors," he said during his speech at the symposium.

If a bomb were to go off in a city street in the US, Ferren observed, it would likely show up on YouTube almost instantly because there are now nearly as many video-equipped and networked cell phones on the planet as people.

The Air Force needs to rethink "network effects" exemplified by Facebook, he said; understand that it won't always own the ISR platform; and that the generated knowledge is context-dependent for a given scenario.

James largely agreed with Ferren's outside assessment, saying the Air Force must find a way to bring unconventional and open source assets into its ISR enterprise.

James spoke of the proliferation of Twitter feeds, the accessibility of YouTube digital video, and crowd sourcing applications on mobile devices as suppliers of information—what he dubbed "Twitter-Int"—that often get overlooked. Analytics have been developed to build better ISR products using information from these places.

"Every person is a sensor," James declared. "That really is becoming a reality," and the Air Force has to think "more broadly than we have in the past"

USAF photo

The RC-135 Rivet Joint (shown here), U-2, and Global Hawk have been largely operating in the US Central Command area of responsibility for the past 10 years, but are now receiving more requests from PACOM as well.

about how it will bring those sources into the process.

This has already come under discussion at the service's highest levels. At a recent Corona meeting, USAF's four-star generals discussed how the service would further meld space and cyber operations into the broader ISR mission and how it would operate in a more access-challenged situation.

Collaboration Is Key

Intelligence personnel are key to the cyber domain and they understand the importance of information gleaned from nontraditional sources.

"There is a lot of good discussion and work" in this area, James said.

ISR integration also touches the service's tacair modernization programs. One of the taskings out of the last Corona meeting was to lay out a way ahead for USAF's fifth generation fighters—the F-22 and F-35—and how to use their ISR capabilities. While these assets have huge capabilities, USAF officials have repeatedly noted, they still need to pass and receive data from networks via assets such as E-3 AWACS, ground stations, and other nodes of the ISR fleet which aren't fifth generation aircraft.

"We didn't design in the ability to bring that data [from the sensors and radars] off board," James said of the fighters. "So how do we improve the storage capacity [on Raptors and Lightning IIs], ... especially considering these assets will be the only assets we can fly in a contested airspace, initially?"

Another area of interest is how to improve operations from standoff distances, such as from U-2s flying outside the range of ground-based surface-to-air missiles and other threats.

Collaboration will play a huge role as the US draws down from Central Asia and redistributes its force structure. The ability to leverage the ISR data that allies collect and share will prove valuable.

"Effective alliances and partnerships are a force multiplier in a region as vast as the Asia-Pacific region," Donley said, noting cooperation activities with Australia and Japan are vital to maintaining USAF global vigilance.

Australia, in addition to contributing pilots to fly MC-12 missions in Afghanistan, has examined setting up a DCGS node and expanding space capability. This will pay great dividends as the US seeks new venues of cooperation with its treaty ally.

"We are never going to fight alone; we are always going to fight in a coalition," James said, mentioning that the British have bought RC-135 airframes from the US to add to their ISR capabilities.

Stacie L. Pettyjohn, a RAND political scientist who works with the Air Staff on several global posture studies, described global USAF presence as largely stable in regions where key interests and allies are located. However, as the Pentagon considers difficult force shaping propositions, she said it's worth noting that large Cold War-style garrisons overseas—such as those in Germany and Japan—are "anathema" to many new and prospective partners who often want a lighter, more rotational presence.

"The US should expect expanded demand for rotational access, ... but the character and scope will change in the future," she told symposium attendees.

The global satellite communications network over the Asia-Pacific region

USAF photo

Lt. Gen. Larry James (l) listens to Brig. Gen. Scott Dennis describe ISR capabilities at Kandahar Airfield. CENTCOM's intelligence needs are insatiable but may decrease as the US draws down in Afghanistan.

USAF photo

An MQ-1 Predator flies over Creech AFB, Nev. Airborne ISR platforms, such as the Predator, have exemplified the intelligence mission—but that may be changing.

will grow in importance, James noted, as the distances involved will compound the role of timely, accurate ISR.

"We rely on this network to move our information around," he said, but it has grown up largely ad hoc, as over time, U-2s plugged into it, then Predators and Reapers, and other assets.

"There was never a holistic architecture put in place to manage this global ISR enterprise. ... What does that network look like in the future?" James asked.

Over the summer, the Air Staff's ISR directorate gave an update to Donley's office on its progress in answering the question, but will brief the Secretary again this month on satellite communications architecture plans.

The discussion touches on all parts of the Air Force's ISR plan—from Predator down links to Space Based Infrared System data and video feeds from theater commanders to the mainland US, James said. Where ISR is created, where it is stored, how to decide what to move, and when and where to put easy-access information (using metadata tagging) are critical questions and have implications for investment decisions.

The stress on the network stems from a basic truth about America's ISR apparatus: Connectivity lies at the core of USAF's global ISR superiority. While other nations reveal every day that they too are building and expanding their own RPA technology, James said it is important to remember fielding an asset is far different than networking one—and this capability sets USAF apart from the rest of the world.

Created Expectations

Another country "can put something in the air and put ... a camera on it," he said. "But when you talk about command and control that effectively brings that information together, I would offer that nobody does that better than the US and the US Air Force."

When asked about the danger of putting too much stock in the success of the Air Force's ability to move and manipulate information in recent conflicts, James said he thinks all services and Pentagon officials largely understand what's possible and not possible without secured air and space superiority.

The shifting strategic needs of the force are already manifesting themselves in force structure deliberations and potential cutbacks in some areas. The Air Force may take a serious look at the buildup to 65 ISR CAPs, for example. USAF's guidance is to reach 65 by May 2014.

But as USAF walks through budget deliberations and gets a "better understanding of what the world looks like" after 2014 and into 2015, "I think that [number] is a valid question," James said. Reapers can be modified with new sensors and capabilities, and greater range (which would aid ISR work in the Asia-Pacific region greatly) but fundamentally, they remain assets that function far better in uncontested environments, he said.

The Air Force's successful ISR effort over Iraq and Afghanistan shouldn't be taken lightly by planners.

"We have created expectations that ISR will be able to tell what is going on over the hill or on the battlefield," James said. In any environment where control of the air, space, and cyberspace is contested, that proposition becomes far more complex.

"In a contested environment, that will be tough," James said. ■

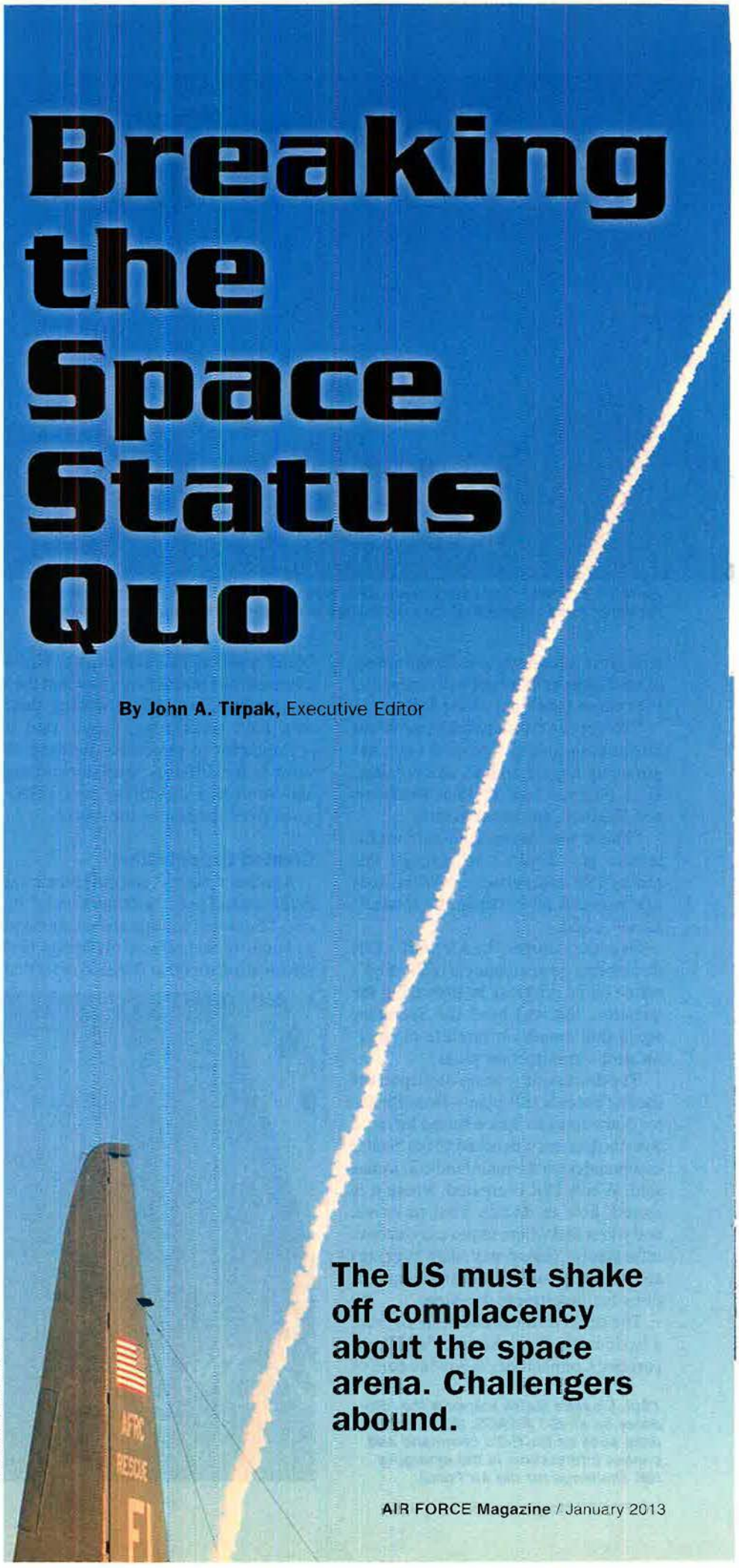
USAF photo by Margo Wright

TSgt. Lissette Malek inspects the rotodome on an E-3 AWACS. Networking data, such as the E-3's command and control information, is the emerging ISR challenge for the Air Force.

Breaking the Space Status Quo

By John A. Tirpak, Executive Editor

The US must shake off complacency about the space arena. Challengers abound.



USAF photo by TSgt. Peter Dean

The United States has become complacent about military space, depending heavily on a few small satellite constellations that are increasingly vulnerable to attack or accidental loss but for which there are no backups. The nation must build some resiliency into its space systems, even as it searches for innovative and affordable ways to lower costs while expanding its overall space capabilities.

These observations and warnings came from Air Force and industry leaders gathered in Los Angeles for the Air Force Association's Global Warfare Symposium, held in November. The US is irrevocably dependent on its space infrastructure, making its satellites a prime target for its enemies. At the same time, the technology for disabling or interfering with satellites is proliferating and getting cheaper. The situation demands a shift to a more resilient, loss-tolerant space infrastructure, they said.

"There isn't a single operation out there, from humanitarian relief operations to irregular warfare to full-scale conflict, that doesn't depend on space capabilities," Air Force Space Command chief Gen. William L. Shelton said in his address at the symposium.

"The ability to operate with impunity in space" for several decades "allowed us to develop very fragile satellites," he said, "with lots of capability on a single spacecraft." But because those spacecraft cost so much and take so long to build, "we've evolved into a 'just in time and just enough' mentality, with no margin for launch failure or premature spacecraft failure," he observed.

Though United Launch Alliance has racked up an impressive string of successful launches, Shelton said the Defense Department is kidding itself if it assumes there will never be a loss.

"We know failures are inevitable," he said, but "we simply don't invest to account for failures." The loss of a crucial satellite when there are no backups, given the near-total dependence of the US military on navigation, communication, timing, weather, and the collection of data from space would be devastating and hard to work around, Shelton maintained. The situation is "unacceptable" from a military perspective.

"We'll need to honestly assess the future, as opposed to attempting to find fault" with studies that argue for a new approach, he insisted.

Jamie M. Morin, acting undersecretary of the Air Force, pointed out that space dominance—or even unencumbered use

USAF photo by Dennis Rogers

Left: A United Launch Alliance Delta IV rocket lofts the GPS IIF-3 satellite in early October. Air Force Space Command is working on ways to increase GPS coverage in challenging terrain and urban areas. Above: Gen. William Shelton at Schriever AFB, Colo. Shelton said that every military operation now performed depends, in some part, on space capabilities.

of space—"is not a birthright, ... not a guarantee" for the US, and the nation must continue to invest to ensure the continuing flow of space-based information to terrestrial forces.

Efficient Procurement

There are now nine nations that can reach space on their own, he said. Air Force leaders, when they talk about space, have come to discuss it as "congested, contested, and competitive," and national strategy recognizes this. With more crowding and unfriendly neighbors on orbit, the US must strive for space mission assurance along "multiple avenues," including resiliency with "affordable mission goals in mind," Morin said.

It's a critical time for Air Force space, he said. USAF invests 20 percent of its procurement funds in space programs, because a variety of constellations—all of them having outlived their expected service lives—must all be replaced at about the same time. These include missile warning systems such as the Defense Support Program, along with communications birds such as Milstar and the Defense Satellite Communications System. A new generation of more powerful satellites is being deployed, but "with significant cost issues."

USAF is pursuing "efficient space procurement," a blanket term to describe a host of measures aimed at reducing costs, Morin said. These include stabilizing research and development funding, buying satellites in production blocks, "greater use of fixed-price and incentive-fee contracts," and "should cost" reviews to determine where cost growth is happening and what drives it.

Morin said these measures have collectively saved $778 million on the Advanced Extremely High Frequency (AEHF) communications satellite program and could save a further $521 million on the oft-restructured Space Based Infrared System satellite program, or SBIRS, if Congress goes along with USAF proposals. That $1.3 billion in savings is "real money," he asserted, adding that he expects Congress will approve USAF's changing methods. "We've gotten good support" from Capitol Hill, so far, he said.

The Air Force is also open to new ideas, such as "disaggregations" of satellite systems—reducing behemoth spacecraft in size and complexity by dividing their tasks among smaller, presumably less costly and less complicated satellites. Other ideas include using partnerships with allies and hosted payloads, so a defense mission package would ride along on a commercial satellite.

Australia paid for Wideband Global SATCOM satellite No. 6, Morin pointed out, in exchange for access to a portion of the bandwidth from the whole constellation. A similar deal was reached on WGS 9, he noted, paid for by Canada, Denmark, Luxembourg, Netherlands, New Zealand, and the US. This is a huge opportunity to leverage allied dollars, Morin said.

Overall, USAF seeks a balance between resilience, functionality, and affordability, Morin said.

Shelton, however, emphasized that space is changing faster than policy.

"We certainly haven't adjusted to the new realities of the neighborhood we operate in," he said, warning that key orbits are becoming increasingly crowded, with rising incidents of collisions with space junk or other spacecraft. This "formerly pristine" environment is now "occupied by friend and foe alike," and adversaries have "begun posting signs to warn us they will take action against us in time of conflict."

He's well pleased, in general, with the progress of the new generation of satellites, such as SBIRS and AEHF. They were built for "when the hour is darkest," but little consideration has been given to "survival of the actual platform," he said.

If these missions must, indeed, be no-fail, since they warn of nuclear war and allow the President to control global US forces in wartime, "doesn't it follow," Shelton asked, "that we need to build in some resiliency?"

In an interview, Shelton said there are many ways enemies can—and do—interfere with US satellites.

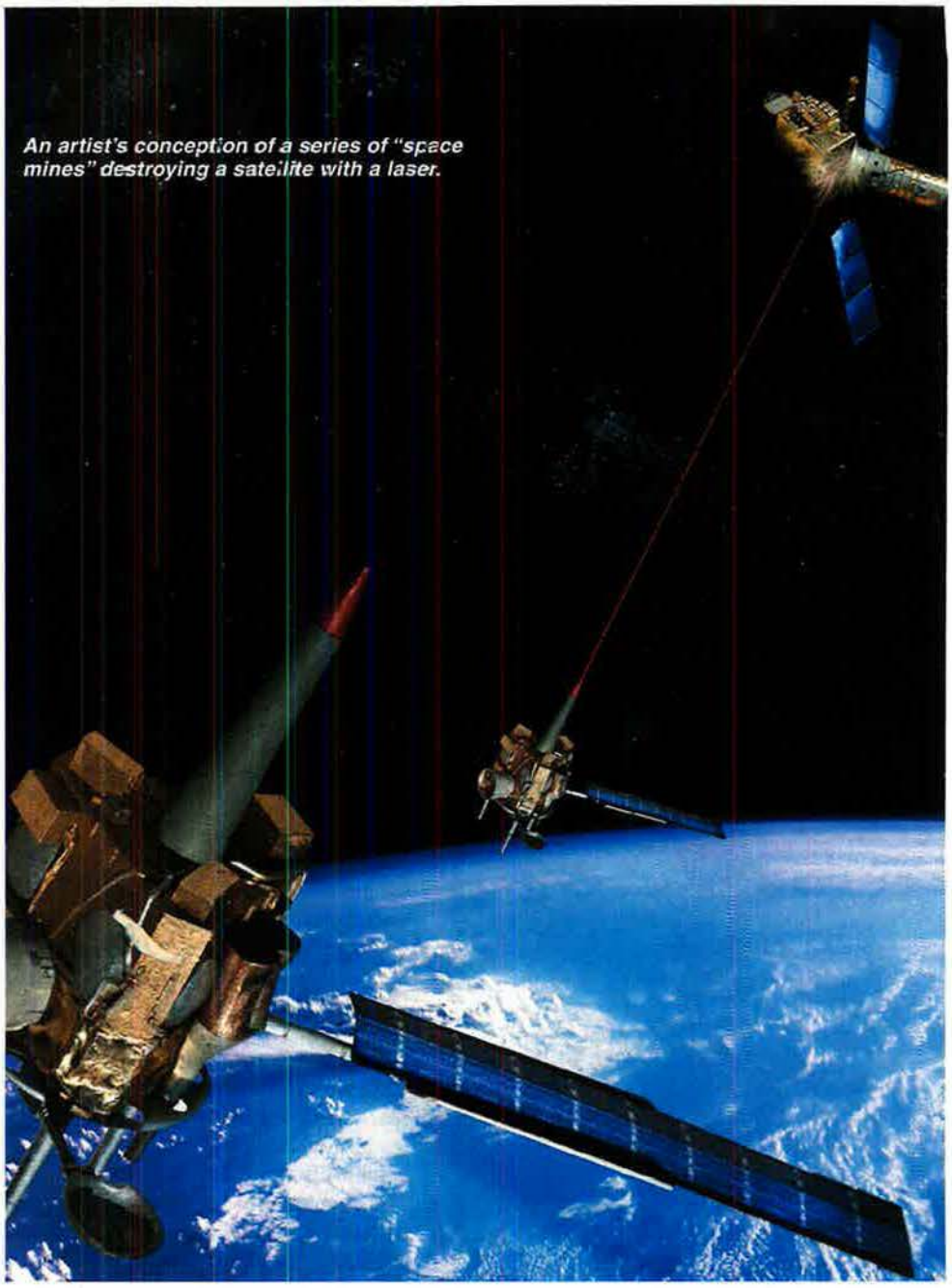
"You can buy a GPS jammer on the Internet," he said. Jamming communications satellites is not difficult, either, "if you've got a satellite TV truck ... and you can match the frequency and ... power to the signal you're trying to jam." Voice of America broadcasts have been blocked by such methods, he said.

"Technically, it's not difficult at all," he said. In fact, "it's prevalent."

More worrisome to him is directed energy. There are already ground-based lasers that can "dazzle" satellites by impairing their optics, but not too far off are "higher-power lasers that would be more destructive," he said.

Moreover, "with the right laser, you can hit a satellite, destroy it, go to the next satellite, destroy it; just keep reloading in very quick fashion, and you can take out our low Earth orbiting satellites of interest in pretty short order."

It would take Space Command "a while to infer ... what's happened," if a satellite were attacked, Shelton observed. A laser has no trajectory that can be tracked back to a point of origin as a rocket does. One dead satellite could be "an anomaly"; only with a second one going off the air in about the same region would a pattern be established and a point of origin of the attack approximated. Even then, the laser anti-satellite system could be mobile, "so this is going to be a real challenge for us." He emphasized the need to keep up with USAF's space-based surveillance systems program so the nation can know as quickly as possible if its constellations are under attack.



An artist's conception of a series of "space mines" destroying a satellite with a laser.

A Road Paved in Gold

China's 2007 test of a kinetic anti-satellite system—which left a terrible mess of space junk in its wake that has been a hazard to space navigation ever since—is just one more example that there are "any number of threats out there in the counterspace world, and we have to adapt; we have to adjust," Shelton asserted. "There is no question in my mind . . that the status quo is not adequate, in terms of the way we've filled out our constellations."

Shelton told the symposium attendees the US should consider making "battlefield attrition purchases" of critical spacecraft, much as it does with fighters or bombers. For some reason, decision-makers accept that there will be combat losses of aircraft and plan for them, but don't do so with satellites, he said. This change in mindset is especially crucial now that national strategy focuses on overcoming anti-access, area-denial environments, he said.

"The same rigorous examination of A2/AD in the terrestrial domains must incorporate the challenges to enabling space and cyber services we take for granted in our permissive environments in Afghanistan today," Shelton said.

He acknowledged that space programs such as SBIRS were extremely costly to mature—"a road paved in gold." Some argue that "we've reached the production mode on our constellations, so we shouldn't change a darn thing," and that any changes should be "minor evolutionary [modifications], and life will

Artist's conception by Erik Simonsen

Getting to Orbit and New Players in the Launch Business

"We love the operational record" of United Launch Alliance, which has racked up 57 consecutive successful satellite launches, said Air Force Space Command chief Gen. William L. Shelton at the Air Force Association's Global Warfare Symposium in Los Angeles in November. But while he's buoyed by the prospect that new competitors in the launch business could drive down launch costs—he has previously said savings could amount to 50 percent over current contracts—Shelton isn't sure there's a business case for a lot of new companies in the industry.

Though the US is absolutely dependent on a space launch industrial base, Shelton also isn't sure the time has come yet to create an industrial policy that would pick winners and losers.

The ULA joint venture of Boeing and Lockheed Martin—builders of Atlas and Delta rockets under the Evolved Expendable Launch Vehicle program—came about because an expected boom in demand for launch services never materialized. It still hasn't, Shelton said.

It's not clear there will be "adequate business for multiple launch providers," Shelton said in his speech, despite the aggressive growth of new-start entrants such as SpaceX, which has already lofted payloads for NASA. Even counting the international market, it remains to be seen whether any company can capture enough business to make a go of it.

In an interview, Shelton said the emergence of SpaceX was possible only because of the "deep pockets" of founder Elon Musk, who raised outside capital to get the company started and win NASA contracts.

"He's not ready to carry national security payloads" of high value, Shelton said. "We have a certification process that we will go through to get him certified, but until we can get to the place where we have adequate mission assurance with SpaceX, we won't contract with them. And he knows that." There's a lot of "due diligence" to be done "on both sides," Shelton noted.

Other companies looking to break into the rocket industry may have a long way to go to build their business through international contracts or space tourism, and "we'll see if that takes off." Space tourism has a "very select" potential customer base, but "nevertheless, they've got customers lined up," Shelton admitted.

However, there just aren't "a plethora of payloads out there waiting [for] rides," Shelton said. "We could get to a place where there is an overabundance, ... and the market just doesn't support that many providers. It's going to be interesting to watch this develop over the next few years and see who gets to stay in the business and who doesn't."

The Air Force is "struggling" with the issue of whether it must subsidize certain elements of the industrial base to assure a steady supply of critical elements, Shelton said.

The decision to maintain both Atlas and Delta ensured that a problem with a single type of rocket would not ground the military space effort.

The service is looking at whether it can "decide that we need just Atlas or just Delta and walk away" from maintaining two rocket types.

In a sense, USAF is already down to one supplier for its upper stage, with the Pratt & Whitney RL-10 rocket motor, currently under a cloud due to an anomaly in launching the GPS IIF-3 satellite. That bird reached orbit, but if it had been heavier, might not have, Shelton said.

These considerations are "really a Rubik's Cube" of questions with interrelated answers, Shelton said.

Though the Air Force is "concerned" about the health of space contractors, it is not yet worried enough that "we would make targeted investments, necessarily, to make sure that we've got a valid industrial base."

be good." But that, Shelton said, would be like deciding never to invest in fifth generation fighters, "even though modern integrated air defenses will clearly defeat our older platforms."

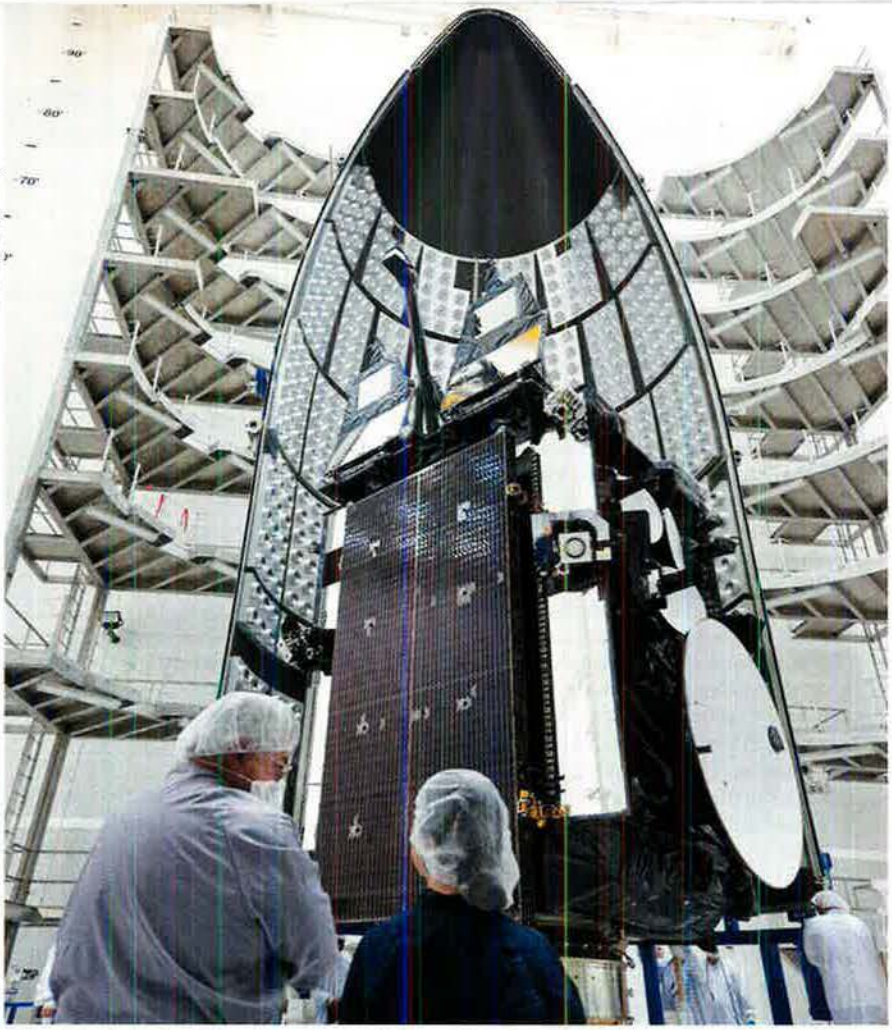
Lt. Gen. Ellen M. Pawlikowski, head of the Space and Missile Systems Center, said there are many opportunities for disaggregating satellites. On SBIRS, for example, "the strategic and tactical functions could be divided" among two satellites rather than being carried aboard a single large and heavy one, she said. It's a strategy Shelton agrees with: More satellites mean "we at least complicate the attack options for the adversary."

Likewise, he said, the scanning and staring functions on SBIRS could be flown on different platforms, "or if the staring sensors develop as well as we expect, we could go to a larger number of staring sensors on smaller platforms."

Pawlikowski also observed that the US relies heavily on buying satellite communications capability and even imagery from private satellite companies, and Shelton noted that "80 percent of the [communications] traffic coming back from Afghanistan is over commercial SATCOM." The US can go a step further with "hosted" payloads.

Walter S. Scott, executive VP of DigitalGlobe, suggested half-jokingly that one way to discourage China or Russia from targeting a US orbital system is to host it aboard a Russian or Chinese television broadcast satellite capability. Shelton concurred.

"People joke about that but there has been a lot of talk about hosted payloads on consortium satellites," he said. An attack on such a craft—owned by a number of countries—means "again, you've complicated the targeting calculus. So



Lockheed Martin photo by Jim Dowdall

A look inside the Atlas V payload fairing while the second Advanced Extremely High Frequency satellite is encapsulated. Shelton is pleased by the progress of the new generation of satellites such as AEHF, but feels more attention must be paid to the survival of the actual platform.

this is all part of the departure from the status quo that we need to think about."

Kay Sears, president of Intelsat General, said in a panel discussion that the US strategic pivot to the Pacific will require greater investment in satellite coverage of the area.

"We need more ground stations in the Pacific," she said. "We need very different satellites and frequencies" and more jam-proof satellite capabilities. Intelsat provides the lion's share, by far, of the satellite communications that allow the Global Hawk to fly and gather information. A step up in use of Global Hawk in the Pacific theater will require a commensurate increase in satellite coverage of the area, she said.

But she also confessed to being "pretty worried" about the theater and "our ability to recover and endure in wartime" in any Pacific conflict.

Commercial satellites need more tools to remain capable if jammed or attacked, and she offered a list of technologies—steerable and switchable beams, for instance—that would keep the commercial constellations DOD depends on functional in a conflict. The Department of Defense should bear a good part of that cost, she argued, but it would be affordable for the insurance it would provide. There could be a number of arrangements explored, such as sharing costs or bartering imagery for security, she said.

Scott said he didn't think the Civil Reserve Air Fleet—commercial cargo carriers that get preferential contracts in peacetime in exchange for a willingness to be "drafted" in wartime—is the right model for satellite imagery and communications. That's because there is a premium to be charged for selling "first priority" to other users that could be pre-empted by the US in wartime. Sears said she thinks the "co-investment" model, such as with WGS arrangements with Australia and other countries, makes a better exemplar for hosted payloads and priority service.

Die Is Cast for AEHF, SBIRS

John Celli, president of Space Systems/Loral, said he thinks the hosted payload is the way to fill needed capacity in the Pacific, but he warned that the Pentagon would have to change the way it does business to get industry to partner in this way. It might take 20 years of a satellite's life to pay back the cost of designing, launching, and operating it, he said, but the Pentagon only wants to make two-year deals for services, at most.

"I don't know who would take that deal," he said.

In design terms, "the die is cast" for AEHF and SBIRS through the sixth satellite in both series, Shelton said. With block buys and other considerations, that means no significant change in the configuration of those satellites through the mid-2020s, he said, assuming no launch failures or premature satellite failures. Given stable designs, "I'll freely admit the safe bet, from a cost perspective, is to stay the course." However, from a survivability and resiliency standpoint, he said, work should begin soon to disaggregate, shift to smaller satellites and hosted payloads. GPS is a model, he said, because "with such a large constellation, there is built-in resiliency," and AFSPC is pursuing anti-jam efforts and "more comprehensive coverage in challenging terrain and urban areas."

Shelton is seeking to shelve the Operationally Responsive Space office, arguing that the functions it has performed and its "philosophies" are best fulfilled by SMC. The ORS program has explored the idea of hosted payload, and tried it once so far, with CHIRP, or Commercially Hosted Infrared Payload. The ORS program has also looked at the concept of smallsats. So far, Congress has not agreed to stand down the ORS office, "so we will find a compromise to make best use of the funds provided," Shelton said.

The notion of ORS, though, is fundamentally flawed, he argued. The ORS also looked at how to rapidly launch replacement satellites if one was taken out by an accident or attack. Shelton said, though, that it makes little sense to have satellites on the ground, "sitting around waiting for the day" when they might be needed—and then try to launch them under "crisis conditions." Better to have them already on orbit, he said, since a larger constellation will improve functionality and present a greater number of targets to an adversary.

While adversaries have demonstrated their ability to attack satellites with electronic warfare, lasers, and kinetic means, the latter is "not anything we favor" as a potential US response, Shelton argued. Kinetic attacks create thousands of pieces of debris which only makes things more difficult for the US in its own space operations.

"That's not a good strategy," he said, adding the US will "look at other ways to do counterspace." ■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Meet the New PLAAF

By Rebecca Grant

China's air force—the People's Liberation Army Air Force—has emerged in recent years as an upstart competitor in the realm of airpower. "All indicators point to the continued improvement of the PLAAF over the next decade, to the point where China is expected to have one of the world's foremost air forces by 2020," said the US Air Force's National Air and Space Intelligence Center (NASIC) in an authoritative 2010 report.

The PLAAF put itself in the headlines around the world by rolling out the J-20 with its first public flight in January 2011. The stealthy aircraft's first flight was one dramatic example of a steady process of modernization based on outright purchases from Russia, licensed production agreements, and China's own aircraft development by leading prime manufacturers Shenyang Aircraft Corp. and Chengdu Aircraft Industry Group.

Fighters aren't the only new capabilities. China has added advanced missiles, upgraded its venerable H-6 bombers, and pressed ahead with airborne early warning. China's air force operates numerous advanced air defenses. In the last few years, progress in doctrine and training has picked up speed. Last but not least, China has an aircraft carrier undergoing sea trials.

Today the new PLAAF is reorganized, modernized, and in the hunt for control of the air.

Geopolitical Response

China's airpower ambitions come from its own direct experience and from observing the success of the US and its allies in crafting airpower into an asymmetric advantage. One major catalyst for change was the 1996 Taiwan Strait Crisis, when China threatened Taiwan, through short-range ballistic missile tests and military exercises, and US Navy aircraft carriers made transits of the strait in a show of force.

Amy Chang of the US-China Economic and Security Review Commission wrote in a recent report that the crisis "catalyzed investment in the long-term modernization and professionalization of China's armed forces. If there had been uncertainty before as to what the United States might do in a Taiwan scenario, this seemed to be a clear statement that US forces would intervene—and that the PLA lacked effective capabilities to deter or defeat them."

A June 2012 Center for Strategic and International Studies (CSIS) report on Asia stated, "In particular, China realized after the Taiwan confrontations that it possessed a limited set of military options (short of nuclear weapons) and that US power projection in the form of aircraft carriers and long-range precision strike (e.g., B-2 bombers) to deter Chinese aggression were insurmountable for the PLA."

China entered the second decade of the 21st century on track to wield a much wider range of conventional force options and with improved airpower capabilities out in front. No longer is the PLAAF "an overly large, technologically inferior force," stated NASIC. Divestment and investment have reshaped China's two-tier air forces. The PLAAF is moving into position to capitalize on geographic strengths and raise the stakes very high for an opponent should a crisis arise. It is worth recapping how all this came to be.

China has learned a lot from USAF.

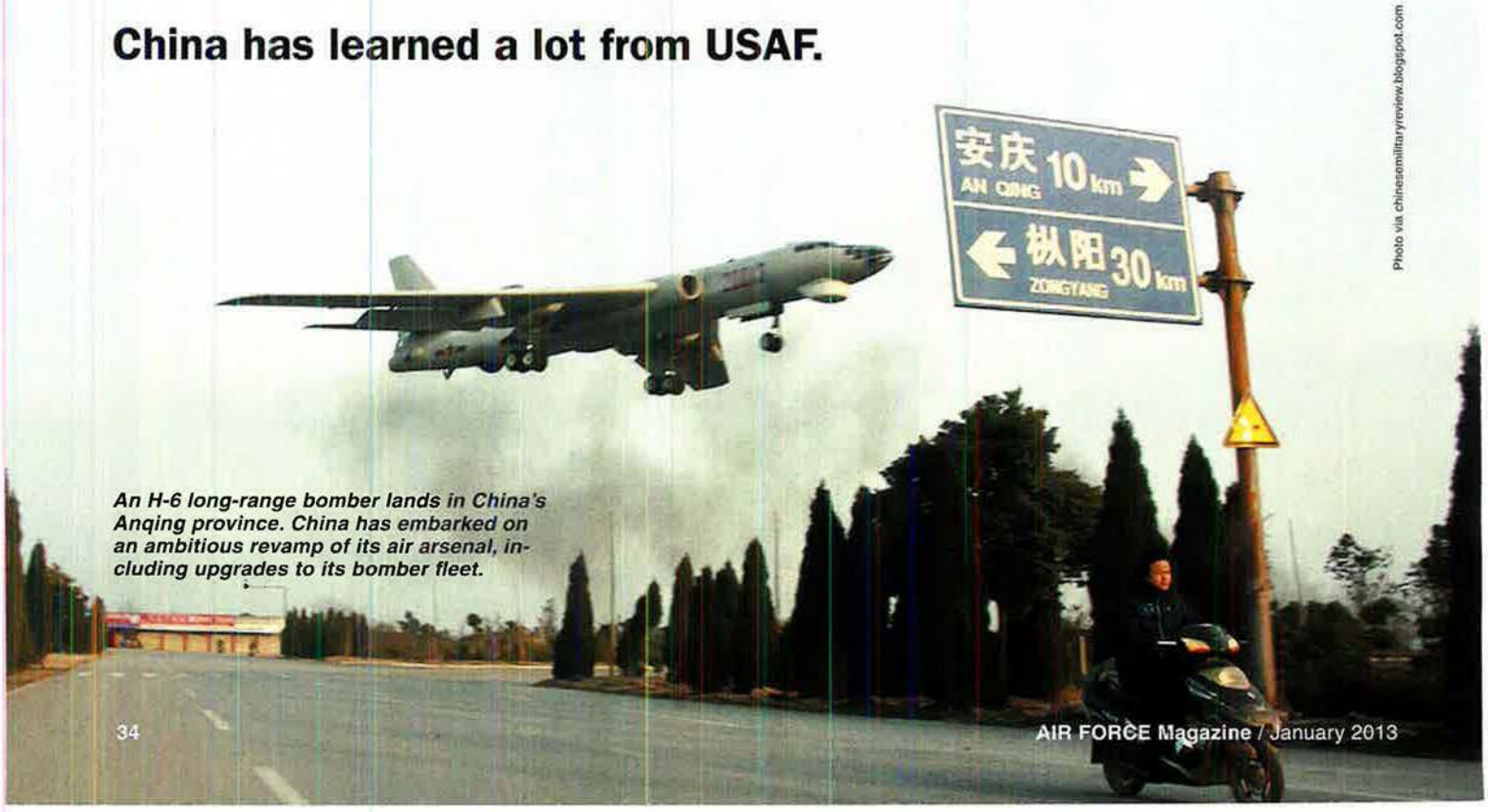

Photo via chinesemilitaryreview.blogspot.com

An H-6 long-range bomber lands in China's Anqing province. China has embarked on an ambitious revamp of its air arsenal, including upgrades to its bomber fleet.

China's Fighter Modernization

By far the most significant development for the PLAAF has been the shift from a large force of outdated, 1960s-vintage fighters to a smaller, more capable force. Today's PLAAF features several fighters brought into service in the 2000s. Some were purchased from Russia, while others were built under license by China's two major combat aircraft manufacturers, Shenyang Aircraft Corp. and Chengdu Aircraft Industry Group. Together they total nearly 400 aircraft whose aerodynamic characteristics and armament may be close to par with US fighters, excepting the F-22.

The PLAAF describes its force structure as a two-tier system. "The PLAAF has established a major weapons and equipment system with third generation aircraft and surface-to-air missiles as the mainstay, and modified second generation aircraft and surface-to-air missiles as the supplement," as China described it in a 2008 national defense document.

The Pentagon's 2012 China military report tallies 1,570 fighters, 550 bombers, 300 transport aircraft, plus another 1,450 older aircraft in the PLAAF inventory. However, the report does not offer a thorough order of battle.

A more detailed way to look at the PLAAF is by its own metric of "mainstay" and "supplement" forces. The mainstay forces correspond to fourth generation fighters in US terminology. The supplement forces owe much to advances and derivatives of the MiG-21. The table shows estimates from two sources for fighter and attack aircraft plus the H-6 strategic bomber.

MAINSTAY				
	Maker	**Type**	**RAND**	**AMR**
	Chengdu	J-10	120	200
	Sukhoi	Su-30	73	76
	Shenyang	J-11A	116	140
	Shenyang	J-11B	18	
	Xian	JH-7	72	70
Subtotal			**399**	**486**
SUPPLEMENT				
	Shenyang	J-8	312	360
	Chengdu	J-7	552	350
	Nanchang	Q-5	120	130
Subtotal			**984**	**840**
Fighter/Attack			**1,383**	**1,326**
Strategic Bomber	Xian	H-6	**82**	**120**

Sources: *Asian Military Review*, "The AMR Regional Air Force Directory 2012," and David A. Shlapak, RAND, "Equipping the PLAAF," in *The Chinese Air Force* by Hallion, Cliff, and Saunders.

The number range suggests China probably has more than 400 fighters in the fourth generation class by US terminology. Analyst Richard Fisher Jr. expects this number to grow. "Given what can be discerned about production rates, by 2020 it is conceivable that the percentage of 'modern' combat aircraft could exceed 50 percent or be closer to 1,000 in number," Fisher concluded in a late 2011 calculation published by the International Assessment and Strategy Center.

Just as important are improvements in air-to-air missile technology. China once relied on imitations of the AIM-7 family but now has sophisticated short- and medium-range air-to-air missiles in its inventory. The principal types are the R-27/AA-10 semi-active radar/infrared missile; the infrared guided R-73/AA-11 with a range of 18.6 miles; and the active radar homing R-77/AA-12 with a range estimated at 31 to 50 miles. Three of the four main types of fourth generation fighters—the J-10, J-11, and Su-30—carry the long-range advanced air-to-air missile R-77/AA-12 and the indigenous variant PL-12. So does the J-8, bringing the number of potential missile platforms to 776.

Stealth Competition

Two major Chinese aerospace firms are flying stealthy fighter demonstration aircraft. Of course, both are subsidiaries of AVIC, China's Aviation Industry

Photo via chinesemilitaryreview.blogspot.com

***J-15 fighters, such as this one, in late November made successful arrested landings on the Chinese carrier* Liaoning.**

Artist's conception by Erik Simonsen

An artist's conception of a pair of J-20 fighters on a mission. The "Mighty Dragon" made its first public flight in January 2011, during a visit to China by then-Defense Secretary Robert Gates.

Corp. Together, the J-20 and J-31 could represent a design competition similar to the contest between the Lockheed Martin team X-35 and the Boeing X-32 back in 2001. At the least, the new fighters indicate a healthy combat aircraft design base absorbing lessons from multiple international sources and putting them in experimental designs.

The Chengdu J-20 was first to fly. In a 2009 China Central Television interview, Gen. He Weirong, deputy head of China's air force, said stealth fighters were about to undergo test flights and would be deployed in eight or 10 years. The J-20 "Mighty Dragon" made its first public flight in January 2011 during a visit by US Secretary of Defense Robert M. Gates to China.

The J-20's front aspect in particular shows many external stealth design curves and features similar to the F-22. From side and rear aspects, the resemblance fades, due to the block fuselage, canards, protruding engines, and thin vertical stabilizers. For now, it is equipped with Russian-built AL-31F engines. The size of the J-20 suggests it could carry internal fuel plus a large bomb bay suited to known Chinese missile inventories including cruise missiles and extended range air-to-air and anti-ship missiles. RAND analyst David A. Shlapak estimated it might be capable of supercruise, i.e., reaching Mach speed without afterburner.

Second to fly, on Oct. 31, 2012, was the Shenyang J-31 (named by analysts after its tail number), first seen in roll out photos before it took flight. The J-31 appeared to be a more compact and advanced design. From flattering angles it could almost be the fourth variant of the F-35. "The J-31 is almost certainly designed with the intention to have the potential of operating on aircraft carriers, judging from its enhanced double-wheel nose landing gear" and vertical stabilizers, aviation analyst Bai Wei told *The Times of India*.

The flight of the Shenyang demonstration aircraft leaves little doubt China's two top fighter houses are striving for stealth. In US terms the presence of two X aircraft types would signify a demonstration and validation flyoff competition and put a potential full-scale program less than five years from production.

China's bombers are not new or stealthy but their armament cannot be dismissed. With Russia, China is one of the few air forces to operate a bomber fleet. China's H-6 bomber is an old design derived from the Soviet Union's Tu-16 Badger bomber. The total build was around 150 H-6 bombers shared among the PLAAF and PLA Navy. Up to five were converted to air refueling tankers in the mid-1990s.

By itself, the 1950s-era technology is not impressive. The real story lies in the cruise missiles carried by the H-6. An H-6G bomber first tested an extended-range, air-launched anti-ship missile more than a decade ago in 2001. At least one variant, the H-6K, reportedly can deliver six DH-10 cruise missiles or carry six to eight long-range air-to-air missiles primed for hunting airborne early warning aircraft such as the E-3 AWACS and E-2C/D Hawkeye.

The DH-10 cruise missile shows Chinese military air attack development in microcosm. The ground-launched missile was first deployed in small numbers in 2008. By 2009, the number of deployed DH-10s was pegged at up to 350 missiles. Current assessments suggest China has between 200 and 500 DH-10 missiles with a 930-mile range. What portion of the inventory consists of air-launched cruise missiles is not known.

Still, this growing capability gives China the ability to create havoc in the air over the Pacific. Estimates suggest the H-6M carries four anti-ship missiles, while the H-6K carries six cruise missiles. China has the option of combining its most advanced H-6 bomber variants with air-launched DH-10 cruise missiles, theoretically increasing the missile's reach to more than 2,000 miles.

Guam and all other locations of US Pacific Command facilities would fall in range of the H-6 bomber given those specifications.

China made its first move for an AWACS-like aircraft more than a decade ago by attempting to buy Israel's Phalcon airborne early warning system. The deal was nixed in 2000 but only after the US House Appropriations Committee threatened to cut US aid to Israel. China has since developed the KJ2000 radar system, mounted now on Il-76 aircraft. Reports indicate China is attempting to modify a Boeing 737-800 to host the radar package. Estimates suggest China has four operational airborne early warning aircraft.

The PLAAF is also tasked with ground-based air defense. The PLAAF took delivery of its first SA-2s in 1958 and has since built a formidable arsenal of legacy SAMs, advanced Russian systems, and their own indigenously modified HQ-9s. Like fighter aircraft, the PLAAF surface-to-air missile fleet has a highly modernized elite force of about 192 launchers on top of a bedrock of approximately 490 legacy launchers.

Of particular concern are the 192 SA-20, SA-10, and HQ-9 type launchers. The SA-10 range is about 50 miles, but the SA-20 variants have ranges between 93 and 124 miles.

Training for the SAM units "focuses heavily on night mobility," according to NASIC. A typical exercise begins with rapid departure, positioning to a preselected launch site, and camouflage and concealment.

The Chinese-developed HHQ-9 is a sea-launched missile that has been dem-

onstrated in launch from Chinese Navy destroyers. Its range is estimated between 47 and 93 miles. With the HHQ-9, China could project lethal air defenses at sea as far as its fleet can maneuver.

Carrier Aviation Prospects

Next to its stealth aircraft, the most dramatic expansion of China's airpower comes in the form of its new aircraft carrier.

China purchased the ex-Soviet Union's *Varyag* in 1998 and ultimately towed it from the Black Sea for extensive refurbishment. The 65,000 ton displacement *Varyag* was the second hull of the Kuznetsov class. The carrier put to sea in August 2011.

Liaoning was formally christened on Sept. 25, 2012, at a ceremony attended by China's President, Hu Jintao. Senior Col. Zhang Zheng was named as *Liaoning's* first commanding officer. Zhang, age 43, previously commanded a frigate and a guided missile destroyer. He studied English and military doctrine at the Joint Services Command and Staff college in Britain from 2001 to 2003.

People's Daily Online in October 2012 reported that Li Jie, a professor at the Marine Military Academy, said the aircraft carrier and their fleets in particular enable the naval force to go farther and conduct maritime surveillance with more efficiency.

As with the stealth programs, there have been major debates about the Chinese carrier. "The most controversial issue of the post-Cold War era has been whether or not China is planning to procure aircraft carriers," wrote Norman Polmar in December 2008.

Liaoning differs from the US Navy's Nimitz-class carriers in several ways. Launch operations take place from the primary deck where a 12-degree ski jump lofts fixed wing aircraft into the air. Arresting wires recover aircraft. *Liaoning's* hull was originally designed for substantial self-defense, with automatic deck guns comparable to the Phalanx, vertical launch tubes for long-range air defense, and ship-to-ship missiles.

Full flight operations have not yet been observed. However, a Shenyang J-15 fighter completed a touch-and-go landing drill on *Liaoning* on Oct. 12, 2012, and in late November a pair of J-15s made successful arrested landings before launching again from the carrier. The J-15 is a Chinese-built derivative of the Su-33 designed for carrier operations. China acquired one Su-33 (an upgrade of the Su-27) from Ukraine in 2001. Analysts Phillip C. Saunders and Joshua K. Wiseman from the National Defense University expect the J-15 to enter full rate production between 2015 and 2017, which "will give China a capable fourth generation fighter that can be operated from aboard aircraft carriers." The carrier class was originally designed to deploy with some 30 fixed wing fighters and an additional complement of helicopters. That deck mix will add both prestige and local control of the air.

USAF photo by TSgt. Jerome S. Teyborn

Gen. Herbert Carlisle (r), commander of Pacific Air Forces, speaks with Lt. Gen. Cai Yingting, deputy chief of the General Staff of the People's Liberation Army, at JB Pearl Harbor-Hickam, Hawaii. Carlisle says China's technology may be 15 years behind the US, but America's stealth advantage is diminishing.

Net Assessment

NASIC summed up the improvements so far: The PLAAF "is emerging as a well-equipped and increasingly well-trained force, still possessing some identifiable shortcomings and weaknesses."

Significant holes remain in the PLAAF modernization. Foremost among these is its small air refueling fleet. China has perhaps eight Il-78 tankers and may have converted up to a dozen H-6 bombers to refueling status.

Lack of combat experience is also a factor. The USAF pilot force, for example, has long boasted at least a fraction of airmen with combat experience from Vietnam, Operation Desert Storm, etc. Combat experience plus large force exercises season aircrews. The last Chinese pilots to gain combat experience also flew during Vietnam. So far, China's pilots have given no sign that they are gaining skills the way US forces do in Red Flag and other training events. However, they have begun some international exercises as with the deployment to Turkey in 2010.

What's much harder to assess is the tactical savvy of China's air force leaders from unit to headquarters level. One interesting fact: The preponderance of top officers are fighter pilots, a characteristic that reflects the sheer number of fighter cockpits in the PLAAF since its inception.

Given the forces it's acquiring, China can now combine top equipment and information-focused doctrine into tough tactical problem sets for other forces in the Asia-Pacific region. Geography may still be China's biggest asset because it allows for concentration of forces. China has its entire coastal and inland territory to use as a launching point for fighters, bombers, and support and reconnaissance aircraft. In hypothetical air combat, China will be fighting near home base. The US and its allies, on the other hand, would be reaching to project force—a task that can only be accomplished with backing from tankers, ISR, and air battle control aircraft, all of them far more vulnerable than the fighters and bombers themselves.

US technology may still be 15 years ahead of China's. But that gives little reassurance, especially given the trickle of US stealth aircraft production.

Carlisle put it simply. "We've had an advantage in stealth for a number of years. That kind of time [gap] will not occur again." ■

Rebecca Grant is president of IRIS Independent Research. Her most recent article for Air Force *Magazine was "Linebacker II" in the December 2012 issue.*

Staff photo by Rudi M. U. Church

At left, senior test pilot instructor Evan Thomas and Test Pilot School instructor Maj. Brian Deas stand on the tarmac after a certification flight. Above, a 412th Test Wing F-16 returns to Edwards AFB, Calif. The TPS shares aircraft with the test wing for efficiency and maintenance.

The US Air Force Test Pilot School is overhauling its curriculum, cramming new essentials into its already jam-packed and intensive 48-week program of studying and flying. The new coursework—adding cyber studies and remotely piloted aircraft, among other topics—is being wedged in alongside time-honored fundamentals aimed at producing the elite aircrews needed to evaluate and assess ever more sophisticated USAF equipment.

Accepting a mere 10 percent of the rated officers who apply each year, the TPS produces just 50 graduates annually—and very soon, that will drop to 40. Contrary to the school's name, graduates include engineers and combat systems officers as well as pilots from across the service, turning them into test and evaluation experts.

The TPS, located at Edwards AFB, Calif., boasts an eclectic mix of aircraft, meant to expose students to the widest possible variety of flying experience. On top of an aggressive flying program, though, comes an extremely demanding academic program through which graduates earn a master's degree in flight test engineering. Along with the sheepskin comes the coveted TPS patch—a mark of distinction graduates wear for the rest of their careers.

The Primary Mission

The TPS program gives students—already experienced aircrews—with specialized academic knowledge, flying skills, and scientific discipline. With these tools, they go on to hone the effectiveness of every item of future Air Force flying equipment—from prototype and X-planes to software upgrades, retrofit antennas, and sensor pods.

Despite the handful of graduates each year, the tiny TPS is the bedrock of the Air Force developmental test community. Testers can catch design flaws in big-ticket programs such as the F-35 fighter or KC-46 tanker early enough to save significant amounts of money and even lives. Ensuring testers are prepared for the enormous responsibility of making aircraft safe and effective is the school's primary mission.

Some graduates have grown into positions where "they are now decision-makers" on the most important procurement programs in the Air Force, said the TPS commandant, Col. Lawrence M. Hoffman. "That's what we're try-

School is reinventing itself ging technologies.

By Aaron M. U. Church, Associate Editor

lots for Tomorrow

Lockheed Martin photo by Chad Bettay

ing to build here from the ground up." One of those is Lt. Gen. Christopher C. Bogdan, now head of the F-35 strike fighter program.

Though flight testers live at the cutting edge of constantly evolving technology, many of the foundational elements that make good test pilots remain constant. TPS focuses on the fundamentals of practical airmanship, flight physics, and test management. On the other hand, the increasing use of computer networking to interweave aircraft systems and link aircraft to other platforms has added a new domain to testing.

"We've been testing air vehicles here for years—we test performance, flying qualities, and systems. We look at them comprehensively," explained Hoffman. To achieve that holistic approach now demands that "we need to be looking at the cyber component."

Infusing cyber as a foundational curriculum concept and incorporating awareness of aircraft's linkage to space-based systems for crucial functions is a top priority.

With the recent addition of a remotely piloted aircraft test "track," the school welcomes cyber and space-enabled platform curriculum as a TPS staple for the first time.

There are only three test pilot schools in the US. Aside from TPS, the only other in the Department of Defense is the Navy's version at Patuxent River, Md. (The third is a civilian school.)

With a class size of just 20 students, competition for admission to TPS is intense. Just to be considered, a candidate must be a highly experienced aviator, personally recommended by a unit commander.

"They're some of the best that you can find at any base around the Air Force, and we've got to whittle it down," said Hoffman.

After an initial screening, pilot-tracked candidates come to Edwards for a personal interview and a flight evaluation in three very different aircraft: a turboprop C-12, supersonic T-38, and a sailplane. For every candidate, at least one is a completely new challenge.

"We put them in the airplane and evaluate their ability to adapt ... to do new things, things they aren't accustomed to," explained the school's chief test pilot, William Gray III. The school instituted this highly personalized selection process four years ago; since then, Gray reported, the airmanship and technical skills of the average student have "significantly increased."

In addition to pilots, the school trains test engineers who manage evaluations from a ground control station, as well as

Staff photos by Aaron M. H. Church

Cmdr. Michael Williams (left), a TPS instructor, and TPS candidate Capt. Clifton Bell walk away from a C-12 after completing the last of three screening flights.

backseaters who test systems such as radar and electronics in flight. In fact, TPS is a test team school with tracks for pilots, CSOs, test engineers, and, most recently, RPA operators.

Though the grading criteria for each of these vary, the curriculum and flight syllabus are largely unified, giving each member a firm understanding of the demands and pressures placed on each member of the test team.

For example, engineers on the ground who coach pilots aloft through a flight evaluation must understand what the pilots are experiencing. They get experience hitting exacting test points under extreme G forces in the back seat of an F-16.

"When you're up there in the air, things happen much faster and you don't necessarily have the brain bytes available that you would on the ground, so that's been a huge epiphany for me," said Capt. Mitch Pohlman, a flight test engineer in Class 12-2 which began last July. "We all sit through the same briefs and learn the same flight test techniques, because we're guiding those techniques a lot of times in the air from the control room," he observed.

TPS is broken into four phases, each focusing on a key aspect of the profession: flight performance, aircraft handling, basic systems, and test management. With the amount of content condensed into a year-long course, TPS is fast-paced and unrelenting but also methodical.

TPS Reports

In each phase, "we teach the basic theory in the classrooms [and] then we give them hands-on examples in the simulators or labs," said David Vanhoy, the school's civilian technical director. "Then it's 'demo-do': ... demonstration flights with instructors, ... then it's the 'do' portion, where we turn them loose in student groups to go out and accomplish the same thing they've just seen."

A pair of T-38s on the flight line have fully instrumented nose probes that allow TPS students to collect data during test training hops.

The course is intensive. When they graduate, students will have flown 85 "airborne laboratories" in as many as 20 different aircraft. They will also have planned and executed a real-world mini-test project. all while balancing flying with academics.

"A lot of guys come here and work to their physical limits to get the thing done—and they need to," said Gray. "We're teaching a fairly comprehensive master's degree course in about half the time you'd want to, ... and that's on top of all the flying," he said.

Every day is split between flying and academics, and the pace of study is such that "every week we're essentially getting the bulk of an undergraduate level class," Pohlman noted. Students often learn and test on a new topic the same week. By the time they're flying the practical portion, they're already onto the next subject in class, he said.

This fire-hose approach may seem less than ideal, but the goal of TPS is not to create technical experts. Instead, it aims to instill the skills to test any aircraft or system.

"We need to teach the fundamentals" so that "whatever gets thrown their way, ... they can quickly learn how that system operates," said Gray. "If they fly 20 different airplanes here, by the time they're done" any airplane is "just another airplane," he said. "It's that ability to adapt that's such an important part of the skill set."

The course is hectic and challenging, but with funding as tight as it is in the Air Force, there's no option to lengthen the course. "The Air Force really isn't going to give us more time," said Gray.

Given the number of new things the school is looking to inject into the curriculum—cyber, RPAs, and space—the time crunch is a real hurdle.

"We stay focused on the basics, but the basics have gotten a lot more complex," Gray said.

Private contractors, Air Force civilians, and uniformed personnel comprise the teaching cadre, many teaching both in the cockpit and classroom. In addition, they develop the curriculum along the way, and it falls to them to weave the new material into the already full syllabus without damaging the school's foundational focus.

Teachers at the school said integrating cyber into TPS is probably the most difficult, while the "space" element is much easier.

"We're not space testers, but we certainly need to understand the interface

The tandem F-16B provides a high-performance platform for students. They fly it in two-student test teams or with an instructor.

and the interaction of our air vehicles with space," said Hoffman. "We rely on space" to navigate, communicate, and control unmanned aircraft, so "we need to understand the fragility of our space network."

Cyber, though, is interrelated with every aspect of an aircraft's function and beyond. As such, it is impractical to teach independently and impossible to cover exhaustively in a reasonable time frame.

"If you go back to World War II, ... everything was stand-alone. ... You tested the individual system you had," said Randolph H. Kelly, a master instructor who heads the course's systems phase. Today, "it isn't so much that way." In modern aircraft such as the F-35, software interface links everything from the oxygen system to the flight controls. "The problem was, TPS was still stuck in those days of individual systems," he said.

To address the situation, TPS went back and completely reengineered the systems-phase curriculum. Previously, students learned about radios, navigation equipment, radars, sensors, and a host of systems as separate entities. Now, the goal in changing the materials is to "take those worldwide expansive systems and try to break them down into pieces" to teach students to evaluate weapon systems from a "cyber perspective," said Kelly.

Integrating RPA

To do this, his team picked out overarching principles that are broadly applicable and put them at the beginning of the course. The idea is to free up classroom time to teach cyber and space. Instead of a standalone module, cyber will be "a concurrent thread" throughout the course, said Kelly.

The school teaches two overlapping courses each year and plans to roll out the reengineered curriculum for the TPS class starting in July 2013. Until then, the school will continue teaching its four-hour introductory cyber course—"not enough," admitted Gray, but it will help bridge the gap.

Integrating RPAs is much further along. In fact, the first RPA pilot graduated TPS in December 2011. Since then, three others have either graduated, or were currently going through the course in October, according to the school's chief RPA test pilot, Lt. Col. Fred Bivetto.

"The RPA pilots are a bit of a different flavor, because some of them have manned experience—a lot of it in some cases," said Hoffman. As a result, RPA pilots are evaluated on an individual basis and tracked either as test pilots or CSOs, based on their background and cockpit experience.

From the school's standpoint, RPA operators fit well into the CSO track, since both types of aircrew control electronic systems in flight. As an efficiency measure, the RPA pilot track is mainly a tailored CSO track, with a variety of pilot tasks lumped in.

RPA testers "see everything from an operator's standpoint. They get the chance to do handling-qualities evaluations; they get to see how airplanes feel" from the backseat, in the case of students who haven't flown aircraft before, explained Gray.

"The curriculum is essentially the same" as for a pilot, except for front-seat check rides in F-16s and T-38s. Instead, the RPA operators fly evaluated test flights in simulators which replicate an unmanned aircraft quite well—especially when TPS student and faculty creativity is involved.

As a capstone test management project, a recent class created an interface linking a Learjet-24 to the school's in-house "handling qualities simulator." Though the project was an experiment, it allowed students to fly the "surrogate RPA" from inside the school building. Like the simulator, the contractor-owned Learjet was already part of the school curriculum, put to a new use.

"We've had these two test management projects that have been completed already, and the data looks really great," said Bivetto. TPS plans to have one more class test the concept before deciding whether to fund the surrogate RPA as "an actual cornerstone" of the TPS curriculum, he added.

The unique "variable stability" Learjet can be reprogrammed with programmable flight rules to handle like anything from a B-52 to a Global Hawk. Since it flies with a safety pilot to take over if needed, the surrogate RPA could potentially teach students to fly test and evaluation sorties and maneuvers that would be too dangerous for an RPA to fly in shared airspace. On top of this, TPS is looking to actually acquire its own simple, affordable RPA—possibly similar to NASA's remotely operated integrated drone aircraft developed by the Dryden Flight Research Center across the ramp at Edwards.

"I would say that by 2013, we will have all the possibilities looked at, and then ... hopefully they can get some funding to support that," Bivetto summed up.

"In my opinion, RPA is here today, and here to stay," said Hoffman. "RPA, cyber, and space, those are the things that we're integrating into the school today to be ready into the future." This will ensure USAF continues to hand airmen combat-ready weapons that have been tried, tested, and proved as second to none, he said. ■

From Gunnery School to Weapons School

The Nevada school has expanded its offerings whenever USAF needed a new breed of weapons expert.

Photography by Rick Llinares and the US Air Force Weapons School

In April 1995, F-4G "Wild Weasels" of the 561st Fighter Squadron fly over the Nellis Range Complex, Nev., with a pair of F-16s from the 57th Wing in the background.

The US Air Force Weapons School traces its history to 1949, when the Aircraft Gunnery School stood up at Las Vegas AFB, Nev. It brought together a group of World War II combat veterans to teach the next generation of pilots about the rigors of aerial combat. In 1950, the site became Nellis Air Force Base, and four years later the school was renamed the USAF Fighter Weapons School. It began to train fighter instructors. In the decades that followed, students trained in all manner of aircraft to meet the needs of an evolving Air Force. In 1992, to reflect the inclusion of other aircraft, the school became the US Air Force Weapons School. Here's a look back at some of its aircraft, through the years.

I1I A Fighter Weapons School F-105F, circa the early 1960s, at Nellis. I2I A quartet of F-80 Shooting Stars in the mid-1950s. I3I An F-100 Super Sabre in action near Nellis. I4I An F-86 Sabre, circa 1954.

I1I A Fighter Weapons School F-84 Thunderjet takes off some time in the mid-'50s. Throughout the 1950s, students trained in the F-51, F-80, F-84, and all versions of the F-100. By 1960 the F-100 and F-105 had become the two primary fighters at the school. I2I A Fighter Weapons School "Heritage Flight" takes to the air in the 1950s, with an F-51 at top, an F-86 below it, and an F-100D at the bottom. I3I "Air Corps Gunnery School" reads the sign in front of the flagpole. Las Vegas Air Force Base got its start as an Army Air Corps school for aerial gunners. I4I An F-51 Mustang, known as the P-51 during its famed World War II service, sports "The Fighter School" on its nose.

|1| An F-4 Phantom II displays the 57th Fighter Weapons Wing emblem just behind the weapon systems officer's seat, in this photo, circa 1970. The early 1970s saw an increase in attention to air-to-air combat skills after analysis of Vietnam War aerial engagements revealed the Air Force needed to re-emphasize realistic threats in dissimilar air combat. |2| A two-ship of Fighter Weapons School A-7D Corsair II attack jets in flight. A-7s had a brief tenure at the school in the early 1970s but by 1975 were phased out in favor of using F-5s as aggressors. |3| An EC-130 Compass Call flies over the Nellis Range Complex in April 1995. Following the standup of Air Combat Command in 1992, the school overhauled its curriculum, adding bomber, helicopter, RC-135, and EC-130 courses. Today only 30 percent of the students come from the classic fighter specialties. |4| The weapons school belongs to what is now the 57th Wing. Here, a quartet of 57th Wing A-10s in 1995 carry inert AGM-65 Maverick and AIM-9 Sidewinder missiles and an ALQ-131 electronic countermeasures pod.

|1| *An A-10 Warthog of the 57th Wing pops flares in 1995.* *|2|* *A USAF B-1B (foreground) from the 28th Bomb Wing at Ellsworth AFB, S.D.—detached to the 57th Wing—and one of the weapons school's F-15 Eagles overfly the range in December 1994.* *|3|* *A USAF F-15 Eagle assigned to the weapons school flies over Nevada in 1995.* *|4|* *Also in 1995, an F-4G with the 561st Fighter Squadron flies over the Sally Corridor area of the Nellis Range Complex. The last Phantom II class graduated from the weapons school in 1985, ending 20 years of F-4 weapons officer training, but the fighter remained in USAF service in the Wild Weasel suppression of enemy air defenses role until 1996.*

|1| A US Air Force Weapons School F-16 bearing a 50th anniversary paint scheme sits on the ramp at Nellis in 1999. The F-16 division of the school graduated its first students in 1982. |2| Three F-15E Strike Eagles from the weapons school fly over the Caliente section of the Nellis Range Complex in 2000. A ground-attack variant of the F-15 Eagle, the F-15E has merited its own division at the school since 1991. |3| An F-111 detached to the weapons school from Cannon AFB, N.M., flies over Nevada during a 1994 mission. |4| An F-4G of the 57th Wing in action at Nellis in 1995.

I1I An F-111 from Cannon with a pair of F-16s in 1995. I2I A KC-135 from the 151st Air Refueling Group of the Utah Guard refuels US Air Force Weapons School F-15 Eagles. A 2006 merger with the Mobility Weapons School added instructor courses for the KC-135, C-130, and C-17 to the curriculum. I3I An E-3 AWACS from Tinker AFB, Okla., before a weapons school Mission Employment phase sortie in 1994. The Air Force needed more weapons officers skilled at integrating all aspects of its domains, so the school has continued to expand. I4I A B-52 detached from Barksdale AFB, La., in 1999. Today's US Air Force Weapons School covers 22 combat specialties. It consists of 18 squadrons at eight locations, drawing together a wide range of air, space, and cyber curriculums. ■

Ten years ago, Effects-Based Operations was a driving concept in US military strategy. It was a departure from the traditional American way of war which, since the days of Ulysses S. Grant, had centered on annihilation and attrition.

According to EBO, the purpose of a military operation is to achieve a desired strategic, operational, or tactical effect—such as neutralizing the enemy or holding him in check—but does not in every instance require the destruction of the enemy force, especially at the expense of high casualties.

EBO originated in the Air Force in the 1990s, gradually gained joint and international recognition, and was a constant topic for war colleges and professional military journals. Then, in the fall of 2008, EBO hit a barrier.

The Assault on EBO

By John T. Correll

The cardinal sin of Effects-Based Operations was that it threatened the traditional way of war.

AP photo by Sergei Grits

Both the term and the concept were summarily purged by order of Marine Corps Gen. James N. Mattis, commander of US Joint Forces Command. In a sweeping declaration Aug. 14, 2008, Mattis said that JFCOM would no longer "use, sponsor, or export" EBO or related concepts and terms, the underlying principles of which he deemed to be "fundamentally flawed." Coming as it did from JFCOM, the judgment carried weight in the joint world.

Mattis' reason, ostensibly, was that the methodology—a combination of EBO and computer-modeling software, operational net assessment (ONA), and system-of-system analysis (SoSA)—had "not delivered on their advertised benefits" and did a poor job of predicting the outcome of battle. What Mattis did not say was that ONA and SoSA were not part of the Air Force concept. They had been grafted onto EBO by Joint Forces Command itself despite Air Force objection.

No doubt the methodology was part of it, but it wasn't nearly all of it.

EBO had been guilty of a cardinal sin. Traditionalists took it as a threat to the budgets and dominance of the ground forces. The JFCOM decision capped a long-running effort to dump EBO by ground power advocates alarmed by the rise of airpower in joint operations. Mattis himself was on record against EBO before he came to JFCOM.

Retired Marine Corps Lt. Gen. Paul K. Van Riper—who had led the opposition to EBO since the 1990s—praised Mattis for putting an end to EBO and said that "with the Effects-Based Operations distraction now behind them," US military leaders could "once again effectively employ the simple elegance of mission-oriented command."

Photo courtesy of David Deptula

Far left: Northern Alliance fighters study contrails from US jets above the village of Ai-Khanum, Afghanistan, in 2001. Many primary objectives in Afghanistan were achieved in the early months of Operation Enduring Freedom, when EBO tactics were being employed. Left: Then-Lt. Col. David Deptula (r) briefs Gen. Norman Schwarzkopf, head of US Central Command, just hours before the air campaign that began Operation Desert Storm in 1991.

Not Quite Dead

However, EBO was not quite as dead as Mattis and Van Riper figured. It never went away completely and, with the passage of time, the embattled concept is stirring again. For the first time in more than five years, the Air Force is speaking up in public on the subject. The forthcoming Air Force Doctrine Document 3-0 takes a strong position in favor of "the effects-based approach to operations."

"The Air Force very much supports an effects-based approach as a way of thinking about, planning, and executing operations," said Maj. Gen. Thomas K. Andersen, commander of USAF's Curtis E. LeMay Center for Doctrine Development and Education. "We still hold that operations are driven by desired ends. It makes the most efficient use of resources and best integrates us into the joint effort.

Retired Air Force Lt. Gen. David A. Deptula, the developer and primary champion of EBO, says that the effects-based approach continues in de facto usage by US and NATO military planners. "EBO is alive and well," Deptula said. "It simply makes too much common sense not to apply, and contrary to the way it has been cast by detractors, it is very much a joint approach."

EBO was based in considerable part on the experience of the Gulf War in 1991 in which Deptula, then a lieutenant colonel, was the principal planner for attack operations in the coalition air campaign.

Deptula built on the work of Col. John A. Warden III, airpower theorist and head of the Checkmate planning cell in the Pentagon where Deptula had been pulled in as an extra hand at the outset of the crisis in the Gulf. Warden held that the enemy should be regarded as a system, held together by vital strategic "centers of gravity," which should be given priority in the attack.

USN photo by Mass Comm. Spec. 2nd Class Eric Dietrich

USMC Gen. James Mattis addresses Naval War College students in Newport, R.I., in 2012. In 2008, as head of Joint Forces Command, Mattis wasted no time in gutting EBO. He had been on record as being a foe of the concept before his appointment.

"Warden's group generated a series of then-innovative concepts, and we many times discussed an 'effects-based' approach to warfare," Deptula said. When the Gulf War started, Warden remained in Washington, but Deptula was assigned to the "Black Hole," the below-ground planning shop of the air component in Riyadh, Saudi Arabia.

"I used an effects-based approach in building the actual Desert Storm air campaign targeting plan," Deptula said. "On my initial attack plan, I had a column labeled 'effects.'"

The campaign as executed threw out the off-the-shelf plan, which called for airpower to concentrate on the enemy force at the front, trading space for time and holding back the invaders until ground forces got there to regain the initiative.

It was the first conflict to effectively use "parallel operations," in which all target sets were attacked concurrently and from the beginning, making it impossible for the enemy to adjust or adapt. About 150 individual target sets were struck the first day—more than were struck over central Europe during World War II in the years 1942 and 1943 combined. By morning of the first day, Iraq's command and control network no longer existed, and Saddam Hussein's ability to mount a coherent military response was gone.

"The solution lay in effects-based rather than destruction-based targeting," Deptula said. The goal was to render enemy forces ineffective and unable to conduct operations. Iraqi aircraft fled to Iran and Iraqi soldiers abandoned their tanks. Power plants shut down to avoid being bombed. In 38 days, airpower reduced the opposition to the extent that the reeling Iraqi army was polished off by a four-day ground offensive. US and coalition casualties were a small fraction of the high numbers predicted before the operation began.

Such a strategy had been imagined by early airpower theorists but the requisite technology, particularly in the levels of precision attack, stealth, and information superiority, had not existed in previous conflicts.

New Way of War

After the Gulf War, Deptula continued to expound on the EBO concept. "If we focus on effects—the end of strategy rather than force on force—that enables us to consider different and perhaps more effective ways to accomplish the same goal more quickly than in the past, with fewer resources, and most importantly with fewer casualties," Deptula said.

EBO emphasized parallel operations as a departure from the traditional practice in which many high-value targets were not struck until the enemy forces were rolled back and sorties were applied against individual targets in a sequential process often referred to as "servicing a target list."

Although EBO applied to all services, it meant that airpower would take on more of the burden and would most likely be the dominant means of conducting parallel warfare in a major regional conflict.

In 1996, Air Force Chief of Staff Gen. Ronald R. Fogleman said, "We are on the verge of introducing a new American way of war," an alternative to the strategy of annihilation and attrition that had prevailed since the 1800s. There was an opportunity and an obligation, he said, to move away from the costly clash of force on force "to a concept that leverages our sophisticated military capabilities to achieve US objectives."

As the evidence from regional conflicts of the 1990s mounted, the basic ideas of EBO gained acceptance. A Joint Vision statement by the Joint Chiefs of Staff in 1996 and the Quadrennial Defense Review in 1997 said that a "revolution in military affairs" had taken place. The Joint Chiefs acknowledged the capability to achieve the effects of mass without the actual massing of forces.

Defenders of the traditional approach were quick to strike back. In 1998, Van Riper—former commanding general of the Marine Corps Combat Development Command—ridiculed the revolution in military affairs as "lacking meaningful substance" and condemned the "unfulfilled promises" of airpower "from Douhet to Deptula."

Van Riper said that most of those espousing "the current nonsense" did not understand "the confusion and horror of the close-in fighting that occurs in real war" and had gotten their field experience "in vessels sailing hundreds of feet below the surface of the ocean, in aircraft flying miles above the battlefield, or in the command facilities of major headquarters."

The traditionalists were partially successful in their rollback efforts. A revised Joint Vision statement in 2000 restored the traditional concept of mass and eliminated recognition of the revolution in military affairs. On balance, though, EBO was still moving forward.

US Joint Forces Command was redesignated in 1999 with a charter to lead the "transformation" to capabilities for the future. ("Transformation" was another term on Van Riper's list of "empty buzz words.") The Joint Chiefs delegated to JFCOM a primary role in the development of concepts and joint doctrine, and JFCOM began an enthusiastic pursuit of EBO.

The Attack on EBO

The attacks on EBO kept coming. Conrad Crane, professor of military strategy at the Army War College, said that EBO was "based on overconfidence in the potential of technology" and a "misguided belief in the myth that the American public will not tolerate friendly casualties." The United States was most

USAF TSgt. Joe Coleman

Demolished vehicles line Highway 80, the infamous "Highway of Death" used by Iraqi forces fleeing Kuwait during Desert Storm. Deptula's EBO approach to air campaigns proved particularly effective during the operation.

successful in war "when it concludes with a triumphant march through the enemy capital," Crane said.

Col. Gary H. Cheek—later a major general and deputy commander of Third Army—asked whether EBO meant "the end of dominant maneuver" and said, "To many senior leaders in the US Army, the concept of Effects-Based Operations is another attempt by strategic bombing advocates to line Air Force coffers at the expense of land forces."

Army Field Manual 3-0 in 2001 stated, "Ultimately, the outcome of battles, major operations, and campaigns depends on the ability of Army forces to close with and destroy the enemy." Army Training and Doctrine Command said that EBO had no place in Army doctrine.

"EBO isn't a strategy—it's a sales pitch," said Ralph Peters, a retired Army intelligence officer turned opinion columnist. "The only Effects-Based Operations that mean anything are those that destroy the enemy's military, the opposing leadership, and the population's collective will. Bombing well-selected targets helps. But only killing wins wars."

Most dogged of all in the attack was Van Riper. In an e-mail message to Marine Corps and Army leaders in 2005, Van Riper said the joint force development process was producing concepts "devoid of meaningful content" and undermining "a coherent body of doctrine." Of the "vacuous slogans" imposed on the armed forces, none were "more egregious than the idea of 'Effects-Based Operations,'" he said. Van Riper said he had intended the message as a "private communication," but copies spread like wildfire and were soon reported in the trade press.

One of the first military officers to respond to the Van Riper e-mail chain was Mattis, then commander of the Marine Corps Combat Development Command. "We have been engaged on this issue for many months now, highlighting the flaws in the effects-based approach that is permeating all aspects of joint warfighting doctrine," he said. "There is nothing in General Van Riper's statement with which I disagree. ... I think he is squarely on target."

Meanwhile, EBO was undergoing a strange metamorphosis at JFCOM, where the computerized techniques of operational net assessment and system-of-system analysis had been added to "give greater precision and rigor to the formulation and coordination of unified action before, during, and after an operation."

"A ground-centric JFCOM staff attempted to turn EBO into tactics, techniques, and procedures," Deptula said. "They built a checklist for the conduct of EBO. It was a technical, activity-based list of dozens of steps to achieve a certified Effects-Based Operation. I did not agree with what JFCOM had done, as it ran counter to the essence of the effects-based approach. It had become too prescriptive and over-engineered by JFCOM."

Mattis Drops His Bomb

Mattis took command of JFCOM in November 2007. His purge of EBO came the following August in a two-page memorandum with five pages of "Commander's Guidance" attached. It was addressed to JFCOM with copies to commands and agencies of all services.

"We must return to time honored principles and terminology that our forces have tested in the crucible of battle and are well-grounded in the theory and nature of war," Mattis said. He ticked off a list of failures of EBO, as seen by the Army, the Marine Corps, and "other observers." EBO, he said, among other faults, "Assumes a level of unachievable

predictability. ... Calls for an unattainable level of knowledge of the enemy. ... Is too prescriptive and over engineered. ... Discounts the human dimension of war. ... Promotes centralization and leads to micromanagement from HQs. ... Is staff, not command, led."

Mattis said, "War is not composed of the tactics of targetry or an algebraic approach to measuring effects resulting from our actions, but rather operations guided by commander's intent and constant feedback loops."

Belief that the enemy could be immobilized by precision air attacks against critical military systems with little or no use of land forces "runs contrary to historical lessons and the fundamental nature of war," Mattis said.

In his memo and guidance, Mattis made no effort whatsoever to separate the add-on JFCOM methodology from the basic Air Force concept.

As Air Force colonels P. Mason Carpenter and William F. Andrews said later in *Joint Force Quarterly*, JFCOM "rendered a valuable joint concept unusable by promising unattainable predictability and by linking it to the highly deterministic computer-based modeling of ONA and SoSA." In so doing, JFCOM "prescribed the consumption of a fatal poison." It "weighed down a useful concept with an unworkable software approach to war."

Even Van Riper saw the difference. He acknowledged that Deptula and Warden were right when they "demanded that targeting officers expand their horizons and determine how best to attack systems rather than targets" and that it was the JFCOM variant of EBO that "most damaged operational thinking." At the same time, he applauded Mattis for throwing out the "vacuous concept" of EBO.

Carpenter and Andrews said, "American airmen might be excused for contemplating whether the [Mattis] edict is indirectly aimed at excluding the strategic use of airpower in order to drive an exclusive focus on 'the three-block war' as the only future American way of war."

Deptula said that EBO "was not simply a concept. It was a proven approach that was the basis of the Desert Storm air campaign that was a turning point in the conduct of modern warfare. What Mattis did was reminiscent of book burning to stem the spread of ideas."

From EBO to LOBOG

Mattis' authority did not extend as far as directing joint doctrine but the Joint Staff gave him tacit support in a tightly worded statement saying that

USMC photo

USMC Marine Lt. Gen. Paul Van Riper became a vociferous critic of EBO.

the bulk of the EBO "construct" had never been incorporated into joint doctrine anyway.

There was no objection or public response from the Air Force, which was still reeling from the decapitation in July 2008 when Secretary of Defense Robert M. Gates fired the Air Force Secretary and Chief of Staff for reasons widely believed to be related in part to their strong advocacy of airpower.

Mattis stuck to his convictions in ensuing public appearances, calling EBO a "bastardization" of what the Air Force does and dismissing "concepts that are defined in three letters." In August 2010, Mattis was named commander of US Central Command, where his antipathy to EBO continued. JFCOM was abolished in 2011 but there was no change in the joint position on EBO.

Deptula retired in October 2010 and is now free to speak more openly about the curtailment of EBO and the consequences. "We are entering our 12th year of operations in Afghanistan using General Mattis' alternative to EBO, which has been LOBOG, or 'Lots of Boots on the Ground,'" Deptula said.

Deptula hastens to add that "boots on the ground may be an element in an effects-based solution." That in fact was the case in the first three months of Operation Enduring Freedom in Afghanistan when ground and air forces worked together to oust the Taliban, install a government friendly to the US, and eliminate the al Qaeda terrorist training camps. "We achieved those critical US security interests by early 2002," Deptula said.

In an article in *AOL Defense* in October, Deptula said that more recent operations in Afghanistan had stopped using an effects-based approach to determine desired outcomes on the basis of critical US interests and that "mission creep" had led to "committing resources to what had then become contingencies of choice rather than of necessity."

Resurgence

The new Air Force Doctrine Document 3-0, Operations and Planning, will concentrate EBO, previously scattered through various doctrine documents, in a central location. It makes an obvious effort to use joint-friendly language, but the position it takes is essentially the same as the old Air Force version without the add-on software metrics.

AFDD 3-0 uses "Effects-Based Approach to Operations," the term now generally favored and which establishes better alignment with previous joint and international usage. It describes EBAO above all as "a way of thinking" that does not mandate any particular strategy. AFDD 3-0 even recognizes annihilation and attrition as possible alternatives, but emphasizes that "the ultimate aim in war is not just to overthrow the enemy's military power but to compel them to do one's will."

Deptula says that "an effects-based approach to operations has permeated the international as well as domestic arenas." The issue of effects arose repeatedly over the past two years at the NATO Joint Airpower Competence Center conferences in Germany, where the approach was embraced by ground commanders as well as airmen, Deptula said.

"The goal of war is to cause our adversaries to act according to our strategic interests," Deptula says. "The challenge lies in institutionalizing the effects-based methodology. To a degree, that is happening today with the realization that the counterinsurgency approaches in Iraq and Afghanistan were so sub-optimal in attaining critical coalition security objectives.

"Our capabilities can yield much more than destruction. They can influence behavior," Deptula continued. "In the end, that's what warfare is all about. We can no longer blast or buy our way through wicked problem sets. We must think our way through them." ■

John T. Correll was editor in chief of Air Force *Magazine for 18 years and is now a contributor. His most recent article, "The Opening Bell in Laos," appeared in the December 2012 issue.*

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White vs. LeMay: The Battle Over Ballistic Missiles

By Lawrence J. Spinetta

Gen. Thomas White triumphed in an epic battle to develop and field the Atlas, overcoming fierce resistance from Gen. Curtis LeMay.

USAF photo by Al Sherman

Chief of Staff Gen. Thomas White (l) and Vice Chief of Staff Gen. Curtis LeMay in 1961. White appointed LeMay vice chief in order to stifle the bomber advocate's criticism of the missile program.

Gen. Curtis E. LeMay, who led Strategic Air Command from 1948 to 1957, considered America's first ICBM, the Atlas, an extravagant boondoggle that wouldn't perform as anticipated. It would achieve a "satisfactory state of reliability [only after] long and bitter experience in the field," he argued. Of course, LeMay consistently put ballistic missiles last among SAC funding priorities, meaning the Atlas wouldn't get a chance to gain the "long and bitter experience in the field" that he demanded.

Furthermore, LeMay disparaged ICBMs as mere "political and psychological weapons," insisting any money budgeted for them would be better spent on "penetration aids"—air-to-surface missiles—for his bombers.

In March 1953, Gen. Thomas S. Power, LeMay's deputy and successor at SAC, outlined his boss's resolute stance in a letter to USAF's director of requirements.

"Regardless of the missile program," Power wrote, "it is the opinion of this headquarters that the continued advance in the art of manned flight to high altitudes and long ranges should be at all times a priority objective of the Air Force's development program."

Gen. Thomas D. White, who became vice chief in June 1953, and later Chief of Staff from 1957 to 1961, vehemently disagreed. In May 1954, over LeMay's heated objection, White raised the ICBM to the top of USAF's research and development priority list. Over the next seven years—the remainder of White's time on

USAF photo

Gen. Thomas White holding an Atlas rocket model. White acknowledged that the strategic missile buildup may not be good for the traditional Air Force, but insisted it was good for the nation.

Active Duty—he and LeMay clashed over the direction of the Air Force. White prevailed, outmaneuvering LeMay to shepherd the Atlas into the inventory.

Tenuous Relations

LeMay and White weren't friends. Their strained relationship was rooted in starkly different careers and leadership styles.

One of the finest air commanders during World War II, LeMay was promoted at lightning speed, climbing from major to major general in three years. He unapologetically ordered his bombers to reduce Germany to rubble and firebomb Japan, often piloting the lead airplane on raids. As a result, LeMay earned a reputation for being, as Defense Secretary Robert S. McNamara said, "extraordinarily belligerent" and "brutal."

LeMay's personal demeanor matched his philosophy of war. Warren Kozak, LeMay's biographer, described him as "dark, brooding, and forbidding. He rarely smiled, he spoke even less, and when he did, his few words seemed to come out in a snarl. Women seated next to him at dinner said he could sit through the entire meal and not utter a single syllable. Surly, tactless, and with a lifeless, moist cigar constantly locked between his teeth."

In sharp contrast to LeMay, White was suave and brilliant—a true renaissance man. At 18, White became one of the youngest graduates of West Point. His peers described him as polished, well read, and gracious.

Whereas LeMay personified the Air Force operator, White was neither a talented field commander nor a strong aviator. He spent much of his early career as an attaché, a specialty where flying is secondary. Diplomatic service, however, played to his strengths: skill with languages—in his spare time at West Point, he learned Chinese, the first of seven foreign languages he mastered—and social graces. Importantly, it also honed his political savvy and led to high-visibility career opportunities.

After graduating from flying school in 1925, White spent just two years in an observation squadron before volunteering for duty in Peking, China. He seldom flew while stationed in Peking, though, because he had to travel to Mukden, China, or Manila in the Philippines to borrow an aircraft.

In 1934, Army Chief of Staff Gen. Douglas MacArthur picked White to accompany William C. Bullitt Jr., the first US ambassador to the Soviet Union, unaware of White's limited flying proficiency or that White, on his own initiative, had learned Russian. Bullitt had requested a handsome, dashing young man he could show off in diplomatic circles, and MacArthur thought White fit the bill.

The Soviets granted White their first civil pilot license but rarely allowed him to fly. Moreover, White's flying inexperience likely caused or contributed to an incident that cut short his assignment: While ferrying Bullitt from Moscow to Leningrad, he crashed. After getting lost and experiencing "engine difficulties"—perhaps from running out of gas—White made an emergency landing in a bog and the airplane cartwheeled. Muddy but uninjured, Bullitt wired President Franklin Roosevelt:

Boeing photo

Gen. Curtis LeMay (left seat), then SAC commander, and Boeing test pilot Tex Johnston (right seat) prepare to take a new Boeing tanker-transport aircraft on a test flight. The 707-based airframe would become the KC-135 tanker.

via Lawrence J. Spinetta

Above: White (left), as acting military attaché and pilot for Ambassador William Bullitt Jr. (second from right), once crash-landed with Bullitt aboard in a bog near Leningrad in the Soviet Union. Left: As a sign of respect, the Soviets issued White a pilot's license.

"We landed upside down but came out right side up. Trust none has reported to you that we are dead."

The crash didn't hurt White's career. He was transferred to Rome, where he served as assistant attaché. In 1940, he was promoted and appointed attaché to Brazil. There he served for two years before being assigned staff duty, first at Third Air Force and later in intelligence.

In 1944, White was transferred to the Pacific. Unlike LeMay, he saw little combat. Instead, he spent much of his time fishing—a personal passion. Once, searching for a good fishing hole and apparently forgetting there was a war on, White wandered into an area where Japanese were hiding. Luckily, a young US soldier stopped and scolded him.

In 1948, White was appointed the Air Force's director of legislative liaison. Eugene M. Zuckert, then an assistant secretary and later Secretary of the Air Force, recalled White as "a sharp contrast to the usual World War II Air Force general. He was a deep and thoughtful individual. He impressed me more than any officer I had ever met. When he got that job, it became obvious that this man was a man of superior qualifications in an area where the Air Force was very, very poor." White quickly earned a reputation among policy-makers for being articulate, statesman-like, gentlemanly, and humane—qualities that led to his selection as Chief of Staff over LeMay.

LeMay had, in fact, been the heir apparent to Gen. Hoyt S. Vandenberg, the second Air Force Chief of Staff, but a series of unexpected events spoiled the succession plan.

In March 1950, Vandenberg's deputy, Gen. Muir S. Fairchild, died of a heart attack. Nathan F. Twining, who had planned to retire as a three-star, was appointed vice chief. He then became Chief after Vandenberg—suffering from prostate cancer—retired early.

Twining picked White instead of LeMay as his vice chief, a post White held for four years. When Twining was appointed Chairman of the Joint Chiefs of Staff in 1957, White moved up to become Chief. Newspapers appraised White's selection as the "dark horse choice."

Losing out to White was particularly galling for LeMay, who let slip his disdain for attachés in his autobiography. In a backhanded attack on White, LeMay described how he rescued Power from attaché duty: "[Power] was being sent to England as an air attaché, for God's sake. Matter of fact, he already bought all of his stiff shirts, demanded by protocol, to go to England. Well, I got him snaked out of that."

LeMay eventually got his chance to run the Air Force, but the long wait undoubtedly aggravated the tenuous relations with White.

LeMay Leads Resistance

LeMay spent nearly 10 years at SAC. During that time, he built an empire.

In December 1948, LeMay convinced Vandenberg to assemble the USAF Senior Officer Board. At LeMay's urging, the board endorsed strategic bombing as the young service's primary mission, giving him a mandate to transform SAC. Under LeMay, SAC grew fourfold, from 51,985 personnel and 837 aircraft to more than 224,000 airmen—larger than the US Army in 1939—and 2,711 aircraft.

Not surprisingly, LeMay, whose professional success and identity were vested in the manned nuclear bomber, was unreceptive to developing a disruptive alternative. He fumed after learning of White's May 1954 directive that accelerated Atlas "to the maximum extent that technology would allow."

In response, in June 1954, LeMay maneuvered Power, his protégé, into command of Air Research and Development Command (ARDC). His intent was to keep the organization out of the hands of missile enthusiasts.

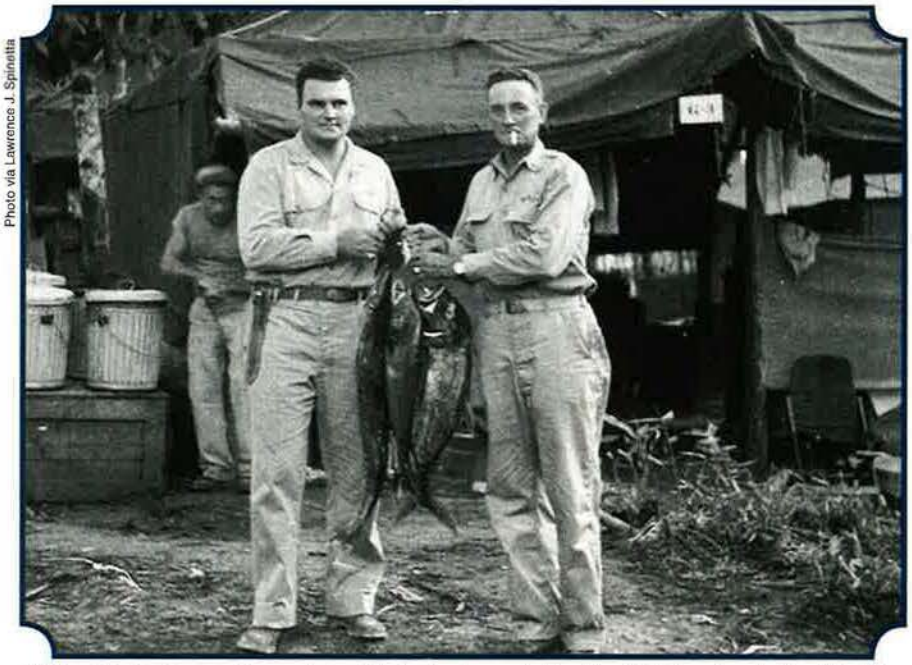

Photo via Lawrence J. Spinetta

White (r) displays a fine catch of fish at a base in the Pacific Theater during World War II. Unlike LeMay, White saw little action during his World War II tour.

In a brilliant counter, White, with Twining's support, ordered the creation of the Western Development Division (WDD), a semi-autonomous organization given responsibility for missile development. Although the WDD was nominally part of the ARDC, its funding was appropriated independently. Additionally, the WDD was granted contracting authority, so it was not beholden to the ARDC commander. Bernard A. Schriever, then a junior one-star, was put in charge.

Power objected to the Headquarters Air Force directive. In Neil Sheehan's book *A Fiery Peace in a Cold War* Power's reaction was described thus: "The whole arrangement was unfair. He was being instructed to create a separate ICBM organization out on the West Coast run by a general officer who was to have complete authority over every detail of the program. Yet the directive also made Power responsible for the ultimate outcome. In short, he was to be held responsible for what he could not control."

Before the WDD's establishment, the Air Force treated missiles no differently than any other weapon system. Air Force Letter 136-3, released in September 1952, asserted that missiles were not revolutionary weapons and did not deserve special treatment. In fact, the Air Force even designated missiles as "experimental bombers," and the Atlas was designated the XB-65.

Lt. Gen. Earle E. Partridge, Power's predecessor at ARDC, was one of the few dissenters to this policy. Early in 1953, he wrote a memorandum to White challenging the assertion that the ICBM was not a revolutionary weapon and urged him to consider the fundamental change in national security that missiles would introduce.

Partridge forecast two divergent schools of thought within the Air Force. "One of these schools will be small but vigorous and will insist that the job can be done by the guided missile. The other group, representing the old fogies, will continue to insist that we adhere to the tried and proven aircraft."

White started to write a long response, but instead informed Partridge, "I tore up [my] reply to you. You have some very cogent points."

In November 1954, White declared that achieving initial operational capability was the immediate objective of the Atlas program, thus making production, not just R&D, the top priority.

An infuriated LeMay vowed, "These things will never be operational."

When Schriever went to brief LeMay, the SAC commander gave him a hostile and short reception. "What is the biggest warhead you can put on that missile?" challenged LeMay. "One megaton," answered Schriever. "When you can put something on that missile bigger than a f---ing firecracker, come and see me," LeMay retorted.

He used every opportunity to fan the embers of resistance among the bomber coterie, who occupied most of the service's top jobs. Increasingly frustrated, White scolded his Air Staff, saying that ballistic missiles were here to stay—that they needed to realize this and get on with it.

LeMay ignored the reprimand and refused to divert money from bombers to missiles. He outlined his position in a 1955 memorandum: "It is my firm belief that the manned bomber must be the backbone of our offense for some time to come. ... Various missile programs should be re-examined to eliminate as many as is necessary to provide the funds for extension of our bomber capability."

The bomber was more than a weapon to LeMay. It was, in the words of one historian, "a fighting machine to which he was deeply wedded emotionally, an arm in which he had unshakable faith." Tellingly, LeMay devoted just three pages of his 572-page autobiography to missiles, and he used those three pages to justify the retention of nuclear bombers.

In June 1956, LeMay told Congress, "We believe that in the future the situation will remain the same as it has in the past, and that is a bomber force well-equipped, determined, well-trained, will penetrate any defense system that can be devised." He later proclaimed, "I think any force that has manned weapons systems at its disposal will certainly have the advantage over one that chose to go to an unmanned system."

At wit's end, White complained in a speech to the Air War College in 1956: "We see too few examples of really creative, logical, farsighted thinking in the Air Force these days. It seems to me that our people are merely trying to find new ways of saying the same old things about airpower without considering whether they need changing to meet new situations and without considering the need for new approaches to new problems."

In June 1957, White convened a board of senior officers chaired by Lt. Gen. Donald Putt, the deputy chief of staff for development, to assess the prospects for integrating missiles into the service. Putt reported a lack of Air Force interest and understanding by most top-level officers.

Keep Your Enemies Closer

White struggled with how to control the obstreperous LeMay. He knew he didn't have the political power to force LeMay out, nor could he outwait his SAC chief. LeMay received his fourth star in 1951 at age 44, which made him the youngest four-star US general since Ulysses S. Grant. White—five years older

LeMay peers from the cockpit of a KC-135 at Ezeiza Airport in Buenos Aires, Argentina, after a record-setting 1957 flight. In 1955, LeMay had written that missile programs should be eliminated to free up additional funding for bomber programs.

than LeMay—had earned his fourth star in 1953, two years after LeMay.

However, when White was promoted to Chief of Staff in July 1957, he recognized an opportunity to stifle the bomber champion, appointing LeMay as his vice chief. As commander of SAC, a "specified command," LeMay was his own boss, but as vice chief, LeMay answered to White.

The ploy was a Faustian bargain for White, because it virtually guaranteed LeMay would succeed White as Chief of Staff.

Nevertheless, the beauty of the maneuver was twofold: First, it capitalized on LeMay's loyalty to chain of command, a tenet the general strictly enforced at SAC. Second, making LeMay vice chief followed a famous strategem attributed to Sun Tzu: Keep your friends close, and your enemies closer. As vice chief, LeMay not only worked for White, he was required to live next door at Fort Myer, Va.

With LeMay muzzled under his close supervision, White called a "come-to-Jesus meeting" with his commanders on Sept. 30, 1957, scolding them for their negative attitude toward missiles.

"The senior Air Force officer's dedication to the airplane is deeply ingrained, and rightly so," White argued, "but we must never permit this to result in a battleship attitude. We cannot afford to ignore the basic precept that all truths change with time."

White told his subordinates that the Air Force should remain flexible and adopt superior technologies.

"With the advent of the guided missile, the US Air Force is in a critical era of its existence. It is essential that we all pull together in the effort to properly utilize this family of new weapons systems for the defense of our nation." He declared that the available funding would permit either the acquisition of the ICBM or a large bomber force, but not both.

White then outlined his missile credo, providing a new institutional vision. First, he declared, "According to current roles and missions, the Air Force has the greatest need for such weapons." In a diplomatic preamble to his unpalatable bottom line, White said, "To preserve the required capability and flexibility of operations, it is essential that the Air Force maintain a significant force of manned aircraft during the foreseeable future."

Then, however, with his audience mollified, White lowered the boom: ICBMs would displace bombers.

"As rapidly as missiles become operationally suitable, they will be phased into units either to completely or partially substitute for manned aircraft according to military requirements."

On Oct. 4, 1957, less than a week after White held his commander's conference, the Soviets successfully launched Sputnik atop the R-7, the world's first ICBM. The United States managed to counter with a successful Atlas launch on Dec. 17, 1957.

In April 1958, anticipating the Atlas would shortly achieve IOC, White ordered the creation of a guided missile insignia. White specified that the badge could not include pilot wings of any kind.

In September 1959, the United States deployed three Atlas missiles at Vandenberg AFB, Calif., providing the country with an "emergency" ICBM capability. Over the next three years, the Air Force fielded 11 operational Atlas squadrons. To prevent a stacked deck against the fledgling weapon system, White returned the brigadier general promotion list to LeMay with instructions to produce a more equitable distribution after observing it included a disproportional number of bomber pilots.

"Just What the Air Force Needed"

When White retired in 1961, *Air Force* Magazine observed, "It is both interesting and germane that General White never was a combat hero and that the qualities that made him 'just what the Air Force needed' are not those usually attributed to combat heroes." The author continued, "It is not likely that another man with General White's particular blend of talents ever again will be Chief of Staff."

White's nontraditional background made him more willing to discount the organizational costs of adopting the ICBM. He made the tough, unpopular decision even though it irritated many men in Air Force blue, because he was convinced that embracing the ICBM was imperative for national security. Indeed, he remembered "telling the Air Staff on many occasions that the buildup in strategic missiles ... was not good for the traditional Air Force but it was vital for the nation." ■

Air Force Lt. Col. Lawrence J. Spinetta is an F-15 pilot with RPA command experience. He currently serves on the Joint Staff. His previous article for Air Force *Magazine, "Sinking Ships," appeared in July 2006.*

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The Death of Korean Air Lines Flight 007

By Peter Grier

A 747 heading from the US to Seoul strayed into Soviet airspace. The USSR shot it down.

As the fateful moment approached, Maj. Gennadiy Osipovich sounded tense and frustrated. It was an early morning hour on Sept. 1, 1983, and it had not been an easy time for Osipovich, an Su-15 fighter pilot assigned to the Soviet Union's Dolinsk-Sokol Air Base on Sakhalin Island, north of Japan.

He had been trying to find a target now looming a few thousand meters ahead of his aircraft. He was having no luck. Soviet tracking radars had produced inaccurate data, for one thing. For another, he and other scrambled pilots had been slow off the mark.

Now the target was close to leaving Soviet airspace after flying over Sakhalin, a sensitive and highly restricted zone. Osipovich radioed superiors for instructions but did not get an immediate response.

An Infamous Act

He could see that the mysterious multi-engine aircraft with blinking lights was apparently unaware of his presence. Suddenly it began to climb, slowing its speed. Osipovich's air combat controller ordered him to open fire.

The authorization came too late. The speedy Su-15 was suddenly right next to the aircraft it was supposed to destroy.

"It should have been earlier. ... I'm already abeam of the target," radioed an agitated Osipovich, according to a transcript of his communications released by the US government.

The Soviet pilot turned and dropped below his lumbering prey. Then he pulled his nose up, lit his afterburners, and locked on with his own radar. At 3:26 a.m. Tokyo time, he fired two AA-3 air-to-air missiles. One of them, proximity-fused, exploded behind the target, severing a crucial control line. The other hit the aircraft but its effect remains unclear.

"The target is destroyed," radioed Osipovich.

But it had not been. The aircraft, Korean Air Lines 007, remained airborne for at least 12 more minutes. Its pilots struggled to regain control until

Illustration by Zaur Eylanbekov

the airplane spiraled into the sea, near Moneron Island just west of Sakhalin.

The shootdown of KAL 007 three decades ago was one of the deadliest and most important events of the late Cold War. Two hundred sixty-nine passengers and crew died when the airliner hit the water. These included US Rep. Lawrence P. McDonald, a conservative Democrat from Georgia.

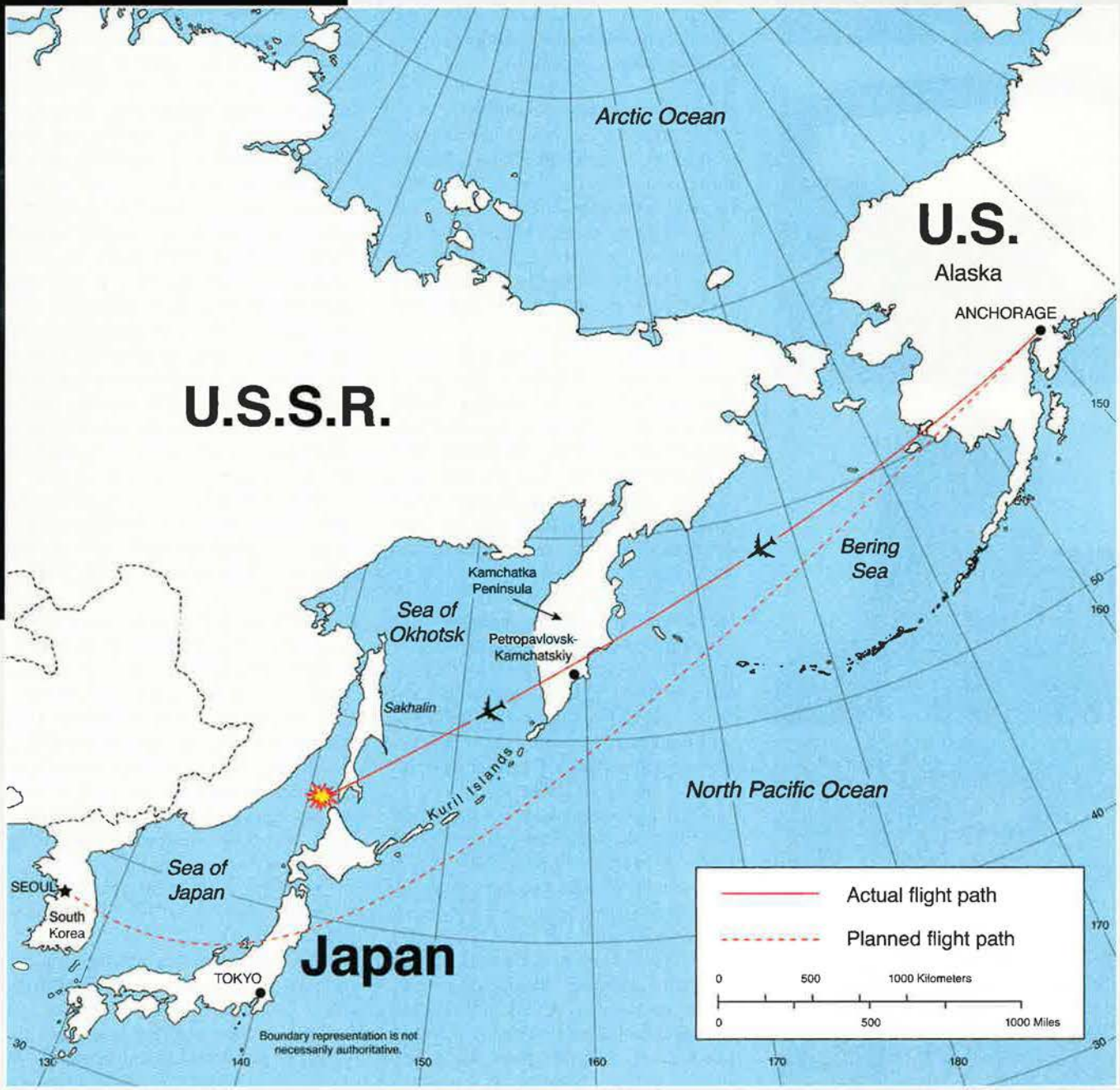
The infamous act pushed US-Soviet tensions to new heights and reinforced each side's worst assumptions about the other.

Initially, Moscow denied the incident had taken place. Confronted by the US with intercepted air defense communications and other evidence, Soviet leaders admitted what had happened but said the aircraft was a spyplane sent to gather intelligence from sensitive military installations in the region.

The Reagan Administration, for its part, charged that the USSR had knowingly shot down an airliner and thus killed defenseless civilians in cold blood. President Reagan called the shootdown a "massacre" and an "act of barbarism."

But US intelligence quickly discovered that the story was more complicated. National Security Agency intercepts showed that the Soviet Union had indeed

Below: A map showing simplified divergence of the planned flight plath (dotted line) and the actual flight path of Korean Air Lines Flight 007, Sept. 1, 1983.



Mgarin73 via Wikipedia

US Congress photo

Soviet documentary screen shots

CIA photo

Top to bottom: US Rep. Lawrence McDonald (D-Ga.), who was killed on KAL 007. Soviet pilot Gennadiy Osipovich in the cockpit of a Soviet fighter. Osipovich during a Soviet television documentary about the shootdown. Marshal Nikolai Ogarkov during a Sept. 9, 1983, press conference in which he claimed the shootdown was justified.

thought the aircraft to be a spyplane, most likely an RC-135 eavesdropping aircraft that had been flying lazy-eights off the Sakhalin coast in advance of a forthcoming missile test.

Furthermore, US intelligence showed that, from the point of view of the Soviet military, anyway, the episode had been a messy disaster. A Boeing 747 had flown a slow and predictable path over Soviet territory for hundreds of miles, overflying the Kamchatka Peninsula, re-entering international airspace, then crossing above Sakhalin.

What Happened—Probably

Meanwhile the USSR air defense system had descended into "something bordering on chaos," according to intelligence historian Mathew M. Aid. Fighters were vectored poorly, radar data was wrong, and pilots and their superiors on the ground filled the airwaves with expletive-laced rants directed at each other.

"Arguably the most significant revelation coming out of the KAL shootdown was the fact that the massive Soviet national air defense system had not performed well at all," wrote Aid in his 2009 history of the NSA, *The Secret Sentry.*

How did a civilian aircraft flying straight and fairly level end up hundreds of miles off course in dangerous territory?

That's a central question of the KAL 007 event. Conspiracy theorists have long pushed the idea that some sort of dark US government plot lay behind the airplane's actions that night. But the simple fact of crew error, combined with continued inattentiveness, appears to have put the Boeing airliner on a collision course with disaster.

KAL 007 originated in New York. At 4:00 a.m. local time, the airliner took off from its intermediate stop in Anchorage, Alaska, headed for Seoul. As it flew west it began to slowly deviate from its planned route. KAL 007 should have passed over a navigational waypoint at Bethel, Alaska, on its way to the open ocean, but when it reached Bethel it had already strayed 12 miles north of its intended path. As it flew on, the distance between its actual and intended flight paths only grew. By the time it neared an oceanic waypoint named "Nabie," some 200 miles off the Alaskan coast, the airplane was already 100 miles away from where it should have been.

The airplane wasn't on its way to Seoul. Instead, it was traveling at a heading of 245 degrees, flying like an arrow toward the eastern portions of the Soviet Union. According to an investigation conducted by the International Civil Aviation Organization in 1993, following release of the airplane's original flight recorder tapes by the new Russian government, the KAL crew activated an autopilot shortly after taking off from Anchorage and then turned to 245 degrees to comply with an air traffic control clearance. The aircraft maintained a heading of 245 degrees until it was shot down some five hours later.

Why did it go off course? The autopilot—more specifically, the pilots' interaction with the autopilot controls—appears to be a large part of the answer.

When the autopilot used in the KAL airliner was set to "heading," it directed the aircraft straight along that heading path. The KAL 007's pilots used this setting just after takeoff. But when the autopilot was turned to the mode "INS Navigation," it was designed to guide the airplane along a series of pre-entered waypoints to its ultimate destination. KAL was supposed to use this mode, riding the autopilot along a transoceanic route with 10 waypoints just outside of Soviet territory, all the way to Seoul.

That didn't happen. Possibly, the pilots just forgot to turn the switch. It is also possible that they set the switch, but the INS Navigation mode did not activate.

In the model autopilot used in that particular 747, the aircraft had to be within 7.5 miles of its preprogrammed route for INS Navigation to take over. If it was farther away, or flying in the wrong direction, the autopilot stayed in heading mode until the gap closed. If the gap didn't close, the aircraft just kept on jetting along the previous heading until the pilots noticed or something else intervened.

In 1993, after examining all the evidence, that's what ICAO concluded had occurred.

"The maintenance of the constant magnetic heading and the resulting track deviation was due to the crew's failure to note that the autopilot had either been left in the heading mode or had been switched to the inertial naviga-

tion system (INS) when the aircraft was beyond range for the INS to capture the desired track," stated the ICAO in 1993.

The pilots had almost certainly been trained how to use the autopilot in the correct way, but human interaction with complex automated systems is often fraught with problems, according to a 2004 book on the issue, *Taming HAL: Designing Interfaces Beyond 2001,* by Asaf Degani, a scientist from the NASA Ames Research Center.

What if a pilot forgot the sequence of events that would engage the INS Navigation mode? What if they got the wrong number for how close they needed to be to their preprogrammed track stuck in their head—20 miles, say, instead of 7.5?

That sort of mistake should have been unsurprising, because it had happened before.

"Such problems in operating this B-747 autopilot were not new, and the track deviation that resulted was not a fluke or a rare case. There were more than a dozen reported similar incidents in which flight crews selected INS-Navigation mode but did not detect that the INS system was not steering the autopilot," wrote Degani.

So KAL 007 lumbered on, heading for Siberia instead of Seoul. After several hours it neared a buffer zone of international airspace monitored by the Soviet military for possible threats. Here a complication developed: A US Air Force Boeing RC-135 was already flying in wide circles in this area. Loaded with eavesdropping electronics, its mission was to spy on the USSR's defenses in the Kamchatka Peninsula. Typically such missions involved flying right up to, but not over, the line into Soviet-controlled space.

No One Was Listening

At some point the tracks of these aircraft converged enough for Soviet air traffic controllers to misidentify the oncoming KAL 007. The presence of the US spyplane thus "resulted in confusion and the assumption by the USSR Air Defense that the aircraft proceeding towards the USSR was an RC-135," according to the ICAO.

Nearly four hours after its takeoff from Anchorage KAL 007 entered the restricted airspace of the Kamchatka Peninsula. Four MiG-23s scrambled to intercept the aircraft and first flew east, then west to try and run down their unidentified target from behind. But the Soviet fighters ran low on fuel before they could catch up and had to return to base. KAL 007 continued on unaware, warm and well-lit in the cold of high altitude.

Crossing Kamchatka, the Boeing passed into international waters over the Sea of Okhotsk. But as it proceeded along its straight heading it soon hit another Soviet piece of land, Sakhalin Island. More Soviet fighters took to the air to find a target that air defense officials now suspected was military. The USSR military command was already tense, due to a recently concluded major north Pacific US Navy exercise and a Soviet missile test in the region scheduled for

Right: A Soviet Il-14 Crate aircraft interfered in the search and rescue operations over the Sea of Japan. Below: A Soviet salvage tug boat searches for pieces of the downed KAL-007.

USAF photos by SSgt. Steve McGill

later that day. They were in a shoot-now, question-later mood.

One Soviet commander said that their orders were to shoot down the airplane even if it made it out to neutral territory, according to transcripts of their conversations. Another said that if it had four contrails, it must be an RC-135.

Osipovich, the attacking pilot, said that he saw the aircraft's blinking light. He fired cannon shots to try and alert the pilots, but as he later admitted, his aircraft was loaded with armor-piercing, not incendiary, shells. The Soviets tried to hail the airplane on a radio frequency reserved for emergencies, but inside KAL 007's cockpit, no one was listening.

Then Tokyo air traffic control ordered the airliner to climb to 35,000 feet. Soviet authorities took this as an evasive maneuver, sealing the airplane's fate.

The USSR's destruction of KAL 007 took place in the context of heightened Cold War anxieties. The Soviet Union, for its part, felt vulnerable: Its economy had begun to break up, its leadership was aging and sclerotic, and the tide of world events seemed to be turning against its communist system. Meanwhile, the US had moved to aggressively confront its superpower adversary via the Reagan Administration's strategic defense initiative, a general increase in military spending, and ramped-up rhetoric about the failures of the Soviet empire.

The prospect of a US-launched nuclear war appears to have genuinely concerned Soviet officials. Soviet behavior made Washington so suspicious it believed the Kremlin might be capable of anything. Then came the KAL shootdown.

"The KAL 007 incident ... touched off a dangerous episode in US-Soviet relations," wrote intelligence analyst Benjamin B. Fischer in a 1997 monograph on the era for the CIA's Center for the Study of Intelligence.

The White House learned of the airplane's destruction hours after it had occurred. US and Japanese eavesdropping equipment had captured the air-to-ground conversations of Soviet fighters involved, which revealed part of the story of what had happened. The next day at 10:45 a.m.—it was still Sept. 1 Washington time—Secretary of State George P. Shultz held a press conference and denounced the Soviet action.

"We can see no excuse whatsoever for this appalling attack," said Shultz.

Confronted with this, the USSR dissembled. A Soviet diplomat visited the State Department and told Shultz that they had warned the airplane off and that it must have crashed afterward. The Soviet news agency TASS issued a statement to similar effect at about the same time.

Faced with this attitude—and with the knowledge afforded by its eavesdropping capabilities—the US intensified its rhetoric. On Sept. 5, President Reagan addressed the nation to denounce what he called a "crime against humanity." He played an intercepted audio tape of Osipovich's discussions with ground control, including a portion where Osipovich mentioned the airplane's blinking light.

Deepened Paranoia

A Boeing 747 airliner is a distinctive shape, noted Reagan. It looks nothing like a US military spyplane.

"There is no way a pilot could mistake this for anything other than a civilian airliner," said Reagan.

The problem was that Osipovich had indeed made just such a mistake and the US knew it. As early as the afternoon of Sept. 1, thorough NSA translations of more intercepts showed that the Soviet officials might have believed they were tracking an RC-135, according to Aid.

Yet Ambassador to the UN Jeane J. Kirkpatrick went before the Security Council the day after Reagan spoke and repeated his charge, using audio tapes and a map of the KAL 007 flight path to make her presentation more forceful.

"Air Force intelligence dissented from the rush to judgment at the time, and eventually US intelligence reached a consensus that the Soviets probably did not know they were attacking a civilian airliner," wrote Fischer. "The charge probably should have been something akin to criminally negligent manslaughter, not premeditated murder. But the official US position never deviated from the initial assessment."

On Sept. 9, Marshal Nikolai V. Ogarkov, the Soviet military's chief of staff, held a press conference in Moscow at which he admitted that the airplane had been shot down but said the action was justified. Whether an RC-135 or a Boeing 747, the airplane had surely been on a US intelligence mission, he said.

His statement might not have been pure propaganda. It appears to be what the Soviet leadership truly believed. A classified memo to the Politburo from the Soviet military and the KGB asserted that KAL 007 was "a major, dual-purpose political provocation carefully organized by the US special services."

This memo, cited in Fischer's CIA study, went on to say that the first purpose of the KAL incursion had been to gather valuable intelligence. Second, if the USSR shot the airplane down, the US knew it could use the event to mount a global anti-Soviet campaign.

The fact that the US quickly moved to do just that only deepened the USSR's paranoia. The Reagan Administration used the incident as an argument for its plans for increased military spending, while pushing for denial of landing rights to the Soviet airline Aeroflot and other civilian sanctions.

"For Washington, the incident seemed to express all that was wrong with the Soviet system and to vindicate the Administration's critique of the Soviet system. For Moscow, the episode seemed to encapsulate and reinforce the Soviets' worst-case assumptions about US policy," concluded Fischer.

KAL 007 left behind little debris as evidence of its plunge into the cold ocean. A US Navy-led search for the wreckage, harassed by Soviet personnel, produced nothing.

Later that fall, Soviet leader Yuri V. Andropov entered the hospital and began a physical decline that culminated in his death the following February. Another aging caretaker, General Secretary Konstantin U. Chernenko, succeeded him. He died in turn after only 13 months in office. On March 11, 1985, Mikhail S. Gorbachev was named head of the USSR, and the rest is history. Gorbachev tried to revive the Soviet economy and relax superpower tensions, but he could not arrest the decline and the Soviet empire collapsed in December 1991.

Boris N. Yeltsin, Russia's new president, was eager to turn the page on the Soviet past. One way he did this was by releasing Kremlin secrets related to KAL 007. In 1992, he made public Soviet memos discussing the shootdown and subsequent sea search for wreckage. Later that year, he released the airplane's black boxes, which Soviet officials had recovered, and a transcript of the Soviet air defense communications surrounding the incident.

The airplane itself still lies at the bottom of the ocean, shattered into small pieces by the force of impact. ■

Peter Grier, a Washington, D.C., editor for the Christian Science Monitor, *is a longtime contributor to* Air Force *Magazine. His most recent article, "Cleaning the Bug House," appeared in September 2012.*

Ace to Ace

Maj. Richard Bong (left) and Maj. Thomas McGuire Jr., shown together in the Philippines, were the top two US aces of World War II. Bong shot down at least 40 enemy aircraft. McGuire scored at least 38 victories. No US fighter pilot before or since has come close to matching those numbers. Friends and friendly rivals, each received the Medal of Honor for heroism in the Pacific. When this photo was taken, on Nov. 15, 1944, the two were at the top of their games. Within months, however, both would be dead. McGuire went first; he died in combat on Jan. 7, 1945. Bong survived his tour and became a Lockheed test pilot. He died in a P-80 crash on Aug. 6, 1945. His death was big news, sharing the next day's front pages with the bombing of Hiroshima.

McGuire strikes a jaunty pose.

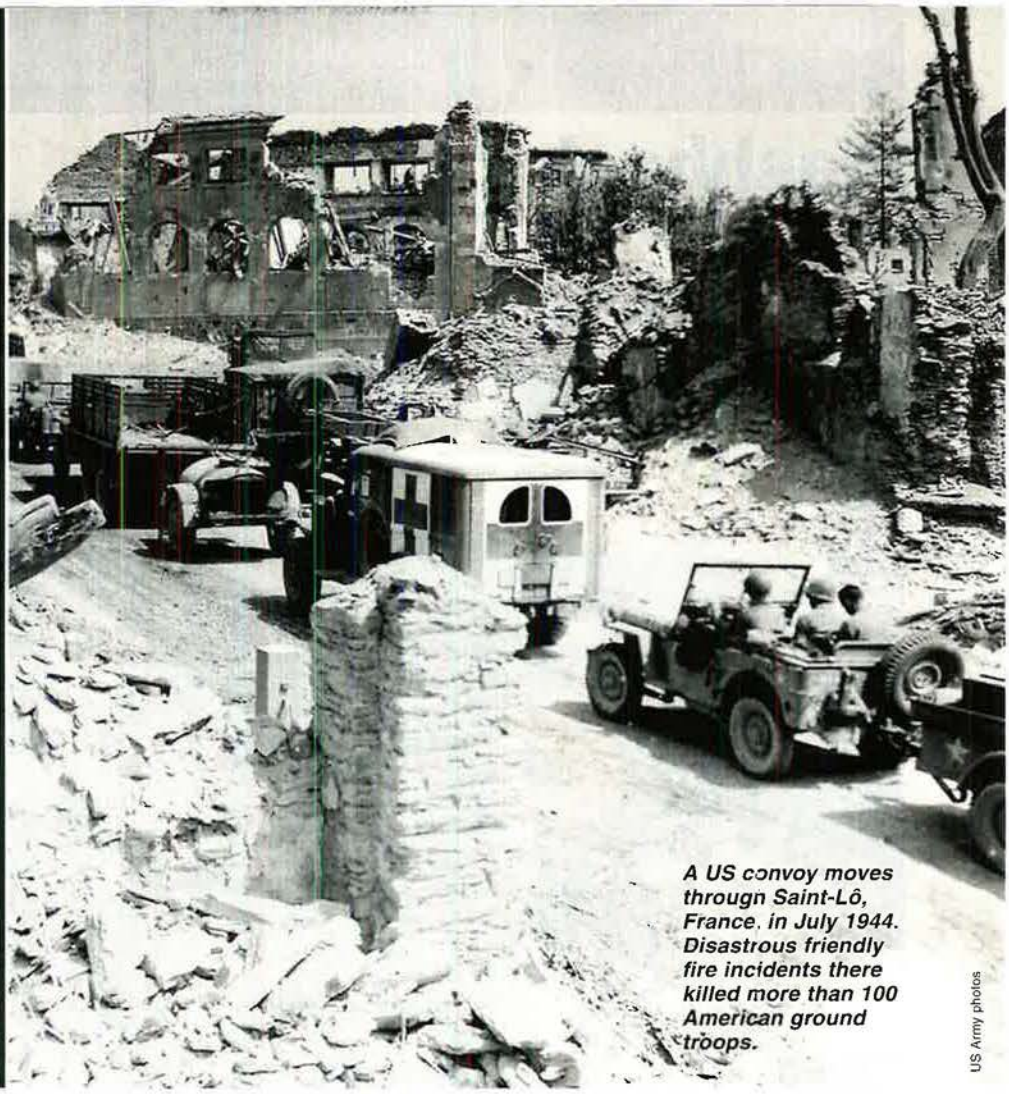
Bong with his wife, Marge.

The fog of war can be deadly and tragic.

From the Revolutionary War to the present day, US forces have come under fire not only from the enemy but from their own side—a situation known as fratricide or, more commonly, "friendly fire." Indeed, one of these terrible episodes marred an iconic campaign of World War II.

Allied forces landed in Normandy on June 6, 1944, but quickly bogged down, unable to push through to open country. Casualties mounted. The British, under Gen. Bernard L. Montgomery, attempted breakouts near Caen, but had no success. Now it was US Army Lt. Gen. Omar N. Bradley's turn at the strategic town of Saint-Lô.

Bradley and Gen. Dwight D. Eisenhower wanted heavy bombers to blow a hole in German defenses, allowing American ground troops to pour through. The situation near the Normandy beaches was in stalemate; a breakout would permit maneuver.



A US convoy moves through Saint-Lô, France, in July 1944. Disastrous friendly fire incidents there killed more than 100 American ground troops.

US Army photos

FRATRICIDE

By Phillip S. Meilinger

Allied anti-aircraft fire brought down this Spitfire—piloted by an American—over Paestum Beach in Italy.

US Army Air Forces Lt. Gen. Carl A. Spaatz, the air commander, was not keen on the use of heavy bombers in a tactical support role; his crews were not trained for the mission. But ground commanders insisted so the airmen began planning. Bradley wanted bombers to fly parallel to the front lines during the run. He thought this approach would lower the chances of "short bombs"—the tendency of some crews to release loads early in order to avoid enemy anti-aircraft fire over targets.

Airmen argued that such a long, narrow bomb run—the target area was seven miles by one mile—would unduly expose aircraft to enemy artillery. Instead, they wanted to bring bombers in on a wide front perpendicular to the target: a major east-to-west road out of Saint-Lô. This would allow the bombers to penetrate the German AAA belt quickly, without diminishing the effectiveness of the air strikes. Crews would use special care not to drop short. Even so, the airmen warned Bradley there would undoubtedly be casualties, with 1,500 bombers hitting a relatively small area near friendly troops. Bradley said the risk was acceptable, as long as a hole could be opened in German lines.

On July 25, 1944, bombers of Eighth Air Force began attacks on the south side of the Saint-Lô road. Soon, the ground became obscured by smoke and debris from bomb explosions. Following bombers began to drift, uncertain of the location of a key road landmark.

The result was disaster. Short bombs killed more than 100 American ground troops during the bombardment, including Lt. Gen. Lesley J. McNair—at that time the highest ranking US general killed in combat during the war. In the following investigation, Spaatz maintained that the tactics used were correct: Lateral or drift error was always greater than range error, which led to short bombs.

Although the accident cast a pall over the campaign, it had a far more serious effect on German defenders. American bombers breached the enemy lines, allowing Bradley's forces to pour through the resulting gap, and the dash across France was about to begin.

"The planes kept coming overhead, like a conveyor belt. ... My front lines looked like a landscape on the moon," German Lt. Gen. Fritz H. M. Bayerlein, of the elite Panzer Lehr Division, later testified. Bayerlein stated that the bombing put out of commission 70 percent of his troops and destroyed all of his tanks.

Lt. Gen. Lesley McNair died in the short-bombing at Saint-Lô. He was the highest-ranking American officer to be killed by friendly fire in World War II.

The affair was terrible for US troops due to the bombing errors, but the tactical results proved positive: Mobility was restored to the battlefield. Yet, Saint-Lô was not the first—or even most serious—example of fratricide during World War II.

The "Safety Corridor"

One year earlier the Allies had recaptured North Africa. Allied leadership determined Sicily would be the next step, though US Army Chief of Staff Gen. George C. Marshall Jr. wanted to land on the coast of France instead.

The British refused. They had already been thrown off the European continent at Dunkirk in 1940, and a landing at Dieppe in 1942 had proved disastrous. They preferred a less risky operation, believing Sicily, a natural stepping-stone to Italy, would open a second front in Europe with a weakened adversary. The Italian government was tottering, and an assault on Italian territory might push it to the negotiating table.

Allied forces would land in two different areas. The British, under Montgomery, would assault the island's east coast, while Americans under Lt. Gen. George S. Patton Jr. would land on the southwestern coast. Patton's area contained several airfields, deemed essential for Allied success, and had to be quickly captured and converted to Allied use. "I would like to stress that point because I am sure that without the airfields, while I may get ashore, I won't live long," Patton himself put it. Airborne troops would be used with the initial amphibious landings to help secure airfields, bridges, and other key points to cut off enemy defenders while facilitating the advance of Allied forces hitting the beaches.

One of these drops involved a combat regiment of the 82nd Airborne Division, set to land near the airfield at Gela. At 8:45 a.m. on July 11, 1943, Patton messaged his principal commanders that a parachute drop would occur that night. Bradley directed his staff to notify Army AAA units and the naval units off the coast. He wanted to ensure friendly forces would not fire on C-47s carrying paratroopers as they approached Sicily.

For the safety of the air convoy, a corridor several miles wide was established from Malta to Sicily. No Allied units were to shoot at aircraft in that corridor—especially if they were flying from the south. The 82nd Airborne's commander, Maj. Gen. Matthew B. Ridgway, was still concerned. When he approached the Navy regarding his fear of friendly fire, the sailors told him they could make no promises regarding the safety of the transport airplanes.

Ridgway then went to Patton and insisted the Navy be forced to do better. Patton talked to the Navy, pushing them to ensure their AAA would not fire on aircraft in the previously designated air corridor. Ridgway then visited the Army's artillery units on the beachhead to make sure they personally got word of the impending airborne attack.

Unfortunately, a risky situation worsened when the German Luftwaffe launched air strikes against Allied troops along the beach and ships off the coast that day. One USN supply ship took a direct hit and exploded. As a result, the gunners at sea and on the ground had been primed to shoot at anything flying overhead.

That evening more than 2,300 paratroopers of the 504th Regimental Combat Team loaded onto 144 C-47s in Tunisia and took off. Two hours later they hit their checkpoint at Malta, heading up the safe corridor for Sicily, 70 miles to the north. As the air armada approached Sicily it was a stroke of bad luck that Luftwaffe bombers had just departed, after having pounded troops and ships. When the jittery gunners below heard the thrum of aircraft engines they feared another Luftwaffe attack—despite their arrival from the south—and they primed their guns.

Almost miraculously, the first group of C-47s reached the coast on target and turned northwest for the final 35 miles to drop their paratroopers at Gela. No one

fired on them and all aircraft disgorged their forces over the drop zone.

The aircraft behind them would fare much worse. The flight, containing battalion commander Lt. Col. William P. Yarborough, approached the beach at 700 feet. This time, a gunner opened fire. Hundreds of others followed suit.

"This surprised and puzzled us greatly because the aircraft they were aiming at were coming from the direction of North Africa, territory from which the Allies were operating," one sailor recalled. He had rushed on deck to the sound of his ship blasting away with all guns. He saw the airplanes take evasive action to no avail: "It was a terrifying scene and one that we could only view with near disbelief." Another said the barrage was like "a curtain of explosives had been draped across the sky as if to bar entrance to Sicily by outside intruders, be they friendly or enemy." Yarborough's C-47—as well as all the others—flashed their amber position lights continuously, the agreed signal that they were friendlies. Either no one below noticed the signals or they disregarded them, and fire intensified.

Under Fire for 20 Miles

Yarborough, who would survive the ordeal, attempted to remain outwardly calm as he watched nearby aircraft burst into flames and plummet to earth. Some airplanes took direct hits and exploded into nothingness. A number of paratroopers, in an attempt to escape from the flying coffins, bailed out, whether over land or water. Gunners tracked and shot them as they drifted slowly down. Some landed in the water and clung to wreckage. Appallingly, naval gunners lowered their sights and began blazing away with machine guns and 20 mm cannons at the helpless paratroopers and aircrews. When they realized their error, the sailors launched boats and attempted to rescue survivors.

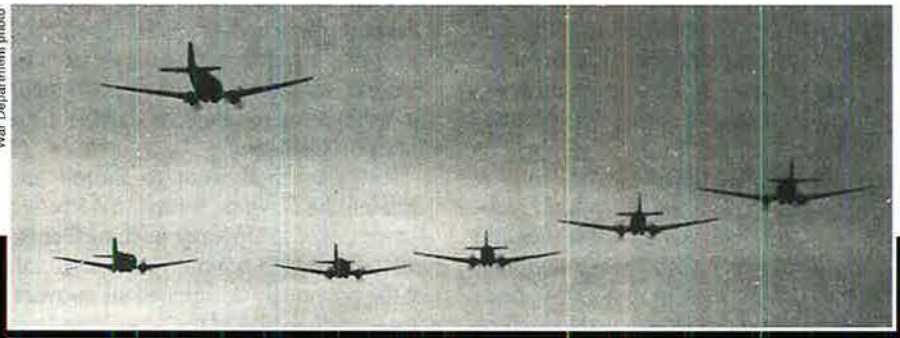
Aircraft broke formation in an effort to escape the fire from below; some turned around and headed back to Africa. Some pilots claimed naval gunners shot at them for 20 miles after they left Sicily.

Patton, Bradley, and Ridgway were on the beach watching the cataclysm unfold above their heads. Bradley was so astounded he stood in the open watching in dismay even though in grave danger from exploding shells. The carnage continued. Even those paratroopers fortunate enough to land safely often found themselves fired upon by friendly troops who thought they were German spies.

By the time it was over, 23 C-47s were shot down and 37 others received heavy damage. Sixty aircrew members went down with their aircraft, and 229 paratroopers died from friendly fire. Because other members of the 504th had turned back, thus saving the troopers on board, the following morning the regiment counted less than 550 men—barely a quarter of their strength were ready for Sicily.

Two days after the disaster at Gela, another airborne operation was launched when 124 aircraft attempted to drop their paratroopers on a bridge near Lentini. Astonishingly, once again the safety corridor was not cleared and troop carriers flew into a hail of friendly ground fire—11 airplanes were shot down and another 50 were damaged.

War Department photo



US Army photo

Top: C-47s packed with troops. Bottom: Paratroopers inside a C-47 head for Sicily. On July 11, 1943, 23 C-47s such as this were blown out of the sky over Italy by friendly fire, and 37 others were heavily damaged. More than 200 American troops were killed.

A board of inquiry convened to determine what went wrong, but answers hardly comforted anyone. Brig. Gen. Paul L. Williams, commander of Northwest African Air Force Troop Carrier Command, was unable to determine if the Navy or the Army fired first. But both fired at will.

The US Navy official historian, Rear Adm. Samuel Eliot Morison, barely mentioned the incident in his massive history and blamed the Army and the air forces for the disaster. He maintained the operation was announced too late for word to reach all of the ships—12 hours apparently being not enough time. He also complained the C-47s should have come in at a higher altitude—not realizing this would mean the paratroopers

USMC photo by MSgt. Edward D. Kniery

US marines work to retrieve a destroyed amphibious assault vehicle near Nasiriyah, Iraq, in 2003. In one friendly fire incident, 10 marines died when a controller, also a marine, called in an A-10 air strike in error.

would be drifting down from a greater height and thus more vulnerable to ground fire. British Adm. Andrew B. Cunningham stated his gunners were within their rights to fire at anything that flew over their ship, saying, "Nothing else could be acceptable to the Navy."

Regrettably, cases of fratricide continued in conflicts after World War II.

In a study conducted by the US Army in 1982, researchers examined fratricide incidents in World War II, Korea, and Vietnam. They determined that friendly fire accounted for a small number of US casualties, less than two percent. Most of those occurred during World War II, and nearly two-thirds of all such incidents were the result of ground-on-ground fire.

The percentage of US troops killed in fratricide incidents leapt dramatically during Operation Desert Storm in 1991, though the number of such incidents attributable to air-on-ground attacks dropped significantly. During Desert Storm, fratricide claimed 35 of 148 US battle deaths, around 24 percent. Although most were the result of ground-on-ground firing, there were also four USAF incidents of air-on-ground attacks.

Military commanders have pushed to eliminate fratricide. They have not been completely successful, but numbers have been reduced.

There was a tragic air-on-air fratricide in April 1984, when two F-15s under the control of an airborne early warning aircraft misidentified two US Army Black Hawk helicopters as enemies. Both helicopters were shot down, killing 26 Americans.

During the second Gulf War beginning in March 2003, analysis showed that fratricide accounted for about 11 percent of the 115 battle deaths. One incident occurred at Nasiriyah, Iraq, on March 23, 2003. Ten marines were killed when two A-10s strafed them. An investigation exonerated the pilots, placing the blame on the marine controller who called for the air strike in clear violation of the standing order because he could not see the target.

There were also ground-on-air fratricide incidents. The day before—March 22, 2003—a US Army Patriot battery shot down a Royal Air Force Tornado fighter, and both crew members died. Two days later a Patriot battery locked on to an Air Force F-16, but the pilot destroyed it with an anti-radiation missile. Fortunately, no one on the ground was killed. In April 2003 a Patriot missile downed a US Navy F/A-18, killing the pilot.

The number of such fratricide incidents has decreased dramatically in the years since then, partly because of improved air weapons, delivery systems and accuracy, partly due to better intelligence, and also due to fewer allied ground forces deployed in harm's way.

Collateral Damage

Today, the greater concern is euphemistically referred to as "collateral damage"—the death or injury of civilians as a result of military operations. This is most common when enemy forces attack friendly ground troops.

This situation, termed "troops in contact," has proved a thorny problem. Ordinarily, preplanned targets receive a thorough vetting in advance of an air strike to confirm intelligence has identified the correct target and collateral damage will be held to a minimum.

In a troops-in-contact circumstance, these safeguards are usually bypassed. Forces on the ground under attack often call in an air strike to assist them. A responding aircraft will receive enemy location information—possibly GPS coordinates—but it may simply be a general description of a building where enemy fire is originating. The pilots then do their best to identify the enemy and deploy their weapons so as to protect friendly ground forces in trouble. It is in this context where most mistakes occur.

Human Rights Watch completed a study of collateral damage incidents in Afghanistan and determined the vast majority of cases where air-delivered weapons caused civilian casualties were troops-in-contact incidents.

The statistics are compelling. In the 35 air strikes that caused collateral damage from 2006 to 2007, only two had been preplanned. Thus, more than 95 percent of the 35 air strikes resulting in collateral damage involved troops in contact—those instances when the rigorous safeguards taken at air and space operations centers to avoid such mistakes were bypassed. Given there were 4,696 air strikes flown by coalition air forces dropping "major munitions" during those two years, the number causing collateral damage was a mere .74 percent of that total—a remarkably small number.

Nonetheless, fratricide remains a serious concern to American forces. Although the number of casualties attributed to friendly fire has decreased since World War II, as a percentage of casualties the number spiked during Desert Storm. Partly this was a statistical anomaly: The coalition suffered remarkably few casualties during the war due to the size of the force and the speed of the ground war. The frequency and severity of these incidents has decreased in years since. Attention now focuses on civilian casualties—another form of fratricide—as killing or injuring civilians is so harmful to American interests that extraordinary actions are taken to limit and possibly eliminate these incidents.

Each of these deaths is tragic, so the work to avoid them will continue. ■

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Churchill's Southern Strategy

The D-Day invasion was forced on a reluctant Churchill by the Americans.

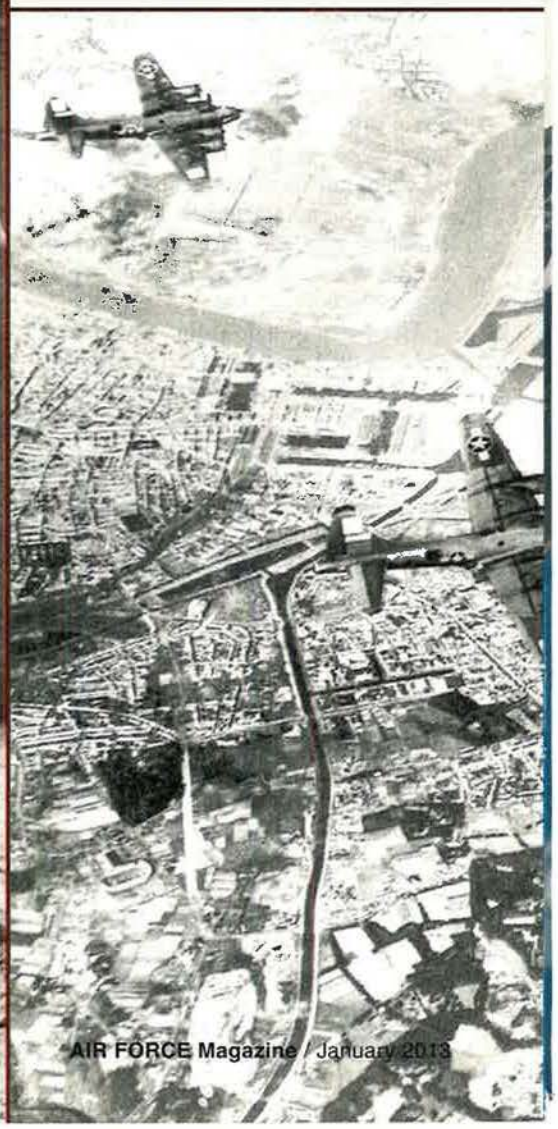
By John T. Correll

After the evacuation of the British Expeditionary Force from Dunkirk in June 1940 and the subsequent fall of France, Nazi Germany held uncontested control of Western Europe.

When the Germans failed in their attempt to capture the British Isles, they turned their attention toward the east and drove to the outskirts of Moscow before the Red Army counteroffensive began in December 1941. The Soviets pushed the Germans back relentlessly on the Eastern Front with staggering casualties on both sides, but in the west, the only challenge to the occupation of Europe was aerial bombing by US and British air forces. The Anglo-American armies concentrated on North Africa and Italy.

There was no front on the ground in Western Europe until Operation Overlord, the D-Day landings in Normandy in June 1944. D-Day was a huge success, the pivotal event of World War II in Europe. In September 1944, British Prime Minister Winston Churchill told the House of

Left: Prime Minister Winston Churchill inspects an Italian village with Field Marshal Harold Alexander (r).



Commons the battle of Normandy was "the greatest and most decisive single battle of the entire war."

However, if Churchill and the British had their way, D-Day might not have happened. They did everything they could to head off the American plan to attack across the English Channel. They pressed instead for a strategy focused on the Mediterranean, pushing through the "soft underbelly" of southern Europe, over the Alps and through the Balkans.

The Americans prevailed because they provided an increasingly larger share of the forces and funding. The British opposition to Overlord has dimmed in memory and today is largely forgotten. Churchill played it down as best he could in his memoirs, but there was already too much on record to leave any doubt about the effort to delay, divert, or avoid the D-Day invasion.

The Americans Enter

Churchill's greatest achievement was in 1940 when he stood against not only the Germans but also widespread defeatist sentiment in Britain, including Foreign Secretary Edward F. L. Wood, Lord Halifax, who wanted to seek terms with Hitler. The expectation was that the Germans would win—and they might have done so except that Churchill, almost single-handedly, inspired Britain to continue the fight.

When the threat of a German invasion passed, it was not feasible politically to keep British forces at home, doing nothing. Furthermore, British leftists pressed Churchill to open a second front to support the Russians.

British forces were not strong enough for an offensive on the continent. The only available enemy they could beat was the Italian force in North Africa, where operations began in December 1940. The British were successful there until the German Afrika Korps arrived in April 1941 to augment the Italians.

It was clear from the beginning Britain alone had no chance of defeating

Bettmann/Corbis/AP Images

President Franklin Roosevelt (l) and Churchill meet in Casablanca, Morocco, where Churchill was shocked—shocked!—that Roosevelt insisted on a commitment to a cross-channel attack. Behind Roosevelt is US Army Gen. George Marshall; behind Churchill is RAF Gen. Alan Brooke.

USAF photo

B-17s fly over Bonn, Germany. The US wanted to face Germany head-on, and the shortest route was through France. Churchill had other plans.

Photo via Library of Congress

US troops at the beachhead in Normandy, France, on D-Day, June 6, 1944. D-Day was a huge success and changed the tide of the war, despite Churchill's misgivings.

Germany. In May 1940, a week after he became Prime Minister, Churchill disclosed to his son Randolph his plan to win the war. "I shall drag the United States in," he said. American sentiment for staying out of the war was strong, though, enhanced by a dislike for the arrogance of the British Empire and its refusal of self-determination for its colonies. What brought the United States in was not Churchill's persuasion but the Japanese attack on Pearl Harbor followed by a declaration of war on the US by Germany and Italy.

The British were of the opinion that the Americans had an obligation to help defeat Hitler, had been remiss in waiting so long to enter the war, and should now fall in line with British leadership.

When Churchill and a British delegation came to Washington, D.C., in December 1941, they made "the assumption that they could draw on United States manpower and weapons as if these had been swept into a common pool for campaigns tailored to suit the interests and convenience of Great Britain," said US Army historian Forrest C. Pogue. "From the British standpoint, it was easy to conclude that a course of action favorable to their national interests was simply good strategic sense and that failure of the Americans to agree showed inexperience, immaturity, and bad manners."

The United States concurred that winning the war in Europe would take precedence over defeating the Japanese in the Pacific and joined the British in forming the Combined Chiefs of Staff to plan strategy and direct Anglo-American operations.

Sidestep

The Americans wanted to engage the Germans as directly as possible, defeat them expeditiously, and turn to the Pacific. The shortest route to Germany was through France.

The proposal of the US military chiefs, worked up by Maj. Gen. Dwight D. Eisenhower, head of the Army War Plans Division, arrived on Roosevelt's desk in April 1942 via Gen. George C. Marshall, the Army Chief of Staff.

It called for Operation Bolero, which would ferry US troops and materiel to Britain, followed in April 1943 by Operation Roundup, an invasion of Europe across the English Channel. In case the Russian front collapsed and faster action was required, a contingency operation, Sledgehammer, would secure an early beachhead in France.

Roosevelt dispatched Marshall and presidential envoy Harry Hopkins to London to sell the idea to the British. On April 12, 1942, Churchill telegraphed Roosevelt he was "in entire agreement with all that you propose and so are the Chiefs of Staff." In actuality, the British did not have the slightest intention of going along with the plan, but Churchill and Gen. Alan F. Brooke, chief of the British Imperial General Staff, did not want to tell the Americans so early in the partnership.

Churchill's Chief of Staff, Maj. Gen. Hastings L. Ismay, said later, "Our American friends went happily homewards under the mistaken impression that we had committed ourselves to both Roundup and Sledgehammer." In his memoirs, Ismay added that "perhaps it would have obviated future misunderstandings if the British had expressed their views more frankly. ... I think we should have come clean, much cleaner than we did."

"It was essential to carry on the defense of India and the Middle East," Churchill said after the war. "We could not entirely lay aside everything in furtherance of the main object proposed by General Marshall."

Still purporting to support the American plan, Churchill visited the United States again in June and persuaded Roosevelt to commit US forces to North Africa, against the advice of the US military chiefs. Marshall warned the Mediterranean was a "blind alley" and this diversion of forces made a cross-channel invasion in 1943 practically impossible.

Sledgehammer was canceled outright.

The "Soft Underbelly"

US and British objectives were not the same. The British wanted to restore and protect the prewar empire, including the routes through Gibraltar and Suez to their colonies and possessions in Africa and Asia. The Americans regarded the Mediterranean and Middle East as a distraction from the main task of taking on the Germans. They were not interested in preservation of the British Empire.

The British experience in war on the continent had made them fearful of going there again. They had sustained 744,000 battle deaths, mostly in France, in World War I and would not tolerate such casualties another time. They had been lucky to escape from Dunkirk without devastating losses. They preferred to nibble around the edges and sap German strength before attempting a head-on confrontation.

British doctrine—unlike that of the Americans, Germans, and Russians—did not emphasize direct concentration of force. From the Victorian era onward, the British had favored limited engagements on the periphery of the empire, conflicts that were frequently protracted but which minimized risks and losses.

The situation was further complicated by Churchill's personality. He was unsurpassed as the leader of a nation at

war but the popular impression that he was also a gifted military strategist was mistaken. To the distress of his generals and admirals, he followed his instincts and impulses rather than reasoned advice and deliberation. Brooke noted in his diary that Churchill "talks absurdities."

Brooke arrived one morning to discover the first item on the War Cabinet agenda was the Prime Minister's new proposal to land in Portugal, cut through northern Spain, and advance across the Pyrenees. Brooke managed to scuttle that particular brainstorm, but Churchill's strategic notions came so often that Brooke had to be selective in which ones he challenged.

Ironically, the Mediterranean strategy seems to have originated with Brooke rather than Churchill, but nobody pursued it longer or harder than the Prime Minister himself.

In a speech to the House of Commons in November 1942, Churchill described a "wide encircling movement in the Mediterranean, having for its primary object the recovery of that vital sea," but also to expose the *underbelly of the Axis,* especially Italy, to heavy attack. That seemed "from the beginning of this year to be the correct strategy," he said.

Whether Churchill ever called it the "*soft* underbelly" is open to question, but others—including Brooke—certainly phrased it that way and it has become firmly entrenched in history.

Suction Pump

The Anglo-American Operation Torch in North Africa had not yet ended when the Allied leaders met at Casablanca, Morocco, in January 1943, but the British were already looking to extend their southern strategy. The immediate objective, they said, should be to knock Italy out of the war, with Sicily as the next target.

Marshall stressed "every diversion or side issue from the main plot acts as a suction pump," but the Americans agreed anyway Sicily would be next, after Torch. The cross-channel invasion was delayed.

In April 1943, the British pressed for more. Churchill proposed to Roosevelt that once Sicily was in hand, the campaign should proceed to the Italian mainland with the invasion of Europe sliding further forward. This time, Roosevelt backed his advisors and insisted on a commitment to a cross-channel attack.

The Trident Conference in May reached a compromise—continuation of the southern offensive into Italy, coupled with a target date of May 1, 1944, for the invasion of France. Operation Roundup was redesignated Overlord. By summer, Churchill was expressing doubts about the feasibility of Overlord and suggesting new initiatives in Greece and Yugoslavia.

USA photo

A US Army patrol enters Cervaro, Italy, in January 1944. The Italian campaign had military value. It knocked Italy out of the war and tied down more than 20 German divisions that could have been used elsewhere.

The British complained constantly of American obstinacy, but Field Marshal John G. Dill, head of the British military mission in Washington, said, "The American Chiefs of Staff have given way to our views a thousand more times than we have given way to theirs." Brooke wrote in his diary that "I despair of getting our American friends to have any strategic vision. Their drag on us has seriously affected our Mediterranean strategy and the whole conduct of the war."

The North Africa campaign, concluded successfully in May 1943. The Allies took Sicily in August and invaded Italy in September, but bogged down. When Eisenhower went to England in December to take command of Overlord, British Field Marshal H. Maitland Wilson replaced him as supreme allied commander in the Mediterranean. One of Churchill's favorites, Field Marshal Harold Alexander, became commander of Allied armies in Italy.

In the Shadow of Overlord

The British accepted Overlord in principle, but refused to declare it an "overriding priority." Instead, it was termed the "main object." The British also agreed with some reluctance to the possibility of Operation Anvil (later Dragoon), a landing in the Marseille-Toulon area of southern France to support Overlord.

Meanwhile, Churchill had become enamored of seizing some Greek islands in the Aegean Sea, just off the coast of Turkey. If the German occupiers could be ousted, it might draw Turkey into the war on the Allied side. Brooke regarded the scheme as "sheer madness," but he did not challenge Churchill on it.

"Postwar politics rather than the expeditious defeat of Hitler seemed the Prime Minister's motive," said historian Warren F. Kimball. "The Aegean was a backwater, Turkey's entry into the war was too little and too late, and any diversion of resources threatened Overlord." British commandos captured several of the smaller islands in the archipelago but could not hold them unless they also captured the large island of Rhodes. This action became the inspiration for *The Guns of Navarone,* but unlike the book and film, was a disaster for the British, who were repulsed with substantial casualties.

Unwilling to give up, Churchill made a zealous pitch at the Cairo Conference in November 1943 for the Americans to join in an assault on Rhodes. To the

horror of British onlookers, the exasperated Marshall responded, "Not one American soldier is going to die on that goddamned beach."

The cross-channel attack was pushed forward for another month to avoid weakening the effort to take Rome. When two British divisions were pulled out of the Mediterranean to prepare for D-Day, Churchill complained operations in the south were being short-changed in "the shadow of Overlord."

In May 1944, Churchill told a conference of dominion Prime Ministers he would have "preferred to roll up Europe from the southeast, joining hands with the Russians" but that "it had proved impossible to persuade the United States to this view."

British Lt. Gen. Frederick E. Morgan, appointed chief planner of Overlord, said, "Apart from a mere dislike of the project, the British authorities proceeded to make every possible step impede progress in northwest Europe by diverting their forces, as unobtrusively as possible, to other theaters of war."

Pogue noted, "So long as Churchill, with the aid of American forces, was winning a peripheral victory in North Africa, the Eastern Mediterranean, or the Middle East, he was gaining victories for the British Empire." Churchill was not necessarily hastening the final victory in Europe and he "was definitely delaying the comeback fight in the Pacific for which the American public was clamoring."

Pride of the Empire

"Up to July 1944 England had considerable say in things," Churchill said. "After that I was conscious that it was America who made the big decisions." By June, the United States, with almost three times as many troops committed, was paying less attention to British attempts to curtail Overlord.

Even more so than before, Churchill was drawn to actions in which Britain could have a leading role and a claim to the credit. He focused on the Mediterranean theater, where the top commanders were British. He listened with great interest to Alexander, who assured him he could break through the Ljubljana Gap between Italy and northern Yugoslavia and advance from there to Vienna, and that "neither the Apennines nor even the Alps should prove a serious obstacle."

The British resented the transfer of resources from the Mediterranean to Overlord and the reallocation of forces to the supplementary Anvil/Dragoon landing in southern France (the Mediterranean operation was postponed and finally conducted on a reduced scale 10 weeks after D-Day).

Churchill's persistence on the southern flank did not end with D-Day. In a note to his military chiefs in July 1944, Churchill said with some petulance, "Let them take their seven divisions—three American and four French. Let them monopolize all the landing craft they can reach. But at least let us have a chance to launch a decisive strategic stroke with what is entirely British and under British command. I am not going to give way about this for anybody. Alexander is to have his campaign."

In his memoirs, Churchill put a less parochial face on the position he had taken during the war, saying, "The mounting of Overlord was the greatest event and duty in the world. But must we sabotage everything we could have in Italy, where the great strength of our country was involved? ... As I saw the problem, the campaign in Italy, in which a million or more of our British, British-controlled, and Allied armies were engaged, was the faithful and indispensable comrade and counterpart to the cross-channel operation."

One of the few Americans to agree with Churchill and Alexander was Lt. Gen. Mark W. Clark, commander of US Fifth Army in Italy, who said in his 1951 autobiography that "the weakening of the campaign in Italy in order to invade southern France, instead of pushing on into the Balkans, was one of the outstanding political mistakes of the war."

The Italian campaign did have military value. It knocked Italy out of the war and it tied down more than 20 German divisions, denying their use elsewhere. However, the prevailing opinion is that Churchill pushed the southern strategy too hard for too long, and sometimes for the wrong reasons. An argument can also be made that an invasion of the continent in 1943 would have been premature and that British reluctance saved the Allies from making a mistake.

Unfortunately, Churchill and the British stuck to their reluctance long after the situation changed.

A Glorious Fiction

"In his speeches between 1940 and 1945, Churchill created a glorious fiction of shared British and American purposes," said Churchill biographer Max Hastings. "He never hinted to his own public, much less the trans-Atlantic one, his frustrations and disappointments about Roosevelt and his policies."

After the war, Churchill and the British chiefs insisted vigorously that they had not opposed the cross-channel operation. Indeed, they did not do so outright. It was always a matter of delaying, rethinking, or deferring to some other requirement that for the moment took precedence.

"There have been many misleading accounts of the line I took," Churchill said in *Closing the Ring,* the fifth volume of his wartime memoirs. "It has become legend in America that I strove to prevent the cross-channel enterprise called Overlord and that I tried vainly to lure the Allies into some mass invasion of the Balkans, or a large-scale campaign in the Eastern Mediterranean, which would effectively kill it."

As British historian Andrew Roberts points out, "It is next to impossible for any reader of *Closing the Ring* to spot the slightest Churchillian doubt about the success of Overlord six weeks before it was launched."

Hastings noted, "It was American resolution alone that ensured the operational timetable for D-Day was maintained, while the Prime Minister expended political capital in a struggle with Washington that he was not only bound to lose, but which he deserved to lose." Planning for Overlord went on despite him, Hastings said.

"Churchill's single-minded pursuit of the Mediterranean option, and his obsession with Turkey and the Balkans—again a hangover from the First World War—might well have inflicted serious damage on Western strategy if he had won his way," said British military historian Richard J. Overy. "Hemmed in by the Alps and the Balkan ranges, at the end of long supply lines, the Western Allies would have inflicted much less damage on Hitler than they did in France, while the Soviet advance in the east would have been slowed up."

Looking back, Maj. Gen. John Noble Kennedy, director of military operations at the War Office and assistant chief of the Imperial General Staff from 1943 to 1945, acknowledged that "had we had our way, I think there can be little doubt that the invasion of France would not have been done in 1944." ■

John T. Correll was editor in chief of Air Force *Magazine for 18 years and is now a contributor. His most recent article, "The Opening Bell in Laos," appeared in the December 2012 issue.*

AFA National Report

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By Frances McKenney, Assistant Managing Editor

Honored in LA

At the Air Force Ball sponsored by the **Gen. B. A. Schriever Los Angeles Chapter** in November, Lt. Gen. Ellen M. Pawlikowski received the prestigious Gen. Thomas D. White Space Award. This Air Force Association national-level award is named for USAF's fourth Chief of Staff (see "White vs. LeMay," p. 46) and highlights the year's most outstanding contributor to the nation's progress in space.

Pawlikowski is commander of Space and Missile Systems Center at Los Angeles Air Force Base, overseeing more than 50 programs covering—in the words of the ball's master of ceremonies—"the world's most progressive space systems." Emcee Patrick Coulter also described some of the projects that Pawlikowski had advanced at her previous assignment as commander of the Air Force Research Laboratory: the first flight of the X-51 Waverider hypersonic vehicle in May 2010; 3-D laser radar ground mapping; and sensor fusion for the Blue Devil intelligence, surveillance, and reconnaissance program.

Coulter told the LA audience that Pawlikowski has had "an indelible impact on the future technology of the Air Force."

AFA Board Chairman George Muellner presents Lt. Gen. Ellen Pawlikowski with the General Thomas D. White Space Award at the Air Force Ball in Los Angeles. Pawlikowski received the honor for her leadership in 2011 as Air Force Research Laboratory commander.

More LA Honors

At the Air Force Ball—the culmination of AFA's two-day Global Warfare Symposium at the Hyatt Regency Century Plaza Hotel in Los Angeles—several other award recipients were called up to the stage.

The Schriever Chapter named Lt. Gen. Susan J. Helms, 14th Air Force commander, as a Schriever Fellow.

AFROTC cadets Daniel Myers from Ohio State University and William Schimmel from the University of Nebraska received Michael Wilson Scholarships. Established by San Francisco Giants pitcher Brian P. Wilson in honor of his late father, a USAF veteran, the scholarships are worth $15,000 each.

During award presentations, the ball's general chairman, Gwynne Shotwell, pointed out that the event raises funds for AFA and the chapter's education foundation. This includes support for 84 Visions of Exploration classrooms.

The AFA and *USA Today* Visions of Exploration program involves more than 1,200 classrooms and encourages youngsters to study science, technology, engineering, and math.

Shotwell, who is president of Space Exploration Technologies, SpaceX for short, presented proceeds of the ball—a check for $50,000—to AFA Vice Chairman of the Board for Aerospace Education Jerry E. White and Schriever Chapter President Stephen L. Quilici.

Airpower for a Museum

Roanoke Chapter President William Tracey Carter recently presented several items to the Virginia Museum of Transportation to enhance its aviation gallery.

The chapter had arranged for both Lockheed Martin and Boeing to donate photos and models of airplanes, including the F-22 Raptor and F-18F Super Hornet. Carter turned them over to the museum's deputy director, Don Moser, in preparation for the grand opening Nov. 17 of the facility's Wings Over Virginia gallery.

The chapter also raised funds, through an AFA matching grant, for a docent's cart. It will help museum staff in presenting hands-on demonstrations to visiting school groups and scout troops.

The Virginia Museum of Transportation is located in Roanoke and opened in 1963 originally to highlight the area's railroad heritage.

The chapter began supporting the museum as part of the AFA-Air Museum Education Initiative, developed by AFA's Chairman of the Board George K. Muellner during his tenure as vice chairman for aerospace education.

Veterans Day in Dallas

The Veterans Day parade in Dallas included an entry from the **Seidel-AFA Dallas Chapter,** featuring Chapter President John R. Tannehill.

AFA President Craig R. McKinley played several roles in the day's events, administering the oath of enlistment to more than 200 young adults in front of

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

City Hall, observing the parade from the reviewing stand, serving as a guest speaker, and laying a wreath for the 11th Hour Ceremony. Several morning TV and radio shows interviewed him to help publicize Veterans Day events.

Along with Doolittle Raider retired Lt. Col. Edward J. Saylor, McKinley was honored at a VIP reception after the parade. Other AFA attendees included former AFA Board Chairman David L. Blankenship, Texoma Region President Robert Slaughter, and Texas State Treasurer Robert M. Genbauer.

Chapter member William Solemene served as parade coordinator and publicity chairman.

Third Run

In Bedford, Mass., the **Paul Revere Chapter** helped sponsor the third annual AFA Veterans Day Fun Run.

Chapter President Keith M. Taylor reported that 350 runners and walkers registered for the 10K and 5K events. The 13 sponsors backing them included MIT Lincoln Laboratory and the Bedford Veterans Affairs medical center, where the race course began.

The event raised more than $8,000, Taylor said. Proceeds from the past two runs have funded care packages and gift cards for deployed troops and their families from nearby Hanscom Air Force Base and for other veterans programs supported by the chapter.

Jonathan Elias, a longtime news anchor for CBS affiliate WBZ Boston, served as master of ceremonies for the run, this year, and the TV station promoted the activity on its website, as did the local news-oriented patch.com and the Hanscom base newspaper.

Emily Shay, whom Taylor described as a "young AFA member," was race director.

The chapter has from the beginning pitched this race as a way to encourage younger members to get involved in the chapter activities.

Taylor, who completed the 5K in 24 minutes, 3 seconds, and came in No. 17 overall for that race, said the chapter also donated $250 to help carry out another road race in the Hanscom area: the Jim Thorpe 5K. That run took place at the end of November, as a signature event for the base's Native American Month celebration.

A tremendously versatile athlete, Jim Thorpe was an American Indian who started out as a football player and runner and went on to earn Olympic gold medals in the pentathlon and decathlon in 1912.

Advancing in the Air Force

At Holloman AFB, N.M., the **Frank Parker Chapter** president, Miles A. Crowell, attended a Community College of the Air Force graduation in November to present AFA Pitsenbarger Awards.

Named for A1C William H. Pitsenbarger, who received a Medal of Honor posthumously for a 1966 mission as a pararescue jumper in the Vietnam War, the $400 awards help airmen who graduate from the CCAF and plan to pursue their education.

Before the actual CCAF ceremony at the Holloman base theater, Crowell went to a morning practice session. There he had a chance to chat with the three Pitsenbarger recipients: SrA. Courtney L. Morgan, SrA. Sharisa Scales, and SSgt. Marc Anthony Thomas Jr.

Crowell reported that Morgan, a financial analyst with the 49th Comptroller Squadron, plans to do further studies in business and that Scales, from the 6th Reconnaissance Squadron, received a degree in intelligence and technology. Thomas studied maintenance management.

Crowell told the three awardees about "how important education is in advancing in the Air Force."

Stuffing Stockings

As they have for the past four years, the **Brig. Gen. Harrison R. Thyng Chapter** in New Hampshire donated

funds for holiday gifts mailed to troops in Southwest Asia.

Chapter President Kevin Grady explained that a local nonprofit group called MooreMart—a play on the name WalMart—holds several drives a year to send care packages to the troops. The project began in Nashua in 2004 when the family of Brian Moore sent him a care package while he was deployed. In November, the organization, supported solely by volunteers, shipped its 50,000th package.

Grady is an AFJROTC instructor at Alvirne High School in Hudson, N.H., and recently mustered his cadets to stuff Christmas stockings with supplies purchased through the chapter donation. He said the cadets included notes of encouragement, along with gift items that typically include toothbrushes, snacks, stationery, and socks.

MilCon Breakfast: A Building Update

With support from the **Delaware Galaxy Chapter,** the Central Delaware Chamber of Commerce hosted its annual MilCon Breakfast at Dover Air Force Base in October.

All three of the state's members of Congress attended the event: Democrats Sen. Thomas R. Carper, Sen. Christopher A. Coons, and Rep. John C. Carney Jr. They spoke about the base's importance to Delaware and the Air Force.

The organizers bill this event as the MilCon (Military Construction) Breakfast because the 436th Airlift Wing commander updates its Capitol Hill delegation and community leaders on building projects under way at Dover.

Chapter President William F. Oldham reported that wing commander Col. Richard G. Moore Jr. told the audience of some 200 guests about finishing the aircrew flight equipment, dormitory, base communications, chapel, and fitness center buildings. Moore also covered future projects: hangars and a security forces complex.

The Galaxy Chapter bought two tables at the breakfast, inviting as their guests district superintendents and principals who have AFJROTC units at their high schools. Oldham commented that this breakfast garners more interest in AFA than any other approach, primarily because it includes a base tour. The superintendents and principals always come away impressed by the base and the Air Force, he said.

Oldham counted 11 chapter members at this breakfast, including VP Daniel Alvarez III, Secretary Stephen Welde, Treasurer John K. Murphy, Government Relations VP Robert Berglund, and Veterans Affairs VP John J. Kotzun.

Brats 'n Beer: $16,000

Last year, the **San Jacinto Chapter** in Texas grossed $12,000 in two days of working a food concession at the Wings

Over Houston air show. This year's take? A record-breaking $16,000.

Mind you, it's not all for the chapter's coffers; they take 10 percent of the gross and give most of it to cadet volunteers from the University of Houston AFROTC unit who help run the booth every year.

"They earn it," commented Homer S. Black, chapter secretary, who organizes the concession's staffing. Led by Lt. Col. A. Todd Aaron, the Det. 003 cadets this year grilled sausages, took the orders, served up nachos, and handled the cash register.

Airmen from the 147th Reconnaissance Wing at Ellington Field, where this Commemorative Air Force air show takes place, took shifts at the booth, as well.

Hot dogs, soft drinks, and beer proved to be the best-sellers, said Black. He worked the concession stand with Chapter Treasurer Larry M. Bradshaw, members David West and Diane Black, and other chapter volunteers.

More Chapter News

■ AFA Vice Chairman of the Board for Field Operations Scott P. Van Cleef spoke to students at Greenfield Elementary School in Troutville, Va., as part of the **Roanoke Chapter's** annual outreach program to highlight Veterans Day. He talked about the Air Force, but as a photo published in the *Roanoke Times* showed, he really had a group of first-graders pop-eyed when he brought out an inert 30 mm practice round from a Warthog. Van Cleef later explained, "I was describing the rate of fire of the A-10's 30 mm Gatling gun."

■ In San Antonio, Lt. Gen. Douglas H. Owens, vice commander, Air Education and Training Command, addressed the **Alamo Chapter's** annual Combat Breakfast on Nov. 7. He spoke about the freedoms Americans have and emphasized the sacrifices made by several wounded airmen in the room. Held at JBSA-Randolph's Kendrick Club, the Combat Breakfast attracted some 200 guests. It is part of San Antonio's annual Celebrate America's Military week of events.

■ A Navy meteorologist spoke to the **Florida Highlands Chapter** in November, recounting highlights from his three years on Active Duty and 17 years—and counting—in the Navy Reserve. Alex Daly teaches science at Avon Park High School, where Chapter President James K. Galloway heads the AFJROTC unit. Daly's presentation covered his Navy career and also information on weather at sea and how it can be used, for example, to help submarines stay undetected. Daly backed off from divulging too many details because the audience "seemed to be too interested," Galloway said with a laugh.

■ The **Thomas W. Anthony Chapter** and Maryland AFA helped sponsor a countywide JROTC training camp in October. Two former cadets returned to their alma mater to help a chapter member conduct it. A1C Delaney Miles and A1C Trent Morrison took leave and traveled at their own expense from Minot AFB, N.D., and JB Pearl Harbor-Hickam, Hawaii, respectively, to assist James Warren, an AFJROTC instructor at Bladensburg High School, Md. Central East Region President Joseph L. Hardy called the airmen's actions "giving back." ■

Reunions

reunions@afa.org

Seeking former faculty, staff, and students of the **Air Force Institute of Technology's School of Systems and Logistics** for 50th anniversary, April 26, 2013. **Contact:** Steven Glazewski (937- 255-7777, x3230) (steven.glazewski@afit.edu). ■

E-mail unit reunion notices four months ahead of the event to reunions@afa.org, or mail notices to "Unit 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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Keeper File

keeper@afa.org

Reagan's Zero Option

The Soviet Union in the 1970s deployed hundreds of SS-4, SS-5, and SS-20 intermediate-range nuclear missiles against targets in Western Europe. In 1979, NATO countered with a plan to base in Europe 572 of its own intermediate-range missiles. Inflamed anti-nuclear forces began years of protests. President Ronald Reagan, who inherited NATO's plan, was determined to press on, but found a better way. He offered to cancel the US deployments if Moscow would withdraw all SS-20s—the "Zero Option." The arms control clerisy considered the idea "unrealistic," designed to score propaganda points. They were wrong. After the US began to deploy intermediate-range nuclear forces weapons in late 1983, the Soviets folded. The Zero Option became the core of the 1987 INF Treaty. In a few years, all such weapons were gone. Their elimination constituted a key step toward liquidation of the Cold War.

"Arms Reduction and Nuclear Weapons"

President Ronald Reagan
Address to the National Press Club
Washington, D.C.
Nov. 18, 1981

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

I would like to discuss ... the growing threat to Western Europe which is posed by the continuing deployment of certain Soviet intermediate-range nuclear missiles. The Soviet Union has three different [types of] such missile systems: the SS-20, the SS-4, and the SS-5, all with the range capable of reaching virtually all of Western Europe. There are other Soviet weapon systems which also represent a major threat.

Now, the only answer to these systems is a comparable threat to Soviet threats, to Soviet targets; in other words, a deterrent preventing the use of these Soviet weapons by the counterthreat of a like response against their own territory. At present, however, there is no equivalent deterrent to these Soviet intermediate missiles. And the Soviets continue to add one new SS-20 a week.

To counter this, the allies agreed in 1979, as part of a two-track decision, to deploy as a deterrent land-based cruise missiles and Pershing II missiles capable of reaching targets in the Soviet Union. These missiles are to be deployed in several countries of Western Europe. This relatively limited force in no way serves as a substitute for the much larger strategic umbrella spread over our NATO allies. Rather, it provides a vital link between conventional shorter-range nuclear forces in Europe and intercontinental forces in the United States.

Deployment of these systems will demonstrate to the Soviet Union that this link cannot be broken. Deterring war depends on the perceived ability of our forces to perform effectively. The more effective our forces are, the less likely it is that we'll have to use them. So, we and our allies are proceeding to modernize NATO's nuclear forces of intermediate range to meet increased Soviet deployments of nuclear systems threatening Western Europe.

Let me turn now to our hopes for arms control negotiations. There's a tendency to make this entire subject overly complex. I want to be clear and concise. ... I've just sent another message to the Soviet leadership. It's a simple, straightforward yet historic, message. ...

The first and most important point concerns the Geneva negotiations. As part of the 1979 two-track decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on intermediate-range nuclear forces. The United States has been preparing for these negotiations through close consultation with our NATO partners.

We're now ready to set forth our proposal. I have informed President Brezhnev that, when our delegation travels to the negotiations on intermediate-range, land-based nuclear missiles in Geneva on the 30th of this month, my representatives will present the following proposal: The United States is prepared to cancel its deployment of Pershing II and ground-launch cruise missiles if the Soviets will dismantle their SS-20, SS-4, and SS-5 missiles. This would be an historic step. With Soviet agreement, we could together substantially reduce the dread threat of nuclear war which hangs over the people of Europe. This, like the first footstep on the Moon, would be a giant step for mankind.

Now, we intend to negotiate in good faith and go to Geneva willing to listen to and consider the proposals of our Soviet counterparts, but let me call to your attention the background against which our proposal is made.

During the past six years, while the United States deployed no new intermediate-range missiles and withdrew 1,000 nuclear warheads from Europe, the Soviet Union deployed 750 warheads on mobile, accurate ballistic missiles. They now have 1,100 warheads on the SS-20s, SS-4s, and -5s. And the United States has no comparable missiles. Indeed, the United States dismantled the last such missile in Europe over 15 years ago.

As we look to the future of the negotiations, it's also important to address certain Soviet claims, which left unrefuted, could become critical barriers to real progress in arms control.

The Soviets assert that a balance of intermediate-range nuclear forces already exists. That assertion is wrong. By any objective measure, ... the Soviet Union has developed an increasingly overwhelming advantage. They now enjoy a superiority on the order of six to one. ...

My Administration, our country, and I are committed to achieving arms reductions agreements. ... Today I have outlined the kinds of bold, equitable proposals which the world expects of us. But we cannot reduce arms unilaterally. Success can only come if the Soviet Union will share our commitment, if it will demonstrate that its often-repeated professions of concern for peace will be matched by positive action. ■

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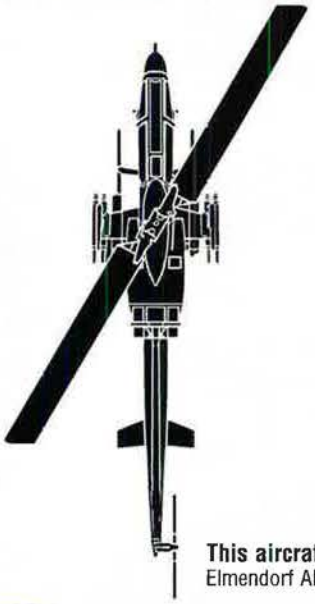
Artwork by Zaur Eylanbekov

AH-1 Cobra



The sleek, menacing-looking AH-1 Cobra gunship was for three decades the backbone of the Army's attack helicopter force. This two-bladed, single-engine aircraft, an offshoot of Bell's iconic UH-1 Huey utility chopper, did yeoman work in Vietnam and many locales afterward, providing armed reconnaissance, anti-tank attack, fire support, escort, anti-shipping attack, and more. Its speed and lethality revolutionized helicopter warfare.

In producing the Cobra, Bell recycled the basic engine, transmission, rotor system, and tail boom of the Huey, but put them in a streamlined, low-profile fuselage. Stub wings provided lift as well as stations for a wide variety of weapons. High-and-low tandem seating gave maximum visibility for the crew. Seated high in the rear, the pilot could better maneuver; the gunner, low and in front, could concentrate lethal fire on the enemy. Aircrews loved it, even though its rotor and low operating altitude precluded use of ejection seats or parachutes. The Cobra had twice the speed and three times the loiter time of the Huey and was also far more maneuverable.

Cobras first saw major combat in 1968 during the Tet Offensive in South Vietnam. In that war, they were used in "hunter-killer" teams in which a single OH-6 chopper would troll for enemy fire and Cobras would blast the newly revealed target. They also supported ground forces in traditional ways. Speed, agility, and powerful armament kept the Cobra at the fore of Army airpower until the arrival of the AH-64 Apache. Much upgraded twin-engine versions remain in service today with the US Marine Corps.

—Walter J. Boyne

This aircraft: Army AH-1G Cobra helicopter—#69-16440—as it looked in 1975 when deployed to Elmendorf AFB, Alaska. It carries high-visibility markings for cold weather operations.

USMC photo by Sgt. Sean P. Murphy

A USMC Cobra fires rockets during an exercise in 2008.

In Brief

Designed, built by Bell ★ first flight Sept. 7, 1965 ★ crew of two (pilot, copilot/gunner) ★ one Avco Lycoming T-53-L-11 turbo-shaft engine with "540" broad-chord rotor ★ number built about 1,400 ★ **Specific to AH-1G:** max speed 175 mph ★ cruise speed 166 mph ★ max range 360 mi ★ armament 7.62 mm mini-gun and 40 mm grenade launcher in chin-nose turret; XM-159 or XM-200 rocket launchers and 20 mm XM-35 cannon in stub wings ★ weight (max) 9,500 lb ★ span (rotor diameter) 44 ft ★ length 53 ft ★ height 13 ft 6 in.

Famous Fliers

Notables: Gil Acheson, Hamilton Howze, James Luscinski, George Seneff, Ali Akbar Shiroodi, John Thompson, Randy Zahn. **Test Pilots:** Donald Bloom, Roger Huffaker, Joseph Mashman, James McCullough, Timothy Mouw, Thomas Post.

Interesting Facts

Flew some one million hours during the Vietnam War ★ nicknamed "Snake" ★ called Tzefa ("Viper") in Israeli service ★ played key combat role in Grenada (1983), Panama (1989), Iraq (1991, 2003), Somalia (1993), and Haiti (1994) ★ made first flight only eight months after Bell decided to build prototype ★ suffered 300 losses in Vietnam ★ used by Israel in operations in Lebanon and Pakistan against rebel forces in Balochistan ★ used today to fight fires in United States as "Firewatch Cobra" or "FireSnake" ★ aced out by armed Hueys in the famous "Apocalypse Now" attack scene.

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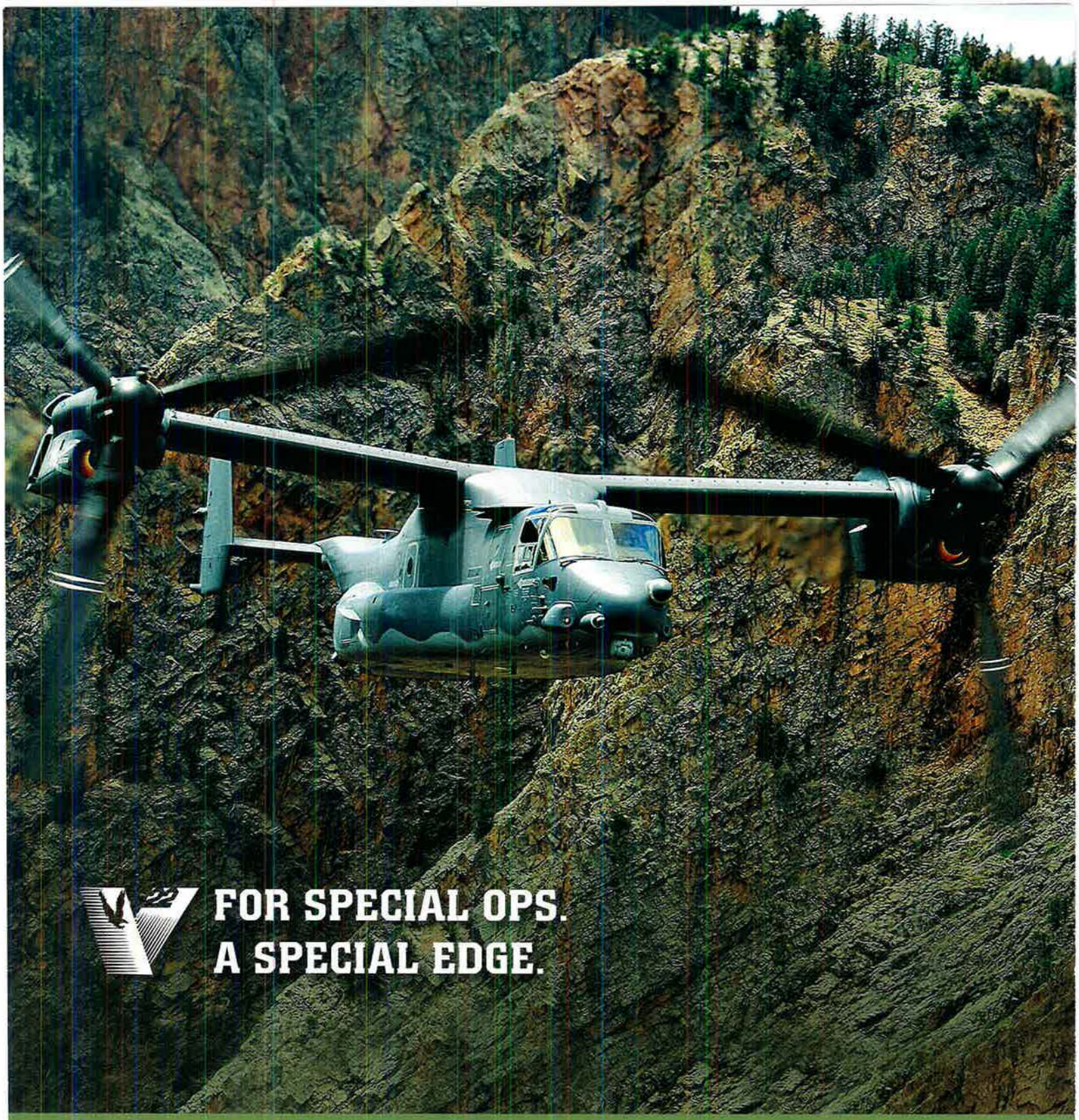

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