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August 2009, Vol. 92, No. 8

AIR FORCE MAGAZINE

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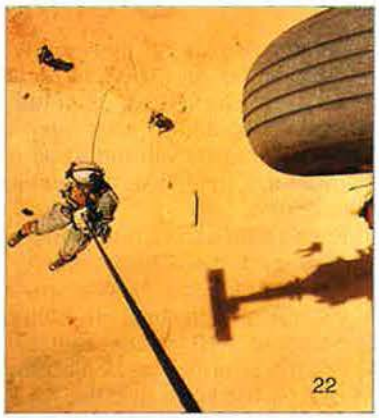

About the cover: An artist's conception of the Delta IV rocket and boosters. Illustration by Erik Simonsen. See "2009 Space Almanac," p. 52.

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Editorial

By Robert S. Dudney, Editor in Chief

The No-Brainers of Robert S. McNamara

IT SHOULD be evident to all that Robert S. McNamara, to paraphrase a line from the 1940 book *Guilty Men,* was among the worst selections for high office since Caligula chose to make his horse a consul at Rome. He died July 6 at age 93. Today's officials can profit from studying his career.

McNamara, the Pentagon chief in the Kennedy and Johnson years, showed sketchy character on many occasions, but nowhere did he do this more baldly than in his 1995 memoir, *In Retrospect: The Tragedy and Lessons of Vietnam.* My predecessor, John T. Correll, dissected it in an editorial, "The Confessions of Robert S. McNamara." I cannot improve upon it. He wrote:

"Robert S. McNamara could give duplicity a bad name. In his new memoir, ... he says that the Vietnam War was a mistake and that he knew it all along. We should have gotten out in 1963, when fewer than 100 Americans had been killed. When he and other US policymakers took us to war, they 'had not truly investigated what was essentially at stake.'

"McNamara was Secretary of Defense from 1961 to 1968 in the Kennedy Administration, which led the US into the Vietnam adventure, and in the Johnson Administration, which widened the involvement to a war in which 58,000 American troops died. He was not some star-crossed functionary who went passively along with a policy he opposed. He was so fiery an advocate that Vietnam became known as 'McNamara's War.' His actions then and his statements now cannot be reconciled with honor.

"The duplicity has another dimension. News accounts bill In Retrospect *as a stark admission of guilt, but an actual reading of it tells a different story. McNamara does, to be sure, acknowledge that he and his colleagues were 'wrong, terribly wrong,' but the admissions account for relatively little of the book's substance. The bulk of it explains how these were honest mistakes and not altogether the fault of McNamara and his friends."*

Correll went on to point out a startling blind spot in the book:

"Somehow, it is not altogether surprising that McNamara comes close to ignoring the rank and file of the US armed forces. In the entire book, there are just four brief instances, one of them in a footnote, when the troops cross his mind. The best he can bring himself to say for those killed in action is that 'the unwisdom of our intervention' does not 'nullify their effort and their loss.'"

Damning as these passages are, it is what comes next that most clearly spotlights McNamara's biggest failing. Correll wrote:

"McNamara never learned the real lessons of the war. In Retrospect *ticks off '11 major causes for our disaster in Vietnam,' but they run mostly to philosophical mush like, 'We misjudged then—as we have since—the geopolitical intentions of our adversaries,' and, 'We failed to recognize that in international affairs, as in other aspects of life, there may be problems for which there are no immediate solutions.'*

His lack of integrity was deeply troubling, but it was the world-class arrogance that did the real military damage.

"Incredibly, McNamara recalls—but regards it as insignificant—that the service Chiefs told him in 1964 that the US had not defined a 'militarily valid objective for Vietnam.' With similar arrogance, McNamara continues to believe that his strategic and tactical abilities were better than those of the military professionals and that his micromanagement of the war was a good idea."

In short, his lack of integrity was deeply troubling, but it was the world-class arrogance that did the real military damage.

Many have testified to the pervasiveness of this arrogance. One who experienced it up close and personal was Gen. Curtis E. LeMay, USAF Chief of Staff in the years 1961-65. LeMay was the greatest combat commander the Air Force had ever produced, yet it counted for little in the lounges of the Office of the Secretary of Defense.

Warren Kozak, author of a new biography, *LeMay: The Life and Wars of General Curtis LeMay,* notes that, "Robert McNamara had very clear ideas of what he wanted to do at the Pentagon. ... He was determined to take control."

Faced with such brash confidence, LeMay and the Chiefs didn't have much of a chance. McNamara killed key service programs. He halted the supersonic B-70 bomber that was LeMay's top priority. The Pentagon chief forced on the Navy and the Air Force the dual-service TFX—later F-111. Most especially, LeMay quarreled with McNamara over the latter's embrace of "gradualism" in Vietnam. LeMay was proved right.

The New Frontiersman saw little reason to consult with the Chiefs. They "sensed this and felt that Kennedy and the people under him simply ignored the military's advice." LeMay was "especially incensed" when McNamara brought in a group of young statisticians as a buffer between him and the military. LeMay referred to them with the dismissive term "whiz kids."

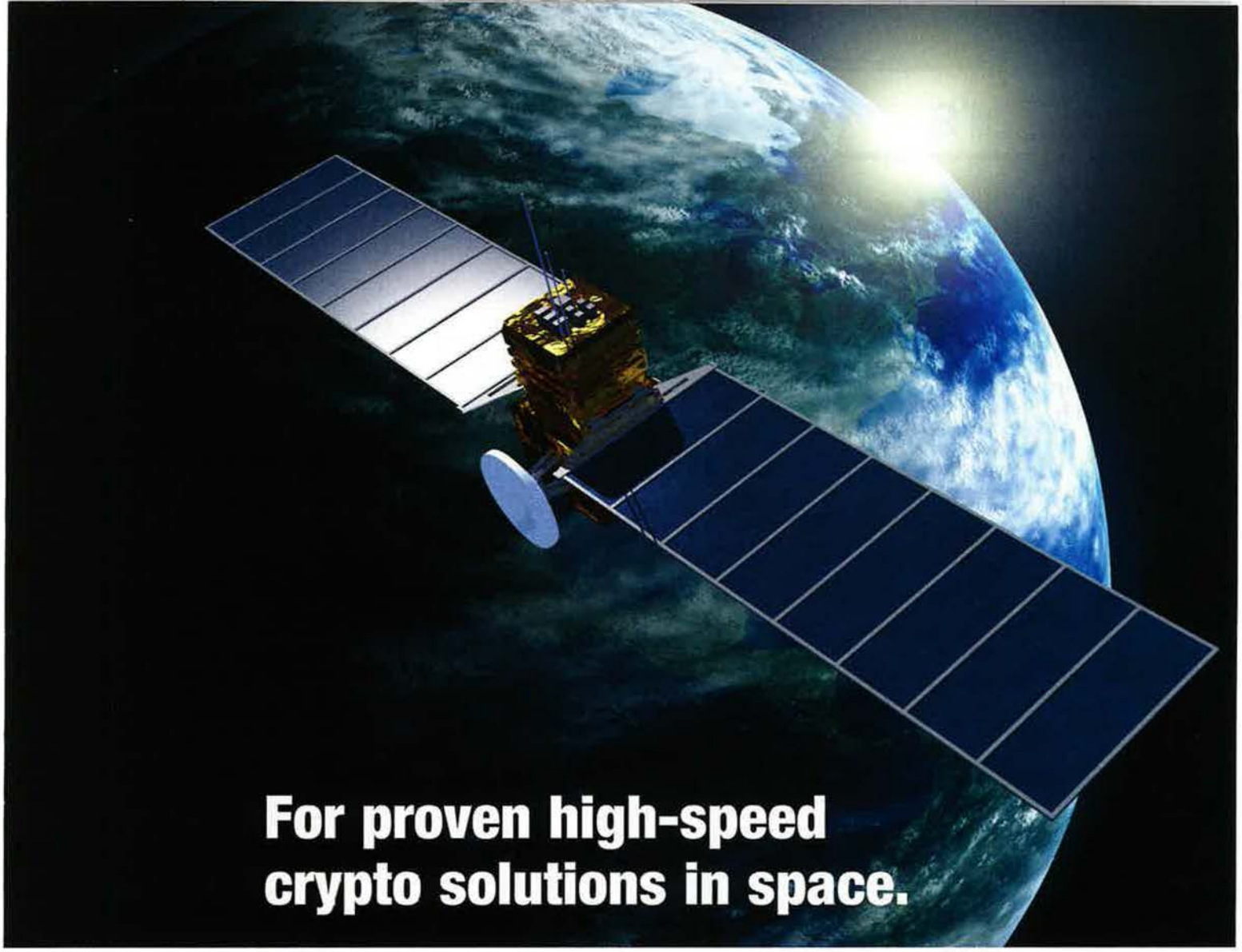
"These young men, who seemed to have the President's ear, ... exuded a sureness of their opinions that LeMay saw as arrogance," writes Kozak. They made decisions with a startling self-assurance.

Today, some call such obvious decisions "no-brainers."

This grated on LeMay, writes Kozak. "As LeMay approached almost everything in his life with a feeling of self-doubt," he says, "he was actually surprised when things worked out well. Here, he saw the opposite—inexperienced people coming in absolutely sure of themselves and ultimately making the wrong decisions with terrible consequences."

Syndicated columnist Richard Reeves, in a July 11 dispatch, called McNamara "possibly the smartest fool ever to serve at the highest level of government in the United States." Part of that "unwisdom," to use McNamara's term, flowed from his arrogance—his firm belief that he already knew all the answers.

As we said, today's officials can profit from studying McNamara's career. ■



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Letters

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Move On the Deterrent

I read with interest your editorial in the June 2009 issue of *Air Force* Magazine ("Defending the Deterrent," p. 2) on the report of the Congressional Commission on the Strategic Posture of the United States.

Both the report and your editorial overlook a key point when it comes to nuclear weapons: strategic and budgetary disconnects exist because the Department of Energy, instead of the Department of Defense, is responsible for the nuclear infrastructure. Cradle-to-grave responsibility for nuclear weapons should reside wholly within the Department of Defense, where such weapons can compete with alternatives based on their utility and cost. Unfortunately, the report recommends making the National Nuclear Security Administration an agency unto itself—similar to the old Atomic Energy Commission, the forerunner of the Department of Energy. This is the exact opposite of what needs to be done.

The report's recommendation to designate the nuclear weapons laboratories as national security labs with programming and budgetary responsibilities shared among the Departments of Energy, State, Defense, and Homeland Security, along with the Director of National Intelligence, is another bad idea. Splitting authority and accountability for one agency among five Cabinet-level departments is irresponsible.

Transferring responsibility for the nuclear infrastructure to the Department of Defense will liberate the annual $9 billion allocation to the National Nuclear Security Administration, allowing Department of Energy resources to be devoted to the development of clean, renewable, alternative energy sources. Such development will benefit our national security posture by eliminating our dependence on oil. Our continued reliance on oil is the only reason why we have a strategic interest in the Middle East. And our current strategic posture in the Middle East is costing us plenty.

Freeing the Department of Energy from its historical duties of nuclear weapons development so it can become a real Department of Energy, not a de facto adjunct of the Department of Defense, is a key step in strengthening America's strategic posture.

Lt. Col. Allan G. Johnson,
USAF (Ret.)
Fairfield, Calif.

The Invasion That Didn't Happen

Regarding "The Invasion That Didn't Happen" (June, p. 42)—it was a good article, but a broader view of the full dimensions of the war, particularly in Asia, makes clear why the complete defeat of Japan in World War II in the shortest possible time was critical.

When Japan invaded China starting in 1931, attacked Pearl Harbor in 1941, then invaded Southeast Asia, it was directly invading countries containing about one-third of the world's population and brutally occupying over half this number. Most became allied with the US to defeat Japan. The long, merciless war killed close to 24 million Allied (mostly Asian civilians), plus nearly three million Japanese by August 1945. Each added week of war doomed to death approximately 100,000 Asian and Western Allies, plus 50,000 Japanese.

Japan's long, brutal aggression made Allied surrender concessions to the military in 1945 impossible and guaranteeing the Emperor's retention a much more difficult decision than revisionists would allow.

The Truman Administration rightly worried about high US casualty levels to invade Japan. But, they were also cognizant of a huge loss of life throughout Asia, as reported by the OSS, the US

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

To advocate aerospace power and a strong national defense.

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

ambassador in Chunking, and British and American commanders in Asia.

I believe that the overwhelming reason the A-bomb was dropped was to quickly and decisively end the war to save all lives throughout the Asian-Pacific Theater, not just American lives. The decision undoubtedly spared a million to three million lives.

The cost in Japanese dead from all US 1945 bombing to end World War II was only about two percent of all Allied Asian and Western civilian dead from Imperial Japan's long and merciless aggression. It is surprising that the A-bomb use has been a moral question while Japan's responsibility for starting the conflict and its horrific consequences has not been.

Werner Gruhl
Columbia, Md.

Regarding revisionist scenarios for concluding the war with Japan, over the years I asked one question, "Where was your dad or grandfather stationed?" In my experience, their family's generational representative was not combat coded or involved directly in the combat operations. My dad, SSgt. Buckley O'Day had already landed on Saipan with the 2nd Marine Division. (Every landing was a miniature D-Day, and deadly.)

My wife's dad, Cpl. J. Frank Thompson landed at Normandy on D+24 and was in almost continuous combat as a part of the 3rd Army's 704th Tank Destroyer Battalion and often attached to units of the 7th Army. Both were scheduled for the invasion of Japan. We were both born after the war because our dads came home.

Any person regrets the loss of life that results from war. President Harry S. Truman made the decision to force the Japanese to surrender. His "the buck stops here" management style saved the lives of more Japanese forces and citizens than it did American forces.

Maj. Gary L. O'Day Sr.,
USAF (Ret.)
Bloomburg, Tex.

Due Credit

Gotta give the old Soviets credit *["Carbon Copy Bomber," June p. 52].* Their reverse engineering of the B-29 was masterfully done. They even copied the mistakes in the individual planes they worked from, including unnecessary holes that were drilled and wrong internal paint schemes.

When they were finished and had the Bull in production, they took pride in the fact that it caught fire at about the same rate as the B-29, which was known for such malfunctions.

Bill Barry
Huntsville, Ala.

Critical CSAR

Secretary of Defense Robert M. Gates obviously hasn't a clue regarding dedicated combat search and rescue (CSAR) and the importance of having the specialized personnel, equipment, and resources to accomplish this mission anywhere and anytime required *["Air Force World: Gates Throws Open CSAR Mission," June, p. 13].*

A highly capable and professional Air Force CSAR community has, is, and will continue to be one of the most indelible identifiers of the US military and an object of appreciation by our allies. In fact, when the British in Afghanistan required rescue and close air support for their Prime Minister Brown's visit to Helmand province, they requested USAF rescue, due to the unique and practiced skill sets of both protection capability (best case) and recovery (worst case).

The former undersecretary of defense for acquisition, technology and logistics, John J. Young Jr., commented, "I don't know that that community has to have its own set of assets for the occasional rescue mission," and "We have new things coming on line, like V-22s." In 2002, Combat Rescue Analysis of Alternatives rejected the V-22 for survivability and rescue opera-

tions incompatibility. Paraphrasing from the current Doctrine for Joint Combat Search and Rescue: Although each service is responsible for performing combat rescue in support of its operations, the services should be aware of the other services' CSAR capabilities. Young is so far off base, it is ridiculous. USAF CSAR forces have been rescuing US Army, marines, and allies in Iraq and Afghanistan due to direct request from joint and coalition commanders.

Bottom line, USAF CSAR has been and will continue to be THE most capable CSAR force we have. If the Joint Chiefs do not rise up as one against this proposal and Congress goes along with dismantling this unique and time-proven capability, then our armed forces will be again demodernized into a second rate force regarding CSAR, along with all the other cutbacks this Administration has planned.

CMSgt. Craig B. Bergman,
USAFR (Ret.)
Tucson

Delta Dart

Air Force Magazine does a wonderful job of contributing to history and getting its facts right. John Correll's article on the Army Air Corps does an excellent job with a question that people keep raising *["But What About the Air Corps?," June, p. 64].*

However, the letter from reader retired Maj. William M. Wellman *[See "Letters: Unmanned F-106," July, p. 5]* is inaccurate. No F-106 Delta Dart was ever deployed to Southeast Asia, and none was ever stationed at Udorn, Thailand. The only time the F-106 ever went to Asia was in 1968 in the aftermath of the North Korean seizure of the US intelligence ship *Pueblo*. That year, the F-106 was briefly deployed in Korea. The F-106 never saw combat.

Major Wellman is probably thinking about the F-102 Delta Dagger, which did deploy to Southeast Asia. In air-to-air combat, the F-102 ended up with a score of zero to one—one F-102 shot down by a MiG, no MiG ever shot down by an F-102.

Robert F. Dorr
Oakton, Va.

Fifty Thousand Airplanes

Juxtaposing President Franklin D. Roosevelt's speech justifying the call for "Fifty Thousand Airplanes" *["Keeper File," June, p. 66]* in 1940 with John T. Correll's article, "The Invasion That Didn't Happen" *[June, p. 42],* clarifies how timely political leadership in peacetime affects the conduct of war when it comes.

As a career Air Force officer and student of history, I have always been amazed by the wisdom of FDR and [British Prime Minister Winston] Churchill in recognizing, before the initial attacks, that the ability to destroy enemy forces before they could mass ground and naval forces for an invasion was the key. Both political leaders overrode strong objections from naval and ground forces to concentrate on air force improvements, and both opposed isolationist political factions with clear, concise explanations of their decisions. The British and American citizens also recognized who was blowing smoke and who were the great leaders in the long run.

Col. John B. McTasney,
USAF (Ret.)
Carmichael, Calif.

Classics

Under famous fliers *["Airpower Classics: B-58 Hustler," May, p. 142],* you could add two Doolittle Raiders and two jet aces—Doolittle Raiders David M. Jones was the B-58 test force commander, and Everett "Brick" Holstrom was the second 43rd Bomb Wing B-58 commander. The first was Jimmy Johnson, 10 Korean War victories.

Jimmy Jabara, Korean War first ace with 15 victories, was Holstrom's wing vice commander.

Col. Richard C. Doom,
USAF (Ret.)
Serafina, N.M.

Washington Watch

By John A. Tirpak, Executive Editor

Fight of the century over?; USAF's "calculated risk"; Thumbs-up for Corley ....

WASHINGTON, D.C., JULY 23, 2009

The F-22 Dogfight

The movement to keep USAF's F-22 in production suddenly went south in late July, with observers now saying it seemed likely to sputter out over the summer.

On Capitol Hill, support for the aircraft at first proved to be unexpectedly strong. Then came a Presidential veto threat, direct personal lobbying by the vice president and Secretary of Defense, and doubtless a great deal of backroom horse trading, all aimed at stopping momentum behind the front-line Air Force fighter. It all led to one of the more contentious debates over a weapon system in decades.

When it was over, the Senate had voted on July 21 to strip from its defense authorization bill $1.75 billion needed to buy seven more of the stealthy Raptors in Fiscal 2010. The money had been put there by the Senate Armed Services Committee, over the objections of its chairman, Sen. Carl Levin (D-Mich.), and ranking minority member, Sen. John McCain (R-Ariz.)

About a month earlier, the House, by a strong 389-22 margin, voted to keep the fighter going, adding $369 million in long-lead production money for 12 F-22s, though in Fiscal Year 2011. When the Senate added F-22 money, it was expected that, in the House-Senate budget conference, some number of additional Raptors would be funded.

Then came action in the full Senate. Levin and McCain teamed up on an amendment killing the F-22 funds. When support for his position seemed soft, Levin withdrew it, buying time to persuade colleagues not to keep production going.

Over the next week, Defense Secretary Robert M. Gates rushed to President Obama's home turf of Chicago to give an emotional speech attacking the F-22 as a symbol of wasteful, business-as-usual Washington politics. National media gave the speech favorable coverage. President Obama said in a press conference that he would veto any bill containing money for new F-22s. Joint Chiefs of Staff Vice Chairman Gen. James E. Cartwright testified before the Senate, claiming that exhaustive analysis showed no more than 187 F-22s are needed (Cartwright was later forced to retract that testimony, admitting that no such studies had been done). The issue was seen as a key test of Obama's ability to push his defense spending cuts through Congress.

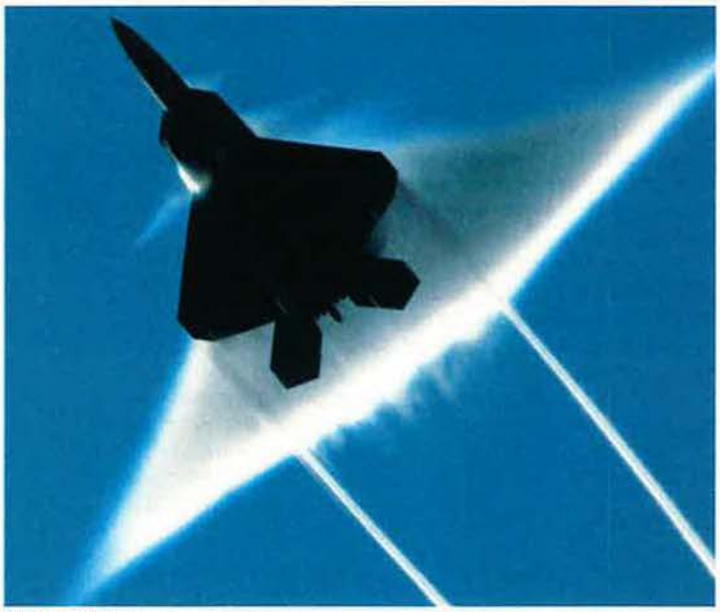
In the final hours before the reintroduced bill came to a vote, Vice President Joe Biden, who was a Senator for 36 years, worked his former colleagues, making a personal appeal to fence-sitters on Obama's behalf.

Despite spirited debate on the Senate floor, the vote on Levin's amendment was 58-40 to stop production. Even then, the door remained open for a conference fight, but Rep. John P. Murtha (D-Pa.), the powerful head of the House Appropriations defense subcommittee and supporter of continued Raptor production, said he thought the Senate vote "ended the debate." He pledged to shift the House-provided F-22 money to be used for spare parts and engines.

There was a large raft of reasons why the F-22 money was inserted by the two defense panels, but Rep. Neil Abercrombie (D-Hawaii), chair of the House Armed Services air and land forces panel, focused on two in June conversations with reporters.

First, he said, Congress had made clear in 2009 that it wanted the Pentagon to buy 20 additional Raptors in Fiscal 2010, but the Pentagon, citing dubious legal technicalities, had ignored the will of Congress.

The Pentagon needs "to learn who's in charge," Abercrombie said, noting that he was particularly incensed by Gates' efforts to "do everything ... to thwart this, ... ignore it, ... pretend 'we don't know what you're saying,'... stall."



USN photo by Petty Officer 1st Class Ronald Dejarnett

Boom, then bust.

If the Pentagon doesn't comply with the 2009 directives, "there's going to be some severe consequences," Abercrombie said. He added that Congress "can't back down" on the F-22. "We can't allow the Executive to run roughshod over Congressional obligation and responsibility."

Second, Abercrombie noted that, although defense officials cite "rigorous analysis" that 187 F-22s are sufficient, it hasn't been provided to Congress. Without it, he said, the HASC believes that some "breathing room" is needed to gain time for thoughtful consideration of the issue, which has ramifications for national strategy, jobs, and the defense industrial base.

The Appropriators Step In

Murtha in late June, added his voice to Abercrombie's, saying he, too, supported buying more of the stealthy F-22s.

His counterpart on the Senate defense appropriations panel, Sen. Daniel K. Inouye (D-Hawaii), "feels very strongly about it, and I do, too." Murtha said he's convinced that Gates' move to terminate the F-22 "was made based on cost" and not on strategy or analysis. On his panel, "we know the Air Force believes it does not have enough [F-22s] in order to train people, deploy people, and have spares available." There is "strong sentiment" in the House for further F-22 buys, Murtha said, though "not a majority."

Abercrombie, asked the previous week about the prospect of a veto over the F-22, shrugged it off.

"Does anybody seriously believe that, given the fact that we have troops in the field in two areas of the world ... that the people of this country would ... put up with a veto threat over some planes?" He believes President Obama "much too shrewd, much too sophisticated in his understanding of the political situation" not to recognize that all House members "and a considerable number of Senators" are up for re-election in 2010, and that a veto of the defense budget bill would be "overridden in a nanosecond." The chances of a veto sticking are "about zero, I can tell you right now," Abercrombie said, adding, "That is not a productive way to go about having this conversation."

Inouye told reporters the day after the full Senate vote that he was relaxing his determination to get more Raptors built. "As a general rule, we follow the authorizers," he said. "I just hope that someday we won't regret this decision." Other Senators, like Sen. Saxby Chambliss (R-Ga.) and Sen. Christopher J. Dodd (D-Conn.), vowed to fight on through the conference.

Plan B

The Air Force is taking a calculated risk by accepting fewer F-22s than planned and retiring more than 250 fighters in Fiscal 2010 alone, but there are ways to change course if the world turns more hostile, according to Chief of Staff Gen. Norton A. Schwartz. However, he acknowledged that those ways would be expensive.

The decisions to terminate the F-22 at 187 aircraft, not increase the overall buy of F-35s, and eliminate early the equivalent of 3.4 fighter wings were all based on the "probabilities" that there won't be any major wars in the next seven years or more, Schwartz said in an interview.

"The risk of a major combat operation is such that we can ... take a bit of risk in the breadth of our fighter team," Schwartz said.

In assessing the threat the Air Force faces, Schwartz said, "it's fundamentally a question of probabilities." The opportunity existed to "act today" to save some money "while we have a little more confidence about the strategic setting that we're in."

However, "there are always cutouts, ... alternatives. There are," he insisted. "And I've thought of them, I know [Air Force Secretary] Mike Donley has; collectively, we have. All of those alternatives require more resources."

Schwartz would not discuss what those alternatives might be, but "if the circumstances change, we can do any number of things."

The list of alternatives, however, is short, and was recently discussed in a Congressional Budget Office study. They involve buying more F-35s at a faster pace, buying new fourth generation fighters with the latest upgrades, buying more drones or bombers, or simply accepting fewer capabilities.

However, Schwartz emphatically rejected the notion of buying "new old" fighters to flesh out the combat air forces. Answering a question after a June speech at the Heritage Foundation in Washington, D.C., Schwartz said of buying more F-15s or F-16s, "No. N-O. I can't make it any clearer." Spending any money on new production of F-15s and F-16s, which were designed in the pre-stealth era of the 1970s, would simply take money away from buying F-35s, which Schwartz has said must be the backbone fighter for USAF's future and "the core of our capability." Buying as many F-35s as possible will keep unit costs low and make the fighter affordable for the US and allies alike, he said. "Ideally," he said, the F-35 should be bought at a rate of 110 a year.

Corley and the Culture Warriors

Air Force Secretary Michael B. Donley believes he and Chief of Staff Gen. Norton A. Schwartz have had some success in changing the service's culture, shifting it away from simply about flying and fighting, and putting more equitable emphasis on all the roles the Air Force plays.

In a June press conference, Donley asserted that he and Schwartz have tried to take a "much more inclusive view of the contributions of every airman." Donley noted that the Air Force has, for many years, been driven by the competing visions of "rated communities" in either the bomber or fighter fields, and suggested that other areas that are equally in demand now have been shortchanged in that scheme.

"The vision of the Air Force as flying fighter aircraft and doing air-to-air combat and dropping weapons from a fighter aircraft is a very monocular and narrowly focused vision. It's a slice of what the United States Air Force is called upon to do" by joint commanders, "and it's only a slice of what we are doing today. And there are other demands across this spectrum of that we need to be attentive to," Donley said.

The Air Force is also about crews in missile silos, medical technicians, maintenance people, space, ISR, and a wide range of other specialties, many of them supporting the war effort from Stateside locations, he said.

"I think our airmen appreciate that every airman out there is contributing in all these different disciplines. ... We need that broad ... effort to get done what we're doing."

However, Donley spent much of the event explaining the leadership's decision to go along with fighter cuts. (See above.)

He believes the decisions to end production of the F-22 and cut 3.4 wings of other fighters from the inventory "are broadly understood, especially by the leadership," although he acknowledged that "it doesn't mean they're all of the same mind. That is certainly not the case, and they all have personal, professional judgments about benefits of various pieces of our Air Force."

He was specifically asked about the comments of Gen. John D. W. Corley, head of Air Combat Command, who in June answered a query from Sen. Saxby Chambliss (R-Ga.) about the continuing need for the F-22. In a written response, Corley said that in his military judgment, an F-22 inventory of 187 "puts execution of our current national military strategy at high risk in the near- to mid-term." Corley also said he is aware of "no studies that demonstrate 187 F-22s are adequate to support our national military strategy," and that a "moderate" level of risk could be obtained with 250 of the fighters. The long-standing Air Force requirement for 381 F-22s, Corley said, would deliver "a tailored package of air superiority to our combatant commanders and provide a potent, globally arrayed, asymmetric deterrent" against adversaries.

Corley said he recognizes that USAF leaders face "tough choices" in balancing military needs with "fiscal realities."

Donley told reporters he saw nothing wrong with Corley's comments, given as they were in direct response to a direct question from a member of Congress, and not as an attempt to "lobby."

"We expect all our officers to answer those letters directly, and we do not ... intervene," Donley said. However, he said that he and Schwartz were aware of Corley's views before deciding against more F-22s, and discounted them because "we had to make decisions for the corporate Air Force, ... taking into account lots of competing demands and requirements."

Donley also pointed out that there was "no money for the F-22 in our budget baseline. There hasn't been for a couple of years, now. So, to put the F-22 back in, we would have had to find $13-plus billion. We determined that higher priorities ... needed to be sustained."

Asked about House action to add money for more F-22s, Donley said, "This was a difficult choice. We made it. And I think the Congress still has an opportunity to take a deep breath and really determine whether their judgment to proceed here is really better than that of the Secretary of Defense, the Chairman of the [JCS], and the leadership of the rest of the department." However, he added that the Pentagon is asking a hard thing of Congress in seeking permission to stop a successful weapon program. Oversight is "their role; this is what they do." ■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Air Force World

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

F-16 Pilot Killed in Crash

Capt. George B. Houghton, 28, of the 421st Fighter Squadron at Hill AFB, Utah, died June 22 when the F-16 that he was flying crashed at the Utah Test and Training Range during a routine training mission.

The aircraft was destroyed on impact, according to Hill's 388th Fighter Wing, the squadron's parent unit. The crash site was reported as being about 35 miles south of Wendover near the Utah-Nevada state line.

As of late June, the Air Force had not determined the cause of the crash, but had convened an investigation board.

US Renews Access to Manas

The Parliament of Kyrgyzstan on June 25 ratified a new agreement that will enable US and coalition forces to continue using Manas Air Base—which is a central mobility hub for operations in Afghanistan—despite an earlier decision in February to oust the US Air Force.

According to a Pentagon report, the new agreement raised the rent from $17.4 million annually to $60 million per year for use of the facility, which is transited by about 15,000 troops and some 500 tons of cargo every month.

"There is give and take in any negotiation, and I think we arrived at a place where we both felt comfortable," said Pentagon spokesman Geoff Morrell during a press briefing on June 24, when asked to comment on the new arrangement.

USAF Leaders Shift

Gen. Carrol H. Chandler received Senate confirmation June 19 to become vice chief of staff of the Air Force. In

USAF photo by A1C Chad Warren

Air Strike Rules Tightened in Afghanistan

Army Gen. Stanley A. McChrystal, who became commander of NATO's International Security Assistance Force and commander of US Forces-Afghanistan on June 15, formulated a new tactical directive, shortly upon assuming his new posts, to restrict the use of air strikes in Afghanistan in cases where civilians might be at risk of harm.

The *Los Angeles Times* reported June 23 that McChrystal's action was intended to reduce the number of Afghan civilian casualties, a large portion of which have been attributed to US and coalition air strikes over the past several years, sowing some anti-Afghan government and anti-NATO sentiments.

According to the newspaper, the new operational standards place the emphasis on protecting civilians rather than killing Taliban insurgents, but they do not go as far as to prohibit close air support. Rather they call for refraining from firing from the air upon structures in which insurgents may have taken refuge among civilians, unless friendly ground troops are in imminent danger.

McChrystal's action came in the aftermath of the controversial air strike May 4 in the village of Gerani in Farah province during a firefight between the Taliban and an Afghan-coalition ground force. While US Central Command's initial findings into the incident concluded that at least 26 and possibly more civilians died, along with 60 to 65 Taliban, the Afghan government put the civilian toll at around 140 and called on the US to halt all air strikes.

CENTCOM's executive summary of the report on its investigation into the bombing, issued on June 19, concluded that the US aircraft strikes were lawful. However, "absent a direct or imminent threat," it advocated "a tactical approach that prioritizes avoidance of civilian casualties as a fundamental aspect of mission success."

Army Col. John Spiszer, commander of the 1st Infantry Division's 3rd Brigade Combat Team, told reporters June 23 that McChrystal's directive is "entirely in line" with that approach.

July, Lt. Gen. Gary L. North was nominated to succeed Chandler at Pacific Air Forces, the command that Chandler headed since 2007.

On June 25, Gen. Douglas M. Fraser took charge of US Southern Command. The Senate confirmed his nomination on June 10. He had been deputy commander at US Pacific Command.

Lt. Gen. Raymond E. Johns Jr., deputy chief of staff for strategic plans and programs since October 2006, was nominated June 4 for promotion to the rank of general and in July was nominated to head Air Mobility Command. The current commander of AMC, Gen. Arthur J. Lichte, is retiring.

Congress Supports Bomber Work

The House Armed Services Committee in June added $215 million to the Pentagon's Fiscal 2010 budget proposal for technology studies in support of a future bomber.

Meanwhile, the Senate Armed Services Committee on June 25 approved an amendment introduced by Sen. John Thune (R-S.D.) that makes it "the policy of the United States to support a development program for next-generation bomber technologies."

While the Pentagon's request did not contain any dollars for the now deferred bomber program, the Air Force's list of unfunded priorities in Fiscal 2010 did include a $140 million

This flight of five F-15C Eagle fighters forms up in the skies above Okinawa and against the backdrop of a total solar eclipse, which was visible across the western Pacific and Asia. The fighters are assigned to the Air Force's 44th Fighter Squadron at Kadena AB, Japan. Millions in Asia watched the eclipse, which lasted for six minutes and 39 seconds. This rare event lasted longer than any eclipse that has occurred since 1991.

07.22.2009

Congress Challenges Pentagon Fighter Decisions

For the fourth consecutive year, Congress acted in June against the Pentagon's plan to stop development of the General Electric-Rolls Royce F136 engine for the F-35 Lightning II.

In another high-profile move against the Obama Administration's plan, House and Senate defense authorizers added funds to build more F-22s beyond 187, though the full Senate on July 21 reversed itself. (See "Washington Watch," p. 7.)

The House Armed Services Committee earmarked $603 million to continue development of the F136, the alternate power plant to Pratt & Whitney's F135, in its markup of the Department of Defense's Fiscal 2010 budget request on June 17. The Senate Armed Services Committee added $438.9 million for the F136 in its markup June 25.

The Office of the Secretary of Defense says the risk is acceptable going forward with just the F135. But Rep. Neil Abercrombie (D-Hawaii), chairman of the House committee's air and land forces panel, said June 12 that it represents "too high an operational risk to take" to have thousands of future F-35s dependent on just one engine type.

In another conflict area, the Air Force proposed in its Fiscal 2010 budget phasing out a combination of 254 A-10s, F-15s, and F-16s next year, but the House committee added language that prohibits retirement of the fighters until the Pentagon provides a report explaining how it plans to fill the capability gaps left by their removal.

Further, concerned about impact of these cuts on the Air National Guard and the impact on the air sovereignty alert mission, House defense authorizers approved an amendment requiring OSD to report on the feasibility of purchasing new 4.5 generation fighters such as the F-15 or F-16 to sustain the Air Guard during the transition to new fifth gen fighters such as the F-35.

The House passed its version of the defense authorization bill on June 25 by a vote of 389 to 22.

The House and Senate also approved $2.2 billion to buy eight C-17 Globemaster III transports not requested by the Pentagon in the Fiscal 2009 war supplemental that both chambers approved in June. They also added $504 million for three MC-130J special mission transports and four HC-130J combat rescue aircraft.

request for a "classified" program that later was revealed to entail work on bomber concepts.

The House committee, in its markup of the defense authorization bill on June 17, provided $75 million above the Air Force's request, said a spokesman for Rep. Neil Abercrombie (D-Hawaii), who chairs the air and land forces panel.

Corona Brings Changes

The Air Force announced June 8 that it would make manpower changes in some of its air and space operations centers to better balance resources with requirements. This was one of the decisions resulting from the Corona Top leadership summit held June 4-6 at Wright-Patterson AFB, Ohio.

The leadership decided to recategorize about 835 rated staff officer billets to nonrated positions and fill some personnel shortfalls with military-to-civilian conversions. To support the standup of 24th Air Force, the service's new cyber organization, the leadership adopted network configuration standards and doctrine updates and instructions.

A final decision on the Heritage Coat was deferred until 2010, and the lead-

Buffs On the Edge: ***A B-52 takes to the air at Eielson AFB, Alaska, in June as part of US Pacific Command's Northern Edge 2009. Northern Edge is one of a series of exercises that prepares joint forces to respond to crises in the Pacific region.***

USAF photo by SSgt. Christopher Boltz

Robert S. McNamara 1916-2009

Robert S. McNamara, who served as Secretary of Defense during a pivotal seven years of the Cold War, was the principal architect of the Vietnam War, and reorganized the Pentagon's bureaucracy, died July 6 in Washington, D.C. He was 93.

McNamara was chiefly identified with Vietnam, and was condemned both by opponents of the war—for escalating it—and by proponents who believed he had tied the military's hands in that conflict.

McNamara was appointed Defense Secretary by President John F. Kennedy, a fellow Harvard alumnus who charged McNamara with running the Pentagon in a more businesslike and cost-effective way. McNamara plunged in, creating the five-year defense plan budgeting process and working to eliminate redundancies among the military services.

Some of those efforts worked out. Other efforts, such as the multiservice TFX fighter-bomber, did not succeed as a joint program.

However, McNamara also made the job much more of a policy position than his predecessors had. He took it upon himself to build up conventional forces so that the US would have more options to conduct "limited" war than it had possessed in the nuclear-centric decade before his tenure. He termed this policy "flexible response." Nevertheless, he oversaw the rapid buildup of US nuclear forces and fitted US intercontinental ballistic missiles with multiple warheads. He embraced the deterrence concept of "mutual assured destruction."

McNamara believed in the "domino theory" that the loss of Vietnam to communist insurgents would quickly lead to neighboring countries also falling to communism. He directed a greater effort to combat insurgents with special forces and also believed that the US could win a war of attrition against a limited number of enemy combatants. McNamara's policies led to the "body count" strategy of winning the conflict, which was popularly referred to as "McNamara's War." However, he advised against invasion of North Vietnam.

Although he supported President Lyndon B. Johnson's escalation of the war effort, including increased bombing of North Vietnam, McNamara eventually concluded that brute force was not winning the day and he privately advised Johnson to seek a negotiated end to the conflict. In 1968, Johnson offered McNamara—already in the job longer than any Defense Secretary before or since—the opportunity to run the World Bank. McNamara later said he was never quite sure if he'd resigned or been fired.

Born in San Francisco in 1916 to a middle-class family, McNamara was a stellar student and Eagle Scout who earned an MBA from Harvard by the age of 23. Specializing in statistical analysis, he worked for Price Waterhouse but soon returned to Harvard as an instructor.

In World War II, McNamara sought to enlist but was barred from service due to poor eyesight. Instead, he served as a War Department consultant, teaching officers methods of making their logistics more efficient. He was eventually commissioned as a captain, and he served in the Army Air Forces throughout Southeast Asia.

Upon leaving the World Bank in 1981, he became an outspoken opponent of nuclear weapons and urged the superpowers to drastically reduce their stockpiles. In 1995, he broke a long silence about the Southeast Asia war with his book, *In Retrospect: The Tragedy and Lessons of Vietnam.* In it, he apologized for miscalculating how to fight the war, and for backing Johnson's escalation when McNamara felt it could no longer be won. Critics of the book found it less of a mea culpa and more of an attempt by McNamara to spread blame for the outcome of the war and justify his early policies.

—John A. Tirpak

ership approved the plan to introduce physical fitness testing twice a year, starting next January.

Worker Strike Ends at Vance

Unionized civilian employees at Vance AFB, Okla., agreed June 22 to a new labor proposal enabling them to return to work immediately, thus ending a two-week strike that had suspended Vance's flying operations and caused some student pilots to be sent to Laughlin and Randolph Air Force Bases in Texas to continue their training.

The strike began June 8 after the expiration of a collective bargaining agreement between the International Association of Machinists and Aerospace Workers Local Lodge 898 and CSC Applied Technologies. The contractor provides support services and aircraft maintenance to the 71st Flying Training Wing, which conducts joint specialized undergraduate pilot training.

USAF Moves To Fill Urgent Need

The Air Force awarded a $276 million contract to Northrop Grumman on June 24 to incorporate the Battlefield Airborne Communications Node on two BD-700 business jet aircraft and two Global Hawk Block 20 unmanned aerial vehicles to fill a joint urgent operational need.

BACN relays voice communication over long distances and bridges frequencies such that ground forces on a frequency-limited radio can talk with close air support aircraft.

The service fielded BACN on a first BD-700 last December to support US Central Command operations. Having three BD-700s equipped with BACN is regarded as a short-term solution until BACN is integrated on the Global Hawks, which the Air Force expects to happen in time for deployment in Fiscal 2011.

UAV Training Reaches Milestone

For the first time, the Air Force will train more pilots this year to fly MQ-1 Predator and MQ-9 Reaper unmanned aerial vehicles than it does to fly its manned fighters and bombers, *USA Today* reported June 16.

Citing interviews with senior service officials as well as UAV-related documents, the newspaper stated that 240 unmanned aircraft operators will be trained this fiscal year, compared to 214 new fighter and bomber pilots.

Already the service is training junior nonpilot officers to fly UAVs and moving new graduates of undergraduate pilot training directly on the unmanned track in order to churn out qualified operators as quickly as possible to meet the

Air Weapon the "Foundation" of Hybrid Warfare

A top military analyst warns that US forces are headed for a deadly new era of "hybrid war," combining the worst features of conventional combat, low-level insurgency, and high-tech weapons.

In a June 25 presentation for the Mitchell Institute for Airpower Studies, Michael W. Isherwood said that the military can no longer simply prepare for one type of conflict. The lines between various types will blur.

Any war with North Korea, he said, would feature high- and low-end attacks, as would a conflict with Iran.

Adversaries of the future, he said, could employ individuals with AK-47s all the way up to units armed with high-tech air defense missiles and even unmanned aircraft.

Isherwood, a retired USAF colonel and combat pilot, presented a paper titled, "Airpower for Hybrid Warfare." He said that wide-area surveillance, rapid air mobility, precision strike, and integrated command systems—hallmarks of US airpower—will serve as the "foundation" of US response to such challenges.

The threat of hybrid warfare, he said, will not only combine different weapons and tactics, but also state and nonstate actors.

US forces now must prepare for computer network attack, destruction or "blinding" of satellites, precision missile strikes, or roadside bombs, along with propaganda campaigns.

Isherwood cited numerous historical examples of hybrid warfare ranging from the Vietnam War to present-day conflicts in which enemy combatants have employed surprisingly conventional tactics and weaponry.

Multiple foreign sources are fielding advanced weaponry, such as near-stealth aircraft, armored vehicles with explosive-reactive armor, and diesel attack submarines equipped with supercavitating torpedoes capable of 230 mph, but can still be expected to embrace insurgent-style tactics.

The analyst claimed airpower would allow commanders to achieve better command and control, strike, mobility, and intelligence capabilities.

Isherwood's comments come at a time when US airpower has come under heightened scrutiny as a result of civilian casualties in Afghanistan. The newly appointed US commander there, Army Gen. Stanley A. McChrystal, has imposed sharp new restraints on US air attacks, in hopes of alleviating the problem. However, Isherwood expressed concern about placing such constraints on airpower.

"The consequences are that you will see more soldiers and marines getting killed," he said.

—Mark W. Moser

ever-growing demand for more UAVs to support operations in Southwest Asia.

Barksdale Gets Strike Command

The Air Force announced June 18 that it had chosen Barksdale AFB, La., as the permanent headquarters site for Air Force Global Strike Command, the new major command that will oversee the service's ICBM force and nuclear-capable bombers.

Barksdale was identified in April as the preferred location, pending the outcome of the environmental assessment required by US law. Service plans called for activating Global Strike Command on Aug. 7, with the assumption of initial operations at the end of September. The Senate confirmed Lt. Gen. Frank G. Klotz in May to lead the command.

The Minuteman III ICBM fleet under 20th Air Force is expected to move from Air Force Space Command in December, while 8th Air Force, with its B-2A and B-52H bombers, is slated to transfer over from Air Combat Command in February 2010.

New Nuclear Doctrine Issued

The Air Force on June 1 published Air Force Doctrine Document 2-12, the new version of its nuclear operations doctrine that supersedes the previous iteration from July 1998. One of its most significant changes is the alignment of nuclear operations with the current global environment and away from a Cold War stance, service officials said.

The document includes a new chapter that aggregates existing material on nuclear safety and security and expands the discussion and emphasis on nuclear surety. The new doctrine is one of the numerous activities that the Air Force has undertaken to reinvigorate its nuclear mission.

Pentagon Sets Cyber Command

Defense Secretary Robert M. Gates signed a memo June 23 to establish a subcommand under US Strategic Command in October to oversee the US military's cyber security activities. It will be called US Cyber Command.

Gates directed STRATCOM to develop the implementation plan for the new organization by Sept. 1, in anticipation of it commencing initial operations on Oct. 1 and being fully operational one year later. While, as a subunified command, it would not require Congressional approval, its commander would be subject to Senate confirmation.

Gates said he intended to recommend Army Lt. Gen. Keith B. Alexander, National Security Agency director, for promotion to the grade of general to take on the additional responsibility of leading CYBERCOM. Gates' preferred location to host the new organization is Ft. Meade, Md., already home to NSA, pending the results of an environmental impact study.

USAF Adjusts to TSAT Kill

The Air Force announced on June 8 that it was "terminating for convenience" its $2 billion contract with Lockheed Martin for the Transformational Satellite

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Operation Iraqi Freedom—Iraq

Casualties

By July 13, a total of 4,326 Americans had died in Operation Iraqi Freedom. The total includes 4,313 troops and 13 Department of Defense civilians. Of these deaths, 3,460 were killed in action with the enemy while 866 died in noncombat incidents.

There have been 31,430 troops wounded in action during Operation Iraqi Freedom. This number includes 17,588 who were wounded and returned to duty within 72 hours and 13,842 who were unable to return to duty quickly.

MC-12W Joins the Fight in Southwest Asia

The MC-12W, the Air Force's newest intelligence-surveillance-reconnaissance platform, flew its inaugural combat sortie on June 10, a four-hour mission over Iraq that started and ended at Joint Base Balad.

"It feels good being out here and doing something good for the warfighter," said Capt. Jason Goodale, the pilot of the historic first mission, which occurred within 48 hours of the arrival of the first MC-12W at Balad.

Manned by a four-person crew, the MC-12W is a turboprop aircraft specially equipped to collect signals intelligence and provide live-streaming overhead video in support of ground troops at the tactical level.

The Air Force is acquiring 37 of these Liberty Project Aircraft, under an accelerated acquisition initiative launched in July 2008 to bolster ISR capability in Afghanistan and Iraq.

The MC-12W is based on the Beechcraft King Air 350 commercial aircraft.

While the Air Force's goal was to field the first MC-12W in Southwest Asia in April, complications with integrating the sensor payloads on the initial eight platforms delayed its arrival until June.

Nonetheless, Lt. Gen. Gary L. North, commander of 9th Air Force and commander of Air Forces Central, said June 11 that the efforts across the Air Force to go from the initial contract award to the first combat sortie inside of eight months were "nothing short of miraculous."

Operation Enduring Freedom—Afghanistan

Casualties

By July 13, a total of 729 Americans had died in Operation Enduring Freedom. The total includes 728 troops and one Department of Defense civilian. Of these deaths, 496 were killed in action with the enemy while 233 died in noncombat incidents.

There have been 3,162 troops wounded in action during OEF. This number includes 1,134 who were wounded and returned to duty within 72 hours and 2,028 who were unable to return to duty quickly.

US Airpower Aids British Assault on Taliban Stronghold

More than 350 British troops, backed up by massive US and coalition airpower, launched an assault on a Taliban stronghold in Helmand province on June 19, according to news reports and US and coalition statements.

The initial assault marked the beginning of Operation Panchai Palang (Panther's Claw), the first stage of a large International Security Assistance Force effort to dismantle Taliban strongholds near the town of Lashkar Gah, the provincial capital, and establish a permanent presence by British and NATO forces in the area.

According to the British Ministry of Defense, the operation began with a large air assault into Babaji, north of Lashkar Gah, that involved 12 Chinook helicopters delivering British troops, supported by an air package including British Harrier fighters, unmanned aerial vehicles, Apache and Black Hawk helicopters, and a US Air Force AC-130 Spectre gunship.

Initial reports stated that these troops secured three main crossing points over canals and discovered 1.3 tons of poppy seeds and a large number of improvised explosive devices and anti-personnel mines. Afghan forces also moved in to set up checkpoints.

In the days following, air support activity increased in the area north of Lashkar Gah. On June 22, for example, an Air Force B-1B Lancer bomber dropped a 2,000-pound GBU-31 satellite-guidance-aided bomb, destroying an enemy building being used as a firing position.

Communications System (TSAT) Mission Operations System, or TMOS, for short. The contract had been awarded in January 2006.

Halting this work was the result of Secretary of Defense Robert M. Gates' April decision to cancel the TSAT satellite program. TMOS was the TSAT ground segment meant to coordinate the flow of information from TSAT satellites into the US military's warfighting networks.

Tweet Flies Final Sortie

The Air Force flew the last training sortie with the T-37 Tweet trainer aircraft on June 17 at Sheppard AFB, Tex., ending the aircraft's in-service run after some 50 years.

"It's been a great trainer for 50 years; right up to the end, it's been a good aircraft," said Col. David E. Petersen, commander of the 80th Flying Training Wing, of the T-37. The wing is now using T-6s.

AOC for Africa Opens

Seventeenth Air Force (Air Forces Africa) activated its dedicated air and space operations center on May 29. The new center, the 617th AOC, gives 17th Air Force an increased command and control capability integral to its function as the air component of US Africa Command.

It is collocated with 17th Air Force headquarters at Ramstein AB, Germany. Initially staffed with about 60 personnel, the new AOC should have about 130 on hand by the time 17th Air Force is declared fully operationally capable around October.

CSAR-X Officially Goes Down

The Air Force on June 2 terminated "for convenience" its $712 million contract with Boeing for the system development and demonstration phase of the HH-47 rescue helicopter.

The Air Force had chosen the HH-47 platform to be its combat search and rescue replacement vehicle, or CSAR-X, to succeed its aging HH-60 Pave Hawk rescue helicopters. Secretary of Defense Robert M. Gates in April announced termination of the CSAR-X program while requirements are re-examined.

CV-22s Operate in Honduras

Air Force Special Operations Command announced June 11 that it had recently deployed several of its CV-22 Ospreys to Honduras and, while there, had them support a humanitarian mission. It was the second overseas deployment acknowledged by AFSOC for the new tilt-rotor aircraft; CV-22s participated in a training exercise in Mali last year.

Senior Staff Changes

RETIREMENTS: Lt. Gen. Ronald F. **Sams,** Maj. Gen. Delwyn R. **Eulberg,** Maj. Gen. Arthur B. **Morrill III,** Brig. Gen. Robert H. **Holmes,** Brig. Gen. Patricia C. **Lewis,** Brig. Gen. Daniel P. **Woodward.**

PROMOTION: To Brigadier General: Daniel O. **Wyman.**

NOMINATIONS: To be General: Raymond E. **Johns Jr.,** Gary L. **North. To be Lieutenant General:** Frank **Gorenc. To be Major General:** Ronnie D. **Hawkins Jr. To be ANG Major General:** James W. **Kwiatkowski,** Jeffrey S. **Lawson,** Deborah S. **Rose,** Edwin A. **Vincent Jr. To be ANG Brigadier General:** Stephen M. **Atkinson,** Paul L. **Ayers,** Daniel S. V. **Bader,** Daryl L. **Bohac,** Joseph J. **Brandemuehl,** Timothy T. **Dearing,** Sharon S. **Dieffenderfer,** Jonathan S. **Flaugher,** Robert M. **Ginnetti,** Johnathan H. **Groff,** James D. **Hill,** Zane R. **Johnson,** Joseph K. **Kim,** Keith I. **Lang,** Robert W. **Lovell,** John P. **McGoff,** Gunther H. **Neumann,** Paul A. **Pocopanni Jr.,** Christopher A. **Pope,** Carolyn J. **Protzmann,** Carlos E. **Rodriguez,** Jose J. **Salinas,** Wayne M. **Shanks,** William H. **Shawver Jr.,** James C. **Witham,** Sallie K. **Worcester,** Wanda A. **Wright,** Wayne A. **Wright.**

CHANGES: Gen. Carrol H. **Chandler,** from Cmdr., PACAF, Hickam AFB, Hawaii, to Vice C/S, USAF, Pentagon ... Brig. Gen. James E. Haywood, from Sr. Mil. Asst. to the Asst. SECAF for Acq., OSAF, Pentagon, to Dir., P&R, AFSPC, Peterson AFB, Colo. ... Maj. Gen. Gilmary M. **Hostage III,** from Vice Cmdr., PACAF, Hickam AFB, Hawaii, to Cmdr., CENTCOM, ACC ... Brig. Gen. John E. **Hyten,** from Dir., P&R, AFSPC, Peterson AFB, Colo., to Dir., Space & Cyber Ops., DCS, Ops.,P&R, USAF, Pentagon ... Brig. Gen. Richard C. **Johnston,** from Dir., Plans, Prgms., & Analyses, USAFE, Ramstein AB, Germany, to Dir., Strat. Planning, DCS, Strat. Plans & Prgms., USAF, Pentagon ... Maj. Gen. James M. **Kowalski,** from Cmdr., AF Global Strike Command (Provisional), Bolling AFB, D.C., to Vice Cmdr., AF Global Strike Command, Barksdale AFB, La. ... Maj. Gen. William T. **Lord,** from Cmdr., AF Cyber Command (Provisional), Barksdale AFB, La., to Chief, Warfighting Integration & Chief Info. Officer, OSAF, Pentagon ... Brig. Gen. (sel.) Kenneth J. **Moran,** from Inspector General, AFMC, Wright-Patterson AFB, Ohio, to Dir., Expeditionary Combat Spt. Sys. Prgm., ESC, AFMC, Wright-Patterson AFB, Ohio ... Maj. Gen. (sel.) Mark. F. **Ramsay,** from Dir., Strat. Planning, DCS, Strat. Plans & Prgms., USAF, Pentagon, to DCS, Ops., SHAPE, NATO, Casteau, Belgium ... Brig. Gen. (sel.) Timothy M. **Ray,** from Dep. Dir., Air & Space Ops., ACC, Langley AFB, Va., to Dir., Ops., AF Global Strike Command, Barksdale AFB, La. ... Brig. Gen. Mark O. **Schissler,** from Dir., Cyber Ops., DCS, Ops., P&R, USAF, Pentagon, to Dir., Plans, Prgms., & Analyses, USAFE, Ramstein AB, Germany ... Brig. Gen. Jeffry F. **Smith,** from Spec. Asst. to the Asst. C/S, Strat. Deterrence & Nuclear Integration, Pentagon, to Dir., Plans, Prgms., & Rqmts., AF Global Strike Command ... Lt. Gen. Glenn F. **Spears,** from Dep. Cmdr., SOUTHCOM, Miami, to Cmdr., 12th AF, ACC, Davis-Monthan AFB, Ariz.

COMMAND CHIEF MASTER SERGEANT CHANGE: CMSgt. Jack **Johnson Jr.,** to AF Global Strike Command, Barksdale AFB, La.

SENIOR EXECUTIVE SERVICES CHANGES: Horace **Larry,** to Dep. Dir., Svcs., DCS, Manpower & Personnel, USAF, Pentagon ... George E. **Mooney,** to Dir., Engineering & Acq. Excellence, Air Armament Ctr., AFMC, Eglin AFB, Fla. ... Jamie M. **Morin,** to Asst. SECAF for Financial Mgmt., & Comptroller, OSAF, Pentagon ... Daniel R. **Sitterly,** to Dir., Force Dev., DCS, Manpower & Personnel, USAF, Pentagon. ■

The command said three CV-22s from the 8th Special Operations Squadron at Hurlburt Field, Fla., delivered about 43,000 pounds of long-overdue supplies to remote Honduran mountain villages that couldn't be reached via roads.

USAF Finds GPS Anomaly

The Air Force said in mid-June it discovered a signal distortion anomaly with GPS IIR-20(M), the newest Global Positioning Satellite that was launched into orbit on March 24. Discovery of the issue came to light during routine early orbit checkout of the satellite.

The Space and Missile Systems Center at Los Angeles AFB, Calif., said in a release June 16 that an Air Force and contractor investigation team had identified a fix that would be tested likely through October, after which, if successful, the service expected to introduce IIR-20(M) into the operational GPS constellation.

Experimental Airlifter Flies

The Air Force Research Laboratory and Lockheed Martin flew the experimental Advanced Composite Cargo Aircraft for the first time on June 2 at the service's Plant 42 in Palmdale, Calif. The initial demonstration flight lasted about 87 minutes.

"The aircraft was a real pleasure to fly, and we experienced no issues," said Rob Rowe, Lockheed's lead ACCA test pilot, said in the company's June 3 release.

The ACCA is a modified Dornier 328J aircraft on which Lockheed has replaced the mid/aft fuselage and empennage with a structure of advanced composite materials fabricated using novel manufacturing techniques.

Light Gunship Still Wanted

Adm. Eric T. Olson, commander of US Special Operations Command, told a Senate panel on emerging threats June 18 that special operations forces still need a gunship version of the C-27J transport aircraft, which has been dubbed the AC-27J Stinger, and would be smaller than the Air Force's current AC-130 gunships.

It's "very important" to have an airplane that has "the capability to operate more remotely, with a smaller footprint, at a lower operating cost, on less improved runways," he said.

Olson said SOCOM's analysis of alternatives "identified the C-27J as the preferred alternative." However, the Office of the Secretary of Defense shelved plans to acquire the AC-27J as part of the Pentagon's Fiscal 2010 budget proposal

Air Force Hints at Smaller F-35 Buy

The Air Force's long-held plans to buy 1,763 F-35 Lightning II stealth fighter aircraft could change depending on the findings of the Quadrennial Defense Review, says Air Force Chief of Staff Gen. Norton A. Schwartz.

Testifying before House appropriators June 3, Schwartz said USAF likely would have "well over 1,500 F-35s" in a future fighter force, together with 187 F-22 Raptors and some number of legacy fighters, based on current thinking. However, the total inventory, of which the F-35 will be the predominant component, is "highly dependent on the scenarios" used in QDR analysis, he said.

In the past, the Air Force posited the 1,763 number on the assumptions that there would also be 381 F-22s in a fighter force of around 2,250 to meet requirements in coming decades. But Schwartz said the new fighter topline is not clear yet and "could end up being less."

Schwartz's comments came on the same day that Lockheed Martin announced receipt of a $2.1 billion contract from the Pentagon for the third low-rate lot of F-35 production, a buy of 17 aircraft, including foreign orders for the first time.

This lot comprises seven Air Force F-35As, seven short-takeoff F-35Bs for the US Marine Corps, one F-35A for the Netherlands, and two F-35Bs for Britain.

The order built upon the first two low-rate initial production lots for a total of 14 F-35s, including eight in the Air Force's configuration.

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Photo courtesy of the Department of Defense

US Should Prep To Intervene in Pakistan, Says Murtha

Rep. John P. Murtha (D-Pa.) warned June 24 that a political upheaval in nuclear-armed Pakistan could—and probably should—bring direct US military intervention.

Murtha, the chairman of the House defense appropriations panel, told defense reporters he would urge such military action, if that's what it takes to prevent the Taliban or other violent Islamic groups from seizing control of Pakistan's nuclear weapons.

The issue "is absolutely what I look at and worry about the most," he said. He added that, should Islamabad lose control over its nuclear arsenal, "I would advise that it's absolutely essential that we intervene."

Murtha echoed concerns about Pakistan repeatedly voiced by Secretary of Defense Robert M. Gates.

"Gates and I both agree that Pakistan is the biggest single threat to the United States," said Murtha, noting his view that dangers posed by Pakistan supersede those generated by Iran or North Korea.

A recent Pentagon study estimated that Pakistan has enough fissile material for approximately 60 nuclear weapons. Pakistan's military has dispersed the weapons to secure sites around the country, according to Global Security Newswire. "We think we know where the weapons are," said Murtha. "I don't know what [we] know, but they think we know."

Murtha, responding to questions from reporters, referred to existence of US contingency plans—one of DOD's closely guarded subjects.

The Pentagon has on the shelf a set of war plans that could be used, if necessary. "We've got to be prepared if it goes the wrong way, to [seize] those sites," Murtha said. "And we have contingency plans, obviously, to do that."

Murtha also noted the changing strategic situation in South Asia. "Until recently, ... we always worried about India and Pakistan having a nuclear exchange." Now, he said, the worry was about loose nukes in the Islamic nation.

Murtha acknowledged that his might be an overly pessimistic view, noting that the top US military officer thinks differently.

"[Adm. Michael] Mullen [the Chairman of the Joint Chiefs of Staff] has great confidence in the Pakistani military. He feels that they really are stable," said Murtha. "But I don't know. The military is always optimistic."

Pakistani authorities claim that their nuclear weapons are kept disassembled. The fissile cores are stored separately from the non-nuclear explosives packages, and that the warheads are stored separately from the delivery systems.

No one has ascertained the validity of these assurances, though the nuclear program, in the works since the 1950s, has remained stable through several regime changes and a military coup d'etat.

—Mark W. Moser

to Congress when it trimmed the C-27J buy from 78 to 38 aircraft.

Missouri Unit Flies Last F-15 Sortie

The Missouri Air National Guard's 131st Fighter Wing at Lambert-St. Louis Airport conducted its final sortie with its F-15C fighters June 13. On that day, the last of the unit's F-15s departed for good for their new home in Hawaii.

BRAC 2005 forced the unit to relinquish its F-15s to units in Hawaii and Montana and transition to a classic associate operation with the active duty B-2A bomber force at Whiteman AFB, Mo., the 509th Bomb Wing.

Production Contract Received

Lockheed Martin received a $1.5 billion contract for the third Space Based Infrared System satellite, GEO-3, and the third SBIRS sensor payload, HEO-3, which is destined for a separate spacecraft. Lockheed announced the deal June 2.

The SBIRS constellation will augment and eventually replace Defense Support Program early warning satellites, one of which, DSP-14, has already been operating more than 20 years, 15 years longer than its design intended.

There are two SBIRS HEO payloads already on orbit; the first is already certified for operations. GEO-1 and GEO-2, planned for geosynchronous orbit, are undergoing ground testing. GEO-1 is slated for launch in 2010. The Air Force requested funds in Fiscal 2010 to procure HEO-4 and buy the long-lead-time parts for GEO-4.

Uniform Changes Announced

The Air Force on June 10 announced uniform changes based on its 98th Virtual Uniform Board, but did not introduce any new uniforms, per se. Instead, service officials said the focus remained on fixing, improving, and upgrading uniforms in the current inventory.

Among the changes: trousers on utility uniforms will be tucked into boots (effective October 2010); the green fleece formerly worn only as the all-purpose environmental clothing system liner is authorized servicewide as an outer-wear garment; and enlisted airmen must switch from pin-on, collar rank insignia to chevrons stitched onto the sleeves of the lightweight blue jacket (effective January 2010).

Critical Retention Year Ahead

Fiscal 2010 could present retention problems as the Air Force builds to an active duty end strength of 331,700, Lt. Gen. Richard Y. Newton III, deputy chief of staff for manpower and personnel, told lawmakers May 21.

Appearing before House defense overseers, Newton cited the reasons as: the need to retain specific skill sets in shortage specialties; the previous personnel drawdown mode, with its attendant decreases in accessions; and a growing list of operational demands in new and emerging missions such as intelligence-surveillance-reconnaissance, aircraft maintenance, acquisition, cyber operations, and the nuclear enterprise.

He said the service plans to continue seeking special pay and allowances to target critical skills, such as combat search and rescue, explosive ordnance disposal, and health care.

USAF Wants Huge Bunker Busters

The Air Force announced June 8 that it intends to award Boeing a contract before the end of the year for the purchase of up to 20 Massive Ordnance Penetrators, the 30,000-pound-class munitions that the company has been developing since 2004 under Pentagon sponsorship to give the US the conventional means to smash hardened bunkers and tunnel complexes.

The Air Force said it wants five MOPs to carry out a flight-test program with the B-2A stealth bomber starting in June 2011. The remaining 10 to 15 units would be residual assets available for operational use on the B-2 by June 2012. The B-2 can carry up to two MOPs.

Airmen Receive Bronze Star Medals

Air Force Chief of Staff Gen. Norton A. Schwartz presented SSgt. David Flowers, an explosive ordnance disposal specialist from Barksdale AFB, La., with

USAF photo by SSgt. Shawn Weismiller

Special Delivery: *A C-17 crew from the 816th Expeditionary Airlift Squadron used a combat offload procedure June 20 to deliver pallets of supplies to an austere airstrip, Tarin Kowt Airfield, Afghanistan. After landing, the C-17 ran up its engines, the pallets were unstrapped, and the aircraft released its brakes.*

a Bronze Star Medal June 23 during Schwartz's visit to Walter Reed Army Medical Center in Washington, D.C. Flowers was there undergoing care for severe leg wounds he received in May while deployed to Afghanistan. Flowers also received the Purple Heart and the Air Force Combat Action Medal from Schwartz.

Also receiving Bronze Star Medals for service in Afghanistan were: Capt. Blair Byrem of Tyndall AFB, Fla., during a June 12 ceremony, and Capt. Raymond Kerr and TSgt. Ronald White, both assigned to Andersen AFB, Guam, on May 29.

Receiving Bronze Star Medals for meritorious actions in Iraq were: SMSgt. William Eaton of Incirlik AB, Turkey, June 2; MSgt. Duane Frey assigned to Lajes Field, Azores, May 22; TSgt. Michael Brady of Kunsan AB, South Korea, May 29; TSgt. Neil Newman of Incirlik, May 29; and Special Agent Richard Cox, assigned to Hill AFB, Utah, June 9. ■

News Notes

■ The remains of retired CMSAF Paul W. Airey, the first Chief Master Sergeant of the Air Force, were laid to rest May 28 at Arlington National Cemetery, along with those of his wife, Shirley, who had died in 2001. Airey died on March 11.

■ Defense Secretary Robert M. Gates on June 12 appointed retired Air Force Gen. Bruce Carlson as the next head of the National Reconnaissance Office. Carlson stepped down as commander of Air Force Materiel Command last November and officially retired on Jan. 1.

■ The Senate on June 19 confirmed the nomination of Maj. Gen. Gilmary M. Hostage III for promotion to lieutenant general to be commander of Air Forces Central. Hostage, vice commander of Pacific Air Forces, will replace Lt. Gen. Gary L. North.

■ The Air Force on June 12 named SSgt. Jon Ouchi, an airborne cryptologic operator at Kadena AB, Japan, as its top enlisted aviator for 2008, recognizing him with the annual Henry "Red" Erwin Award.

■ Air Force Special Operations Command on June 19 formally transferred the flag of the 16th Special Operations Squadron, an AC-130H Spectre gunship unit, from Hurlburt Field, Fla., to the unit's new home at Cannon AFB, N.M.

■ The House of Representatives passed legislation on June 16 to provide a single Congressional Gold Medal of recognition to the women who served in World War II as the Women Airforce Service Pilots. The Senate approved its version of the bill in May.

■ The 63rd Fighter Squadron at Luke AFB, Ariz., officially stood down on May 22 after 68 years of service. Per changes outlined by BRAC 2005, it realigned with Luke's 310th FS.

■ Boeing announced June 16 that it had completed satellite communications and air traffic management upgrades to the Air Force's fleet of 32 E-3 Airborne Warning and Control System command and control aircraft.

■ Officials at Dover AFB, Del., one of the Air Force's major airlift hubs, on June 5 accepted the base's new $54.8 million, 13,800-foot runway. Its construction took 17 months. ■

Issue Brief

By Adam J. Hebert, Executive Editor

What Does JSF Really Cost?

At a recent Pentagon briefing, Defense Secretary Robert M. Gates remarked, "This notion that I'm tilting the scale dramatically against conventional capabilities ... is just not accurate. You know, $1 trillion for the Joint Strike Fighter ... is not a trivial investment in the future."

Indeed, $1 trillion is no trivial amount. How does one arrive at that figure?

This round number, while great for shock value, is debatable. It far surpasses all previous cost estimates. When the Pentagon last projected an official cost of the tri-service F-35 program, it was just shy of $300 billion.

Where does the higher number come from?

Pentagon press officials when asked directly to provide the source for Gates' claim, were unable to do so. All signs are that the Secretary was referring to claims by the Government Accountability Office.

As might be expected, what the F-35 costs depends on what you count and when and how you measure it. To accumulate a bill of $1 trillion for the F-35, one must toss the widest possible cost net and use inflated dollars.

There are many ways to estimate the cost of a program. The differing methods can be compared to a set of Russian *matryosnka* dolls; every time you open one, you find a smaller one inside. Starting with smallest *matryoshka:*

- Recurring Flyaway Cost. This is an aircraft's "sticker price," representing the cost to buy what you actually fly away. It excludes sunk costs such as R&D and testing.
- Flyaway Cost. A bit larger than recurring flyaway cost, this category averages in some nonrecurring expenses such as line startup costs.
- Weapon System Cost. The next level, weapon system cost, pulls in publications, technical data, support and training equipment, contractor services, and the like.
- Procurement Cost. This adds in initial spare parts and deployable spares packages. It captures expenses directly related to buying and initially operating the aircraft.
- Program Acquisition Cost. This includes military construction for new facilities; engineering and manufacturing development; and RDT&E costs.
- Life cycle cost. This one adds in the cost, over the entire life of the program, of operations and maintenance, support, and military personnel expenses. It includes even fuel and other consumables.

As if six cost categories were not confusing enough, one also must contend with three ways of computing costs.

The price can be deflated but held steady for comparative purposes by using a baseline year. For example, F-35 costs are sometimes presented in Fiscal 2002 dollars.

Current-year dollars are larger, and are achieved by converting costs over a lengthy program to a financial language everyone can understand—today's dollars.

Then-year dollars include inflation and therefore yield the largest prices. The difference is huge in a program like the F-35, which will still be going in 2034, because an aircraft that costs $100 million today might cost $200 million 20 years from now simply because of inflation. However, Americans will still judge the cost by today's standards, which inherently distorts the assessment.

Lockheed Martin photo

The F-35's cost depends on what you count, and how you count it.

Critics of big weapon programs, wishing to accentuate purported waste and expense, invariably cite the highest possible cost of targeted programs. Getting to $1 trillion requires the estimator to include all possible cost groups. Then, all future expenses must be expressed in inflated then-year dollars over a very long period. For example, F-35 expenses don't stop with the end of production in 2034. They go on to include the cost of operating, maintaining, and upgrading the aircraft for as long as they last—another 20 to 30 years.

Think of cost estimates in terms of the family automobile.

If recurring flyaway cost represents a car's sticker price, life cycle cost includes everything related to owning and operating the vehicle.

Count your share of development and testing costs that occurred before you bought the car. Include a lifetime of spare parts and "consumables" such as tires and wiper blades. Repairs, oil changes, and routine maintenance all count. If a new garage or driveway repairs are somehow related to the vehicle, tally them, too. Gas? Included. Future upgrades such as a new stereo, paint job, or portable GPS? Yes. Downtown parking? Of course.

This, as is readily seen, leads to a strikingly huge number. However, life cycle cost bears little resemblance to what most people consider the real cost of a vehicle.

We may now examine, with something like perspective, the GAO's trillion dollar claim. In a March report, it alleged that the total F-35 investment "now exceeds $1 trillion," which it broke out as more than "$300 billion to acquire 2,456 aircraft and $760 billion in life cycle operating and support costs."

That's right: Nearly three-quarters of the $1 trillion is the cost of ownership. These expenses are rightly considered O&M, but some would shove it all into the F-35 price tag.

So, what does the F-35 program really cost? The Pentagon pegs it at $298.8 billion in program acquisition cost, in then-year dollars. The Center for Strategic and Budgetary Assessments says this is roughly $251 billion in the dollars we spend today.

That's not cheap, but a trillion dollars is off by a factor of four. ■

More information: http://www.gao.gov/new.items/d09303.pdf

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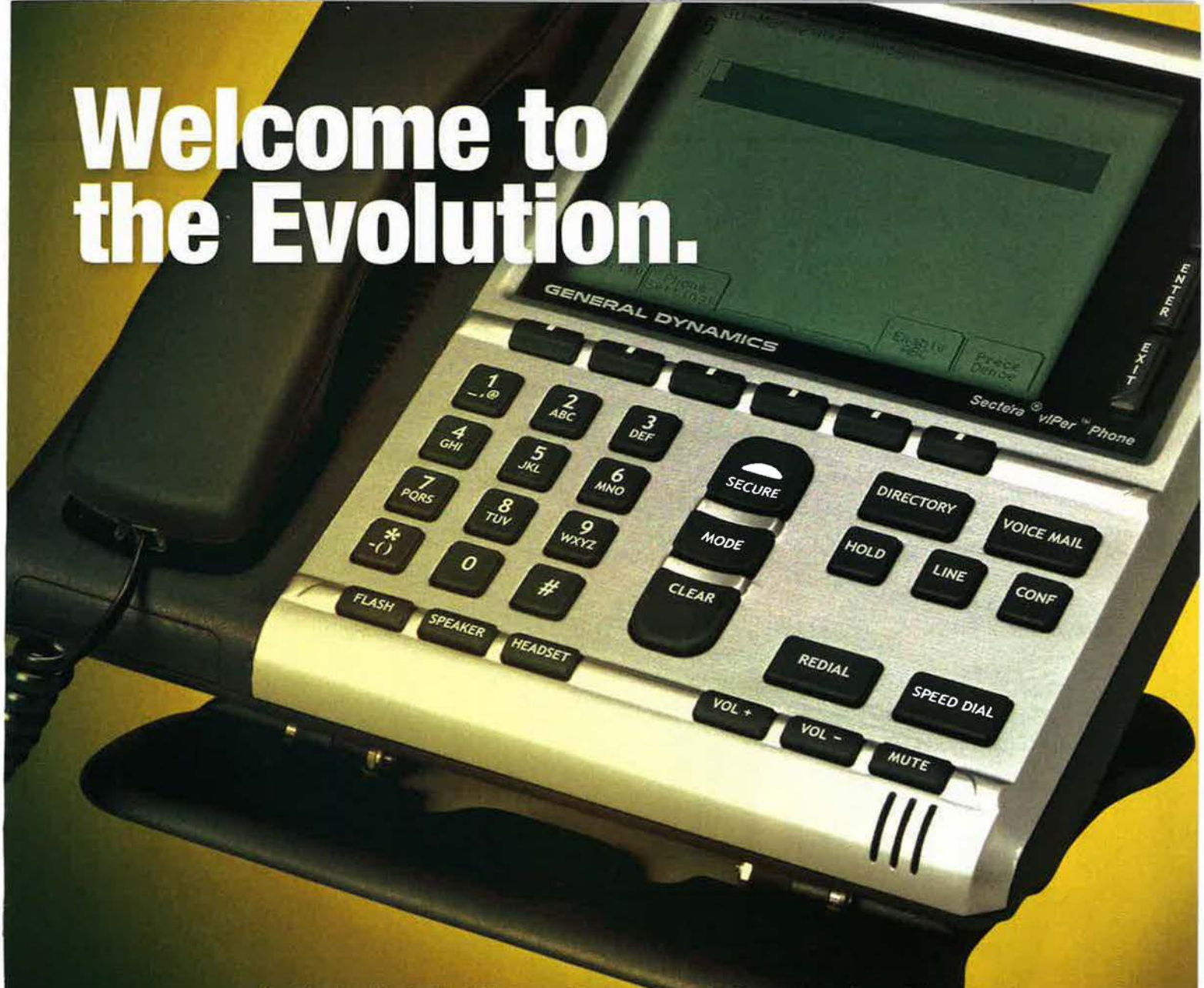

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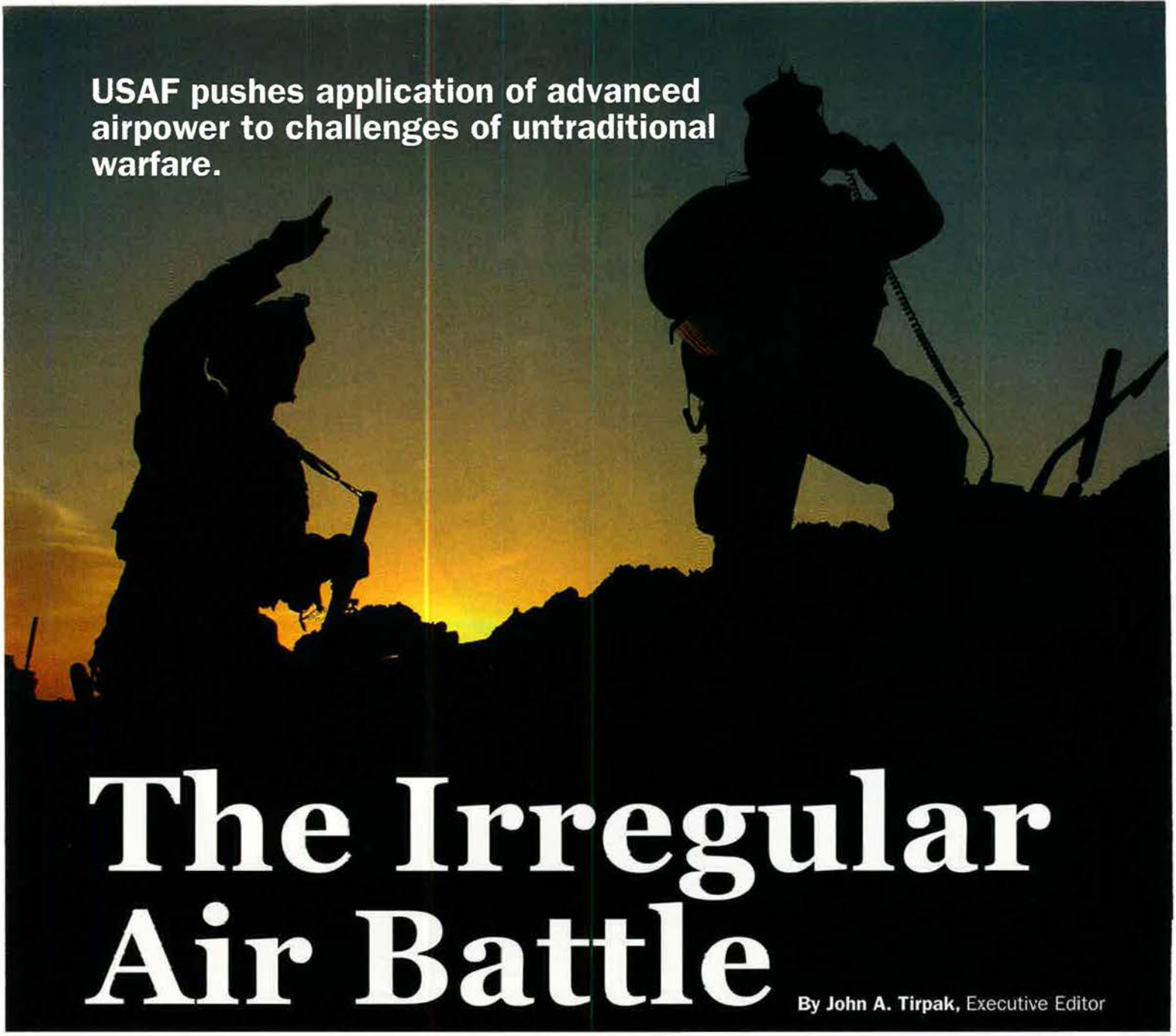

The Irregular Air Battle

By John A. Tirpak, Executive Editor

If all goes as planned, the Air Force this fall will step into what it hopes will prove to be a major expansion of irregular warfare capabilities.

USAF has long possessed unparalleled competence for high-intensity major theater wars. Now, the service wants directly to address problems created by small, unsophisticated insurgencies and other conflicts such as that swirling in Afghanistan.

The effort will comprise advances in aircraft, training, and deployments.

USAF's IW scheme calls for buying or adapting a variety of new aircraft types, likely to include a small counterinsurgency fighter. Roles of many USAF specialists, ranging from instructor pilots to runway builders, will be broadened and deepened, with an increased emphasis on foreign language and cultural proficiency.

The service will stand up a school to train advisors who can help partner nations build and operate their own air forces.

Equally important, the Air Force seeks to sharpen its skills in precision strike and close air support by deploying more combat control airmen with ground forces and by investing in new technologies and hardware.

It will continue to expand and refine its key intelligence-surveillance-reconnaissance capabilities.

Irregular warfare is an often-misunderstood concept. The Defense Department defines IW as "a violent struggle among state and nonstate actors for legitimacy and influence over the relevant populations."

DOD goes on to say, "IW favors indirect and asymmetric approaches, though it may employ the full range of military and other capacities, in order to erode an adversary's power, influence, and will."

It defines "irregular forces" as "armed individuals or groups who are not members of the regular armed forces, police, or other internal security forces."

The Air Force's multifaceted IW program should not be regarded as a transformation of the service into a force focused only on counterinsurgency. Far from it. Air Force leaders, rather, see the shifts as expanding a portfolio of skills already possessed by many airmen.

Irregular warfare is "a multidisciplinary activity," Gen. Norton A. Schwartz, the Air Force Chief of Staff, noted in recent remarks. "The question

USAF members on an armed reconnaissance mission outside of Patrol Base Meade, Iraq.

DOD photo by MSgt. Andy Dunaway

is: Is there a way to maximize the versatility of ... general-purpose assets for us to be better prepared to prosecute the irregular kinds of missions that we face, which include building partner capacity and training others?"

Schwartz, in remarks at a Heritage Foundation event in Washington, D.C., said, "We have entities in the Air Force today that have those combinations of skills." He was referring to contingency response groups, which comprise a number of specialties, focused on the capacity "to open airfields" for expeditionary forces.

However, "with the right kind of training and language skills, ... these existing organizations can also serve to better train others to perform air missions on their own nations' behalf. And that's one of the things we decided to do, ... to 'dual-mission' the existing groups that perform those functions."

Schwartz had just come from a Corona meeting of top Air Force leaders, at which the way ahead for IW was discussed. The overall IW strategy is to be determined by fall, but in the interim, a number of steps will be taken.

For starters, the Air Force leadership ordered an analysis of alternatives to be done to look at aircraft that meet three different needs: small vertical and fixed wing lift, and light attack. The idea is to evaluate aircraft that could be operated effectively by USAF, but also could be affordable and appropriate for use by a wide variety of partner nations that lack the technical sophistication—or money—to invest in higher-end platforms such as C-130s, F-15s, and F-16s.

The Key Enablers

Because many IW operating areas won't be located near airfields, a helicopter is essential, according to Robert S. Day, director of IW requirements for the Air Staff. It is one of the "key enablers" to help work with and build partner nation air forces, particularly "some of the less-governed nations."

Fixed wing transports will also be looked at, and they will generally be on the smaller side, akin to those employed during the Vietnam War, where small payloads and short runways in remote locations were the rule. Day said the C-27J, which the Air Force will buy to augment its tactical airlift fleet, is considered a "medium mobility" aircraft and too large for the IW requirement.

Finally, a new counterinsurgency airplane—performing "armed overwatch"—will be needed, with the ability to operate from forward or bare-bones areas, having ISR capabilities comparable to those on Predator and Reaper unmanned aircraft, but having crews on board with basic attack skills. Day said he's seen "more than 60" proposals for such an aircraft, ranging from off-the-shelf designs to modified World War II fighters to all-new concepts. Key factors in reducing the field of candidates will be simplicity and affordability for less technically sophisticated allies.

Air Mobility Command will perform the AOA on the light transport, while Air Combat Command will perform the ones on the helicopter and light strike aircraft. Cost information is to be compiled this summer, to inform early Fiscal 2011 budget plans, and the full AOAs are to be done later this year.

Partners may wish to select platforms from other countries, especially if they've already got some investment in, say, Russian designs, Day said, which could complicate USAF acquiring such systems if there are Congressional strictures against buying them.

The MC-12W Liberty Project Aircraft—an ISR aircraft based on the civilian Beechcraft King Air 350 and pushed from concept to battlefield in less than two years—is emblematic of

USAF photo by SSgt. Aaron Allmon

SrA. Corey Farr, 66th Expeditionary Rescue Squadron, rappels from an HH-60G Pave Hawk during operational training in Iraq.

USAF photo by SrA. Tiffany Trojca

The first MC-12W to arrive in-theater taxis out of its hangar at Joint Base Balad, Iraq, on the way to its first combat sortie June 10.

what the Air Force is trying to do with its new aircraft, Day said. Such an aircraft would pose little technical challenge and could be operated by both USAF and partner air forces.

Schwartz said of the new aircraft—"light strike, light lift, and so on ...—we won't be making a huge investment in those areas, ... but this is a space that we should probably be in, ... with platforms that other nations—nascent, developing nations—might be able to assimilate more easily than some of our higher-end, more sophisticated platforms that we operate with great effect."

He added that "the idea here is to work our way into this—start small and see where it takes us."

There is about $694 million planned for investment in Air Force IW capabilities over the next seven years. The bulk of the money will go toward procuring the new light aircraft. The rest will be divided among training initiatives, ISR capabilities, and regional IW centers at Air Force headquarters in Europe, the Pacific, and in Africa.

Schwartz also said he envisions the light strike aircraft as possibly a primary or advanced trainer that could be equipped with light ordnance, such as rockets and small bombs. Air Force instructor pilots would have skills in light attack and counterinsurgency, and they could pass these skills along even as they provided basic flight instruction to partner air force pilots. The instructors could also be deployed to COIN missions themselves.

"That's what I'm talking about, ... trying to think innovatively about how to approach this, in a way that's manageable both from a manpower and resource perspective," Schwartz said.

That's why Schwartz has emphasized folding the IW mission into the existing general-purpose forces: because there simply aren't—and won't be—any new infusions of end strength to accommodate new missions.

"Our approach on this will ... be to minimize the creation of new organizations," Schwartz explained. "The idea will be to take elements that have this capability and align them with existing operations groups ... to get them the necessary supervision ... without creating lots of organizations and ... additional overhead that we can't afford."

Right-size for Global Demand

In April—before the Corona deliberations—Schwartz gave an address at the Brookings Institution in Washington, D.C., about the Air Force's role in IW and COIN. He said USAF leadership was considering the possibility of creating an entire wing dedicated to IW. However, Day said the thinking since Corona is toward smaller organizations—groups—but that final decisions haven't been made.

"We are looking at demand signals that are out there" from regional commanders in chief and air operations centers to gauge what the long-term need for IW capacity will be, Day reported. What the Air Force doesn't want to do, he said, is create organizations specifically geared to the current fight.

"What we want to do is right-size for the global demand. Because it's not just Iraq and Afghanistan; it is the globe, and a lot of that is the equator and below," he noted.

The Air Force's IW initiative began in 2004, Day said, when "it was myself and a major, and it was all about how the Air Force can defeat the [improvised explosive devices]," which were taking a heavy toll on US combat troops in Iraq.

The Air Force at that time was getting short shrift in joint service discussions of how it could participate in anti-insurgency operations. When a new Army-Marine Corps joint doctrine on IW—authored by Army Gen. David H. Petraeus—premiered in 2007, it carried scant mention of the role of airpower.

"The counterinsurgency manual issued by the Army and Marines is over 200 pages long, and yet only four pages are dedicated to air, space, and cyberspace," Defense Secretary Robert M. Gates said in an April 2008 speech to the Air War College at Maxwell AFB, Ala.

The speech drew attention because, in it, Gates said it had been "like pulling teeth" to get the military services to move "aggressively ... to provide resources needed now on the battlefield." His

USAF photo

TSgt. Dennis Flanagan trains Afghan maintainers on a Russian-made Mi-17 transport helicopter at Kandahar Airfield, Afghanistan.

remarks were interpreted as a jab at the Air Force for failing to provide enough ISR assets, such as unmanned aircraft, for the wars in Iraq and Afghanistan. Within 40 days of that speech, Gates requested the resignations of the Chief of Staff and Secretary of the Air Force at that time, Gen. T. Michael Moseley and Michael W. Wynne, respectively.

The Air Force had put out its own IW doctrine in August 2007, but with the subsequent decapitation of the Air Force leadership and Gates' instructions to put far greater emphasis on IW, that doctrine is now considered due for replacement. It was updated in January in a new IW white paper, released at the same time as one on the service's Global Partnership Strategy, since the two are so closely interrelated, Day said. Both documents carry the signatures of Schwartz and Air Force Secretary Michael B. Donley.

In the Maxwell speech, Gates said he envisioned a "100-wing Air Force of allies and partners" and encouraged his audience to think about "what more we might do—through training and equipping programs or other initiatives—to enhance the air capabilities of other nations." Gates further noted that USAF would be increasingly called to perform "civil-military or humanitarian operations with interagency and nongovernmental partners and deal directly with local populations. This will put a premium on foreign language and cultural expertise."

Gates wrapped up his remarks by saying the Air Force needed to "think hard about whether we have the right platforms—whether, for example, low-cost, low-tech alternatives exist to do basic reconnaissance and close air support in an environment where we have total command of the skies, aircraft that our partners can afford and use."

The Air Force had anticipated Gates' direction and had set up an IW Task Force the previous month. It set about pursuing "pathfinder" initiatives to investigate what USAF's IW role should be and lay out a plan to get there. At the June Corona, it was decided that the Air Force has still not determined what the "end state" of its IW capabilities should be, Day said.

Some things are already clear, however. Day said that the Air Force doesn't get enough credit for all the things it already brings to IW—mainly because they are so part-and-parcel of what the service does every day.

"These key enablers are so ubiquitous, and we do them habitually, we find [it] hard to even bring them up," he said.

USAF photo by SSgt. Desiree N. Palacios

Crew members ready a B-1B at Ellsworth AFB, S.D. The aircraft is equipped with a Sniper advanced targeting pod.

In a Task Force meeting, he asked the other members to "tell me something the Air Force does that's not ... related to IW." The only answer that came back was ICBMs, Day reported.

Too many people fail to recognize the foundational aspects of the Air Force's IW contribution, he said.

Still "All In"

When somebody calls "troops in contact, in a matter of minutes, somebody's on top, ready to deliver ordnance. That seems fairly easy, but if you go back through everything it takes to deliver it"—GPS satellites, secure communications, mapping, precision ordnance, fighters, tankers to get them there, airlift to resupply them—"that's a pretty complex task."

Day echoed a frequent Schwartz comment that "we've *been* 'all in,' we *are* 'all in,' and we *will be* 'all in.' We will be as competent at irregular warfare as we are in conventional." Still, one of the thrusts of the Air Force's IW plan will be to beef up the number of tactical air control parties deployed with ground forces—to increase their numbers, enhance their skills, and provide them with new equipment.

For example, much of the ground-controller-forces equipment has become "atrophied," Day said, because aircraft are doing more self-reporting of their positions domestically.

"But when you go overseas, aircraft aren't necessarily self-reporting, ... especially if you're in a conflict," he noted. So, the equipment is old, "but the good news is, it may give us the opportunity to replace the equipment ... in a smarter way." He noted that terminal air controllers, ground approach controllers, and en route controllers all have different kinds of radars. They could be equipped with standard "deployable, multifunction radars that simply have a different picture for a different controller," which would mean a larger buy, easier training, and lower unit costs.

Another problem to correct with the expanded-capability contingency response groups is that they will be more closely aligned with specific ground force units. The CRGs permitted the Air Force to "reach out and grab specialists, pull them together in a team, and put them forward." However, the benefits of always working with the same people were not available. Now the CRGs will be aligned with specific Army and Marine Corps units so the organizations "get to know each other" and develop "long-term relationships."

The CRGs involve "a whole litany" of experts, Day said. They will be dual-designated with the task of not only opening new airfields but providing advice to partner countries.

Notionally, one CRG each will be "habitually" aligned with Africa Command and Air Forces Southern. The four remaining in the US will also be for irregular warfare and building partner capacity both.

"Two of those four, we're going to do what we call IW/BPC-Heavy," Day said. If it looks like the mission requires "more than we thought, and we need a lot more time here than the few weeks we were thinking of doing, then these heavies can go in and stay maybe six months."

The Air Force will continuously step up its ability to collect ISR, Schwartz said at Brookings. He acknowledged that avoiding hitting civilians in a counter-insurgency is a relentless challenge, so "what we're focusing on is to provide the kind of tactical situation awareness that allows our folks both to be successful and be discriminating at the same time." Although there are rules of engagement which shift in response to changing situations, "my counterparts—and this is certainly true at the COCOM level

USAF photo by A1C Evelyn Chavez

PC-12 Pilatus aircraft, such as the one pictured here, are versatile and have the ability to operate on short and unimproved runway surfaces.

and at the joint task force level—have little interest in sort of tinkering with the tactics. ... We turn it over to the folks who know how to do this well, with an abundance of information that gives us much higher confidence that they'll act with precision and they'll be successful."

He added that incurring civilian casualties in attacks on "deliberately planned targets" is rare. "The real challenge is spontaneous targeting, ... when a call comes through, 'troops in contact need help now.'" That challenge will require "weapons that you can use discretely, that are precise, as well as scalable in terms of ... the effects." Constant surveillance, he said, will allow the strikers to know "what else is in the blast radius, or the effect radius." He said USAF will work to better integrate "the intelligence side and the ops side" to further reduce the risk of civilian deaths or injuries.

However, there will be so much information to process that there will have to be more automated ways to do it, Schwartz said. Although the Air Force is "putting more than 4,000 people" into the "back end" of ISR—those who do the analysis and development of actionable knowledge—"that trend line can't continue. ... A major area of endeavor has to be ... to apply intelligent systems in a way that allows us to digest that material, to identify intelligence, and distribute that in a much more automated fashion; that's the only way ahead. ... [We] can't fix that with people." The Air Force can't afford to "have information left on the floor."

A new, dedicated air advisor schoolhouse will be developed by Air Education and Training Command, Day said. The existing schoolhouse is on the Army's Ft. Dix, N.J., facility, and produces 700 graduates a year. The new school—location yet to be determined—will graduate about 1,500 air advisors a year, but the output will be scalable to match the current "demand signal," he noted. The school will teach both officers and enlisted how to help partner countries staff, organize, and equip their own air forces, "to help them create their own civil-military air infrastructure." It will involve "some regional training, ... some language training, some social-cultural training."

A Bureaucratic Labyrinth

Among the Corona findings was that there isn't the right level of coordination with other federal agencies that will be involved in helping partner countries defeat insurgencies.

"There's a lack of overall, whole-of-government effort to coordinate BPC [building partner capacity] efforts," Day noted. "It's not just Department of Defense; it's ... Commerce, ... State, ... the judicial arm; it's everything."

Combatant commander staffs and air operations center personnel will likely be given additional training in IW and BPC to help their bosses navigate the bureaucratic labyrinth on getting support in those areas.

"It's like 60 different authorities a combatant commander has to wind his way through to figure out, how do I get money? How do I get it in this year, for this purpose?" Day explained.

Schwartz, in his Brookings remarks, said that the intergovernmental capacity has to be built up, but that the Defense Department usually takes the lead in such matters because "one of the advantages that DOD has—it's inescapable—is that we have depth, and we have scale ... and we also have an organization and people say, yes, sir, or yes, ma'am. So it's not surprising when, in a pinch, ... [when] we need to get something done, that sometimes the spotlight comes toward DOD."

To face that reality, Schwartz said, "I think what we will end up doing is going to our reserves and relying on [them] for some of those unique civilian skill sets ... to make our effort more holistic." He also said that the State Department is launching an initiative to create its own kind of "civilian reserve corps. ... My hunch is that over time, that sort of initiative will proliferate into the other departments of the government."

In his Brookings remarks, Schwartz said the Air Force's IW efforts will require a new breed of airman more than just new equipment or organizations.

The service needs to build "people who can do this, who are comfortable in austere settings, [with] families that are prepared to have their loved ones deployed for extended periods, over a matter of years. ... It's entirely possible ... that the United States Air Force in some ways will have to be more like the Foreign Service when this is all said and done, and much less the garrison force" of the pre-1990s era.

He added that in IW, it must be recognized that force can be too much the "blunt" instrument, and that the Air Force will increasingly focus on more precision and discrete effects.

At the same time, however, development of the new types of capabilities would stand USAF in good stead for dealing with yet another variety of conflict—"hybrid warfare." In this type of war, enemies employ both high- and low-tech weapons and tactics simultaneously or in sequence. An example of this came in summer 2006 in Lebanon, when Israel found itself face-to-face with not only lightly armed Hezbollah irregulars but also Hezbollah forces wielding ballistic missiles, cruise missiles, unmanned aerial vehicles, and advanced communications. The Pentagon leadership is convinced that, in the future, these types of wars will be far more common and likely than large force-on-force major combat operations.

All in all, Schwartz maintains, the American way of war has had to change.

"Sometimes ... we have compensated for maybe not being smarter than our adversaries with mass, with capacity. ... We won whether we were smart or not. But we're in an era where ... things are much more complicated. ... We have to be as skilled and as wise, as well as capable, more capable than our adversaries."

Day said that "if we're successful," his office "will not exist in four years, because irregular warfare will be totally ingrained in the being of the Air Force." ■

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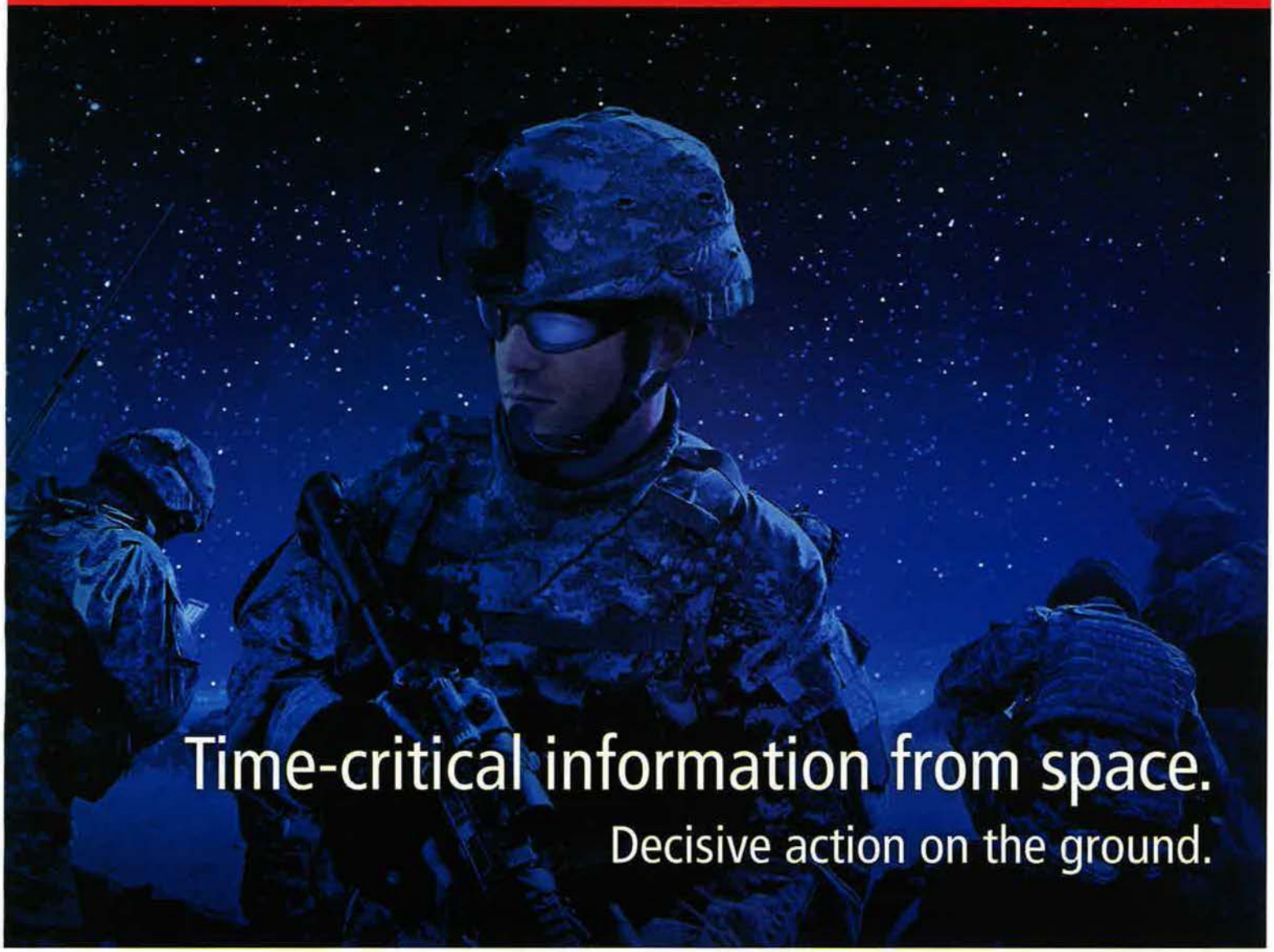

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The Turning Point

USAF photo by SrA. Laura Turn

A year ago, USAF had a fully funded modernization program. That program has unraveled.

By Rebecca Grant

The Air Force is in the throes of what could prove to be one of the greatest upheavals in its turbulent 62-year history.

The words "danger" and "difficulty" have become only too appropriate in describing the situation of USAF's critical combat formations. Today is a time when aged fighters fall out of the sky and no replacement bomber is in sight. The nation bets its basic security on a force that is older—by far—than at any time since World War II.

Some see the current turmoil as comparable to earlier struggles over strategic bombers, ICBMs, and space. Those dustups created years of uncertainty.

The unofficial term "combat air forces" refers to fighter, attack, bomber, and some intelligence-surveillance-reconnaissance (ISR) assets. Within that grouping, the fighter and attack force comprises the bulk of manned and unmanned striking power.

The CAF is US airpower's center of gravity, and it has already undergone irrevocable change and damage. USAF

USAF photo by MSgt. Kevin J. Gruenwald

Top: An F-15 maintainer is ready to flag a pilot at Elmendorf AFB, Alaska. Here: Two F-22 Raptors fly a theater security mission over the Pacific.

USAF photo by TSgt. Erik Gudmundson

An MQ-9 unmanned aerial vehicle in its shelter at Joint Base Balad, Iraq, before a mission for Operation Iraqi Freedom.

fighter and attack aircraft are aging faster than they can be replaced.

A year ago, the Air Force possessed a fully funded modernization program covering fighters, bombers, unmanned aerial systems, data links, and more. That program has unraveled. In its place comes a new Pentagon directive: Hold off on modernization and freely accept moderate to high risk in force plans.

"We're not going to build the Air Force we thought we were going to build," said Michael B. Donley, the service Secretary.

The crisis has been brought to a head by Secretary of Defense Robert M. Gates' decision to halt all production of the F-22 air superiority fighter and cut the maximum production rate of the F-35 multirole fighter. As a result, the service is trying to figure out how to do what it has never done: Accept into its aircraft mix a large number of less capable legacy forces.

The Air Force now being crafted will not be the advanced, sophisticated force conceived after Desert Storm in 1991. Plans laid in the mid-1990s called for the Air Force to push out all of its 1970s-era F-15s, F-16s, F-117s, and A-10s and replace them with new "fifth generation" F-22s and F-35s.

That plan would have, in due course, replaced all F-15Cs, F-16s, and A-10s with 381 F-22s and 1,763 F-35s.

The new plan calls for something less—far less. The new combat structure has been described as a "fifth generation-enabled" force, using small buys of advanced fighters to bootstrap more capability out of modernized legacy fighters.

In this regard, the Pentagon under Gates has made some big moves. The biggest were those to stop F-22 production at 187 aircraft—about half of the Air Force's full replacement requirement of 381—and to limit maximum production of the F-35.

Gates' actions were nothing if not controversial. Retired USAF Lt. Gen. Thomas G. McInerney spoke for many with his claim, "This is the most dangerous defense budget since the post-World War II period." Others dispute this, but there is no disputing the severity of the change.

Gates has made plain that his oft-declared effort to "rebalance" American military forces is no mere budget drill. Indeed, the Fiscal 2010 budget plan that he unveiled on April 6 was, in his words, "a budget crafted to reshape the priorities of America's defense establishment."

A Surfeit of Power

Those plans have been shaken to their foundations. US defense policy has been decoupled from a decades-long commitment to ensure no other power dominates any key region of the world. Two reasons have been adduced by defense officials.

One is a perceived need to focus more intently on wars in Iraq and Afghanistan and, in so doing, bring programming for irregular warfare into the service mainstream. The second is Gates' view that the US military already possesses a surfeit of a certain kind of power—conventional power.

Indeed, Gates' comments and decisions show he's making a deliberate shift away from what are now pejoratively called forces for major theater wars. Areas of US military dominance are now referred to as "excessive overmatch."

In their joint USAF posture statement, Donley and Gen. Norton A. Schwartz, the Chief of Staff, state: "The Department of Defense provided guidance for the military to eliminate excessive overmatch in our tactical fighter force and consider alternatives in our capabilities."

Oddly, the Gates shift does not stem from a full-blown strategy review by the Obama Administration; no national security review has yet taken place on the new President's watch. Instead, Gates has used as his rationale the 2008 National Defense Strategy, shaped largely by himself and vigorously opposed by all the service Chiefs because of its acceptance of risk in the field of major conventional war.

At the center of this new risk strategy is the Air Force's combined fighter, bomber, and attack fleet—the CAF.

For one thing, budget decisions contained in the 2010 plan guarantee that airmen will be compelled to continue flying aged F-15s and F-16s—two airplanes designed in the 1970s and bought, for the most part, in the 1970s and 1980s—for another three decades. The bomber force is, in many ways, worse off.

Old aircraft is only one side of the equation. The other side features a major modernization slump, based on Gates' fighter and bomber decisions.

Taken together, these moves will inevitably drive the Air Force to higher risk levels. There are many reasons for this, but one big one is this: In the past decade, there grew within the Pentagon an overall sense that the CAF was too big.

The problem may have started in early 1991. In January and February of that year, the dominant airpower of a US-led military coalition decimated Iraqi air and ground forces in the six-week Desert Storm campaign. This led, postwar, to substantial cuts in fighter forces—from 38 to 20 active and reserve wings.

At first, this seemed reasonable. Substantial aircraft procurement in the Reagan 1980s meant the remaining USAF fighter force structure in the 1990s was, for the most part, young and strong. Moreover, equippage with precision weapons post-Desert Storm further increased the power of the fleet, allowing USAF to retire older aircraft. In all, the fighter inventory declined by some 1,000 aircraft.

What's more, the experiences of Desert Storm led the Air Force to stop buying F-15s and F-16s in favor of developing lethal stealth and precision

USAF photo by MSgt. Lance Cheung

A B-52 takes off from Minot AFB, N.D. No replacement bomber for the venerable aircraft is in sight.

fighter-bombers for the future, the F-22 and F-35. Research and development money went to F-22 and F-35 programs. Meanwhile, USAF took the opportunity to invest in C-17s and complete the small B-2 bomber buy.

For all that, some in the Pentagon continued to harbor a belief that USAF had more combat airpower than it needed. Cuts came in the 1997 Quadrennial Defense Review, and challenges to USAF force modernization cropped up repeatedly in the late 1990s.

It was not until 2002—the second year of the George W. Bush presidency—that the real challenges began to take shape.

In 2002, the F-22—the leading platform in the Air Force modernization plan—was subjected to a very tough, high-profile review by the Office of the Secretary of Defense. The USAF requirement for 381 F-22s survived the blitz, but barely.

Things rocked along for another two years. However, the enormous cost of the Iraq War finally became a factor working against the F-22. In December 2004, the Pentagon issued an internal directive known as Program Budget Decision 753, signed by Deputy Secretary of Defense Paul D. Wolfowitz.

The directive lopped billions in funding from long-term fighter procurement. It swept away all money for F-22 production after 2011. The end result of this budget drill was a truncated "program of record" of only 179 F-22s. (Efficiencies later allowed the Air Force to purchase another four, for a total of 183 fighters.)

The directive also created a fighter gap. The nation's war plans stuck the Air Force with a requirement for 2,400 fighters. Funding, though, would provide only 1,600. The gap came to a whopping 800 combat fighters.

The Air Force worried about that gap. However, USAF's leaders believed they could live with a smaller fleet, given the capabilities of the F-22 and F-35. A severe funding crunch upended that plan. The Air Force could not buy new fighters fast enough to replace ones that reached their service life limits.

Senior Air Force leaders continued to budget for F-22 and F-35 production at better rates. At least with respect to the F-22, those efforts were met with constant opposition from OSD officials. The key figure in the anti-Raptor cabal was Gordon England, the deputy secretary of defense who had been appointed by Donald H. Rumsfeld but retained by Gates.

Excessive Overmatch?

England was an interesting case. He had worked for two fighter houses—General Dynamics and, briefly, Lockheed Martin. When, in 2005, he was made deputy secretary of defense, England made no secret of his dislike for the F-22 and Lockheed's Marietta, Ga.-based fighter "mafia." He expressed a strong preference for the F-35, and became a great proponent of the notion that USAF was in possession of "excessive overmatch" in combat air forces.

Gates made that capability a major target for cuts when he began to settle on details of a new national defense strategy in the first half of 2008. The Pentagon chief focused military energies on irregular warfare. He laid the groundwork for dismantling much of the planning guidance for major theater wars. The strategy also provided the justification for getting rid of many theater war capabilities across the armed services.

One clear goal of the strategy: The downgrading of the relative importance of US conventional military forces—namely, those flexible, service-specific core competencies focused on dealing with major theater adversaries in various regions.

The need to prepare to fight and win major theater wars always had provided a framework for US defense plans. Moreover, defense strategy in the 1990s had moved away from planning for specific scenarios. Into its place moved so-called capabilities-based planning. As set out by William J. Perry, Secretary of Defense in the period 1994-97, the essence of the strategy was to prepare forces to combat capabilities presented by regional aggressors, and adapt strategies and operational plans to contingencies as they arose.

Capabilities-based planning put heavy emphasis on evaluating adversary military equipment and potential force developments, ranging from diesel submarines to surface-to-air missiles.

Gates, however, came into office with a view that effectively put an end to capabilities-based planning. When his new strategy was released in July 2008, he declared, "I firmly believe that in the years ahead, our military is much more likely to engage in asymmetric conflict than conventional conflict against a rising state power."

Gates made irregular warfare his own personal cause. He claimed that big conventional programs had strong constituencies, but IW did not. He planned to give it one.

Publicly there was little discussion of the Gates strategy. The Presidential election was in full swing and most saw the Gates document as a strategy "destined to be overtaken by events," in the words of Michele Flournoy, then president of the Center for a New American Security (and now Gates' undersecretary of defense for policy).

Nor did Gates try to play his hand to a conclusion. Decisions on the F-22, a new aerial tanker, and other programs were deferred to the next Administration.

Part of the reason may have been that the Joint Chiefs collectively nonconcurred with the strategy. After discussions between the Chiefs and Gates, Gates in summer 2008 elected to go ahead with the document over their objections. By then, Gates had already


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USAF photo by SrA. Julianne Showalter

An F-35 Lightning II at Eglin AFB, Fla. USAF is slated to receive only 80 F-35s per year—maximum.

forced out Secretary of the Air Force Michael W. Wynne and Gen. T. Michael Moseley, the Chief of Staff. In effect, the Air Force and other services lost their battle to try to get Gates to pay attention to future threats from their perspective. He saw their view as merely so much "next-war-itis."

Things were to change, though. Gates saw his hand strengthened considerably after President-elect Barack Obama asked him to stay on in the defense post.

Soon, his strategy preferences began to emerge in programmatic form. Gates made a strange post-election move. The Bush White House, at the behest of the Joint Chiefs, had approved a large budget increase for Fiscal 2010, but Gates turned back $50 billion of it. With Bush gone and Obama in, Gates stepped up to the task of redirecting spending for the 2010 budget year into a series of bold changes. Few had foreseen how dramatic the changes would be.

Full details have yet to emerge. However, the overall direction is clear. Funding taken out over several years will make it impossible for the Air Force to buy a truly modernized force.

Buried in the details of the 2010 budget was a major negative decision: DOD would not, as asked, ramp up USAF's F-35 purchases to 110 per year. Gates approved funding for a maximum rate of only 80 F-35s per year for USAF.

The decision to fund F-35 production at that rate locks in major shifts for the Air Force. First, it guarantees the long-term USAF fighter inventory will be smaller than planned by at least several hundred aircraft.

Will that number be enough to support overseas and homeland security requirements? The answer depends on details of the force planning construct. The F-35 budget was set prior to any decision on new defense planning scenarios and will be affected by decisions in the Pentagon's massive 2009 defense review.

The Net Result

Theater war planning itself is out of favor. Not only that, but, for many, the goal of preparing forces to fight in two regions more or less at the same time seems much less compelling than it once was. The ability to take on two adversaries almost simultaneously has been a core tenet of US national security policy since the Truman years. However, with Gates opting for more risk in conventional conflicts, the two-war notion looked like an outmoded construct.

The net result of all these and other factors is a trend toward forces for just one theater war. Schwartz testified within recent weeks that there was "no question" that 187 F-22s would be "adequate for one major combat operation." However, sizing combat forces for one operation at a time could seriously limit future policy options.

A final element of change in the rebalancing strategy is a rebuff of technology—a move particularly hard on the USAF combat air forces. Gates made it clear he is not a fan of exotic and highly capable weapons.

"I concluded we needed to shift away from the 99 percent 'exquisite' service-centric platforms that are so costly and so complex that they take forever to build and only then in very limited quantities," Gates told an audience at Air University in Montgomery, Ala., on April 15, 2009. "With the pace of technological and geopolitical change, and the range of possible contingencies, we must look more to the 80 percent multiservice solution that can be produced on time, on budget, and in significant numbers."

Unfortunately, the combination of Gates' F-22, F-35, and bomber decisions ensures that USAF will not make a full transition to "fifth generation" aircraft. Instead, USAF will most likely keep significant numbers of F-15Es, F-15Cs, and advanced block F-16s for some time to come. The fleet will hit a low point over the next five years as fighters age and F-22 production ends.

This transition phase will last a decade as USAF's planned F-35 inventory slowly builds. It's a fact of life in this joint, allied program that the Marine Corps and several allies will receive deliveries of F-35s before Air Force bulk buys begin.

The result is that, five years from now, USAF's combat air forces will actually look older than it does now.

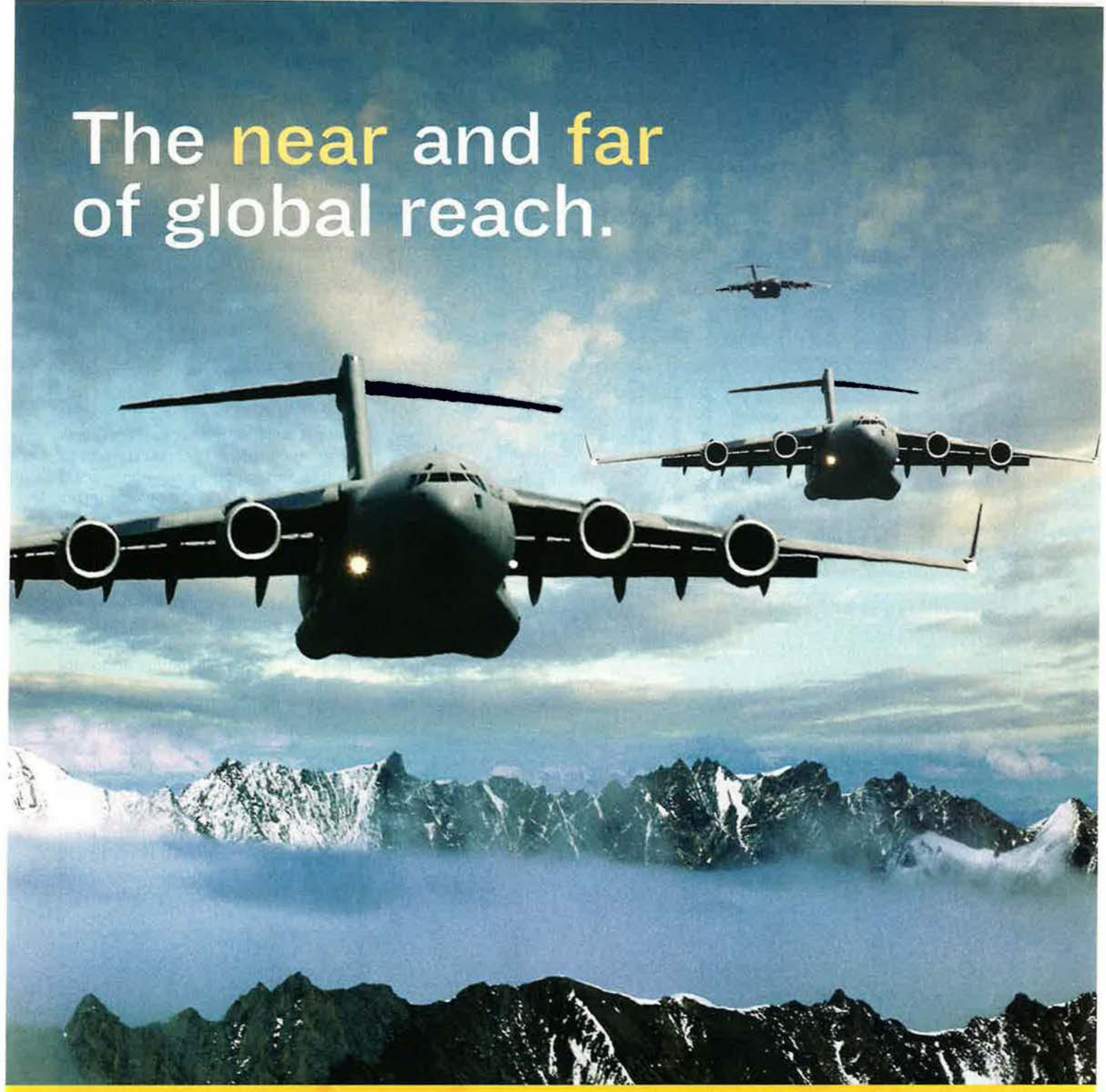
Under the Gates plan (subject to the strong possibility of revision by Congress), the Air Force in 2014 will field a mere 186 F-22s and some 100 F-35s. This boutique fifth generation force will account for just 19 percent of the active duty inventory. The other 81 percent are to be old fighters.

By 2020, the situation should have improved. USAF, by that year, should take delivery of about 580 F-35s. That assumes OSD imposes no further program cuts or schedule delays.

The F-22s and F-35s, joined with remaining F-15Es and even a few F-16s, will form a fleet of around 1,300 active duty fighters. The CAF of 2020 will be an improvement, but it will never be able to give the nation full return on the taxpayer investments. Nor will it be the low-risk, superior force that was planned prior to 2009.

Now clear for all to see is the fundamental result of a decade of Pentagon decision-making: For the first time since the years before World War II, the Air Force has failed to re-equip itself. ■

Rebecca Grant is a senior fellow of the Lexington Institute and president of IRIS Independent Research. She has written extensively on airpower and serves as director, Mitchell Institute, for AFA. Her most recent article for Air Force *Magazine, "Playing With Fire," appeared in the July issue.*



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The Air Force hasn't thought about air base defense for a while. Now, things are changing.

Fighting Under Missile Attack

By John Stillion

Photo via sinodefence.com

For the first time in decades, Air Force aircraft deployed in an international crisis now face substantial risk of damage or destruction on the ground. By some estimates, missile and air attacks could disable up to 70 percent of the aircraft at some overseas bases in the opening minutes of a fight.

The problem is not insurmountable; the Air Force and the Pentagon already have the means to start addressing this critical problem. Even so, there is no doubt the threat is growing.

The affordability, accuracy, and ease of operation of today's cruise and ballistic missiles make possible an effective surprise attack on theater air bases. Some of the more obvious countermeasures, such as operating from more-distant bases, raise major questions about the ability of current and planned USAF forces to fight an effective and efficient air campaign.

These difficulties are compounded in areas such as the Western Pacific, where the missile and air threat is large, bases are few, and political access to existing facilities often is limited or greatly constrained.

The full magnitude of this challenge can be glimpsed by examining a single, highly realistic scenario—emergency movement of US military forces to the Far East in response to a brewing China-Taiwan confrontation in the year 2015.

In this scenario, one of the main difficulties facing the Air Force would be the shortage of suitable bases in the Western Pacific. Only four of the eight

US Army photo

Photo by Jim Haseltine

SrA. Casey Bennett (foreground) and A1C Jacob Sprick guard a US Army Patriot missile air defense artillery battery near Osan AB, South Korea.

US bases there have hardened aircraft shelters.

Already, three of those four (Osan Air Base and Kunsan Air Base in South Korea and Kadena Air Base in Japan) are well within reach of hundreds of Chinese People's Liberation Army missiles. Currently, China has fielded about 400 conventional ballistic missiles and 250 cruise missiles that could reach bases in Japan and South Korea. Beijing also boasts a large fleet of advanced fighter-bombers.

The fourth hardened base (Misawa AB, Japan) lies just outside this threat ring. However, that puts Misawa about 1,850 miles from the Taiwan Strait, roughly the same distance from the strait as Andersen AFB, Guam, far to the south.

The US currently operates from only two bases—both on Okinawa—that lie within 500 miles of the strait. Requirements of tanking, sortie rates, and infrastructure availability make Kadena the best theater base for a large fighter contingent.

A typical US crisis response would likely see Kadena receiving a mix of aircraft similar to what was sent to Aviano AB, Italy, for Operation Allied Force in 1999, or to Shaikh Isa AB, Bahrain, for Operation Desert Storm in 1991.

In a crisis, one could find roughly 190 aircraft on the ground at Kadena. Virtually all of these would be parked in the open, as Kadena has only 15 hardened aircraft shelters.

The shelter shortage could be a critical vulnerability if Kadena ever came under attack from a sophisticated enemy—such as China—which has large numbers of advanced, long-range weapons ready at hand.

Consider a Kadena scenario, built around the following realistic assumptions:

- The attacking force finds two categories of targets: (1) stationary aircraft parked in the open, and (2) aircraft that have some measure of protection because they are airborne, taxiing for takeoff, or cocooned in hardened shelters.
- Of the total, nonsheltered parking space, 90 percent is covered by a massive missile attack. No parked aircraft has time to take off. Of this unprotected aircraft force, 75 percent is destroyed. All others are severely damaged.
- Taxiing aircraft escape without damage. Also undamaged, of course, are aircraft that are already airborne.
- Aircraft ensconced in hardened shelters ride out the attack undamaged. However, these bunkered aircraft are stuck on the ground due to massive debris on operating surfaces and more than 2,500 unexploded submunitions. They are targeted in follow-on attacks by cruise missiles.

Substantial Losses

Losses would be substantial. According to our calculation, only 82 of 268 aircraft deployed to Kadena—31 percent—would be available for postattack operations. These surviving aircraft are assumed to land at other airfields in Japan where specialized parts, maintenance personnel, weapons, etc., are unlikely to be available—further reducing their immediate combat capability.

The threat comes from the PLA 2nd Artillery Corps, which operates China's land-based strategic missile force—in practice a fourth service co-equal with the Army, Navy, and Air Force.

The 2nd Artillery modernization has special significance for US air and naval forces. As a "missile-centric" service, 2nd Artillery has created the world's first large, accurate, conventional missile bombardment capability.

The latest DOD report on Chinese military capability observes that, if recent trends continue, the 2nd Artillery by 2015 will have about 500 CSS-6 ballistic and 800 DH-10 cruise missiles capable of reaching airfields in Korea, Japan, or the Philippines.

The speed and accuracy of these systems, combined with the difficulty of defending against them, make the missiles ideal for carrying out rapid, accurate, and intense surprise attacks.

This missile capability is qualitatively different from anything US forces have faced in the past. The Chinese ballistic missiles of greatest significance to US forces operating in the Western Pacific are the CSS-5 and CSS-6. Both are launched from mobile vehicles, have advanced guidance systems, and solid propellant motors. They have longer range, greater ease of operation, and higher reliability than previous-generation missiles such as the liquid-fueled V-2 and Scud.

The CSS-5 and CSS-6 also are accurate and have a range of warhead options that make them more flexible and destructive than earlier missiles. The CSS-6 and similar Russian systems are for sale on the world market.

The attack scenario above assumes each CSS-6 warhead contains 750 1.1-pound bomblets similar to the M74 bomblet carried by the US Army Tactical Missile System (ATACMS).

The bomblets also are dispensed in a manner similar to the ATACMS dispensing sequence, with an assumed average pattern density of one bomblet every 51 feet. This gives each warhead an effective lethal radius against soft targets (such as aircraft parked in the open) of approximately 650 feet.

Warding off this kind of threat would be difficult. The key would be dispersal. China could theoretically saturate the entire airfield at Kadena with only 34 warheads. That would hit everything found on Kadena's parking ramps.

Far left: China's Dongfeng 15 (CSS-6) ballistic missile during a test launch. Left: A US Patriot missile is fired from a mobile launcher.

Pentagon officials believe the PLA has about 100 launchers for CSS-6 missiles, so a highly scripted, well-rehearsed surprise attack like this would require fewer than half the available mobile missile launchers. China would still have plenty more for attacks on other targets.

Current Chinese conventional ballistic missiles cannot quite reach Andersen on Guam. However, improved missiles having this capability will likely enter service over the next decade. Assuming aircraft deployed to Andersen during a crisis would be similar to those deployed to European bases and Diego Garcia during Desert Storm, an attack with as few as 17 missiles could produce devastating results.

For more than a decade, PLA planners have assumed that Washington would intervene in any future conflict between Taiwan and China. This assumption is buttressed by the US response to incidents such as the 1996 Taiwan missile crisis, the 2001 EP-3 collision and internment, and the October 2006 surfacing of a PLA Navy submarine near a US aircraft carrier.

Chinese strategists believe a conflict over Taiwan independence would be a "local war" where neither the US nor China would seek to destroy its opponent. The focus would instead end with the political status of Taiwan and the post-conflict political-military situation in the Western Pacific.

Chinese strategists also recognize that it will be decades before the PLA could take on the US in a traditional force-on-force battle and expect to win. Therefore, they focus on strategic principles that would allow China to prevail in a limited conflict with a "technologically superior enemy"—the United States. These principles include:

- Seizing the initiative early in the conflict.
- Achieving surprise by striking at unexpected times and places and/or when the enemy is unprepared.
- Attacking pre-emptively to achieve maximum surprise, psychological shock, disrupt deployments, and increase chances of gaining the initiative.

Chinese planners say initial attacks should feature "key point strikes" against information systems, command centers, key weapon systems, support systems, and bases. These should be conducted with a goal to "paralyze first, annihilate later."

Initial attacks should be conducted by the best available forces and concentrated in space and time "against targets vital to sustaining and supporting the enemy's operational system."

The strategists also seek to raise enemy costs by causing significant military casualties early and "smashing the enemy's will to resist."

The PLA has had about a decade to develop operational concepts, acquire systems, and train forces based on these principles. The ballistic missile forces of the 2nd Artillery Corps are especially well-suited for implementing these principles.

The problem isn't just the missiles. US planners seeking to ensure the availability of air bases overseas must consider that ballistic missile attacks are likely to be combined with (or serve as precursors to) additional attacks by cruise missiles and fixed wing aircraft. Other nations, such as Russia and Iran, have or are working to acquire similar capabilities.

Fortunately, US airpower bases are not mere sitting ducks. Far from it. There are several prudent steps that can be taken or already have been taken to minimize the threat.

Defenses

One response, already implemented, is the deployment of a Patriot anti-missile battalion to Okinawa. With PAC-3 missiles, the latest Patriot systems are much more capable than those deployed during Desert Storm.

However, when presented with dozens of fast, maneuvering CSS-6 re-entry vehicles simultaneously, even the PAC-3 system will likely intercept only a few incoming missiles.

It is probable that any surprise attack would seek to overwhelm the Patriot and also include some missiles aimed at Patriot radar and control systems—to help ensure subsequent missile or aircraft attacks face minimal defenses.

Even if active defenses such as Patriot become much more effective, the large footprint of each "leaking" warhead (well over one million square feet can be covered by dispersed bomblets) means that aircraft must be kept outside missile range, parked inside a shelter, or face a significant risk of destruction on the ground.

Over the short term, USAF will need to use existing systems and facilities in creative ways to negate the growing threat posed by accurate, proliferating missiles.

One obvious response is to disperse combat and support aircraft across a larger number of bases—preferably outside the reach of the majority of PLA systems. There are, for example, numerous airfields on the eastern periphery of the Philippine Sea that could be used by USAF aircraft over the short term. The inherent drawback is that safety comes from being outside of Chinese missile range, but this would simultaneously put aircraft farther from the action.

Iwo To (Iwo Jima) is already inside the reach of CSS-5 missiles and therefore is not a good choice as a major deployment base.

Wake Island lies nearly 3,000 miles east of the Taiwan Strait (approximately the distance from Diego Garcia to Baghdad). It is best suited to be a bomber base.

Andersen has long runways and ample parking and fuel storage areas, but is completely unhardened. Washington might be tempted to concentrate a large number of aircraft at Andersen. That would go completely against the logic of dispersal.

Fortunately, there are additional options, in the Mariana Islands. The civil airport on Guam (Won Pat Airport), along with Tinian and Saipan, could host reasonable numbers of fighters and support aircraft.

The remaining three airfields—in the Marianas, Micronesia, and Palau—all offer runways shorter than 7,200 feet,

USAF photo by SSgt. Araceli Alarcon

F-16s of the 80th Fighter Squadron taxi down the runway at Kunsan AB, South Korea. Kunsan is well within the range of Chinese ballistic missiles.

USAF photo by MSgt. Andy Dunaway

Two F-22 Raptors move down the ramp at Kadena AB, Japan, in preparation for a mission in the Pacific region. In the background are two F-15s.

have limited parking space and other infrastructure, and could at best support modest numbers of aircraft. There is also the political issue of gaining permission to use airfields outside US territory.

Dispersal comes with an operational cost. With fighter and attack bases about 1,600 miles from the Taiwan Strait, sortie rates (and thus combat power) would be reduced by 40 percent or more compared to operations from Kadena.

Meanwhile, tanker support requirements would increase enormously—with about three tankers required to support every five fighters deployed. To fly the same number of combat sorties per day as if from Kadena, the US would need to deploy about 100 additional combat aircraft and 200 additional tankers.

Beyond 2020

In the medium term (2015-20), USAF could benefit by making improvements to the airfield infrastructure on the eastern periphery of the Philippine Sea. Extending runways and parking ramps, enhancing fuel storage, and beginning to harden all critical systems would clearly improve the ability of this set of bases to support combat operations under fire.

In the years beyond 2020, more will be required—it is likely that China by then will possess a significant number of missiles with the range to attack unprotected aircraft operating from the periphery of the Philippine Sea. USAF will need to be able to shelter large numbers of aircraft from missile attack and conduct significant rapid runway repair and air base damage repair.

Given the distances involved and limited basing options, it will also be necessary to protect not just fighters, but large support aircraft (tankers, AWACS, Global Hawk, etc.) as well.

Fighter-size shelters have existed for decades: Cold War-era NATO fighter shelters were three- to six-feet thick and could protect aircraft against submunition attack but not direct hits by penetrating missile warheads.

The accuracy of modern ballistic and cruise missiles would allow an adversary to put two or three missiles on each shelter with high confidence of achieving a hit. With shelters, instead of killing multiple aircraft with each missile, future enemies may have to settle for killing one front-line aircraft with two or three $10 million missiles. It is still a good trade.

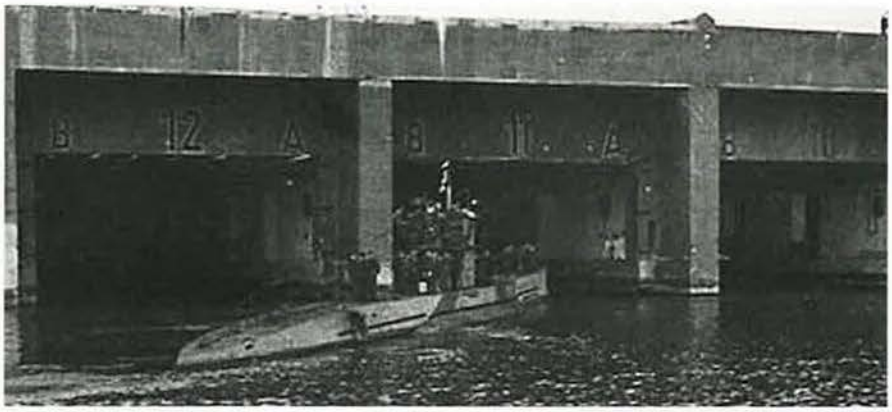
Shelters with nine-foot-thick walls and 12-foot-thick roofs constructed of high-strength concrete would be required to defeat ballistic and cruise missiles armed with penetrating warheads. This was done during World War II to protect German U-boats. So shelters suitable for protecting any USAF aircraft could be built, but as always, would come at a price.

Officials estimate the cost of a large, 12-bay shelter at $700 million. This is expensive, but obviously not as expensive as failing to deter a war with China or permanently losing a large portion of USAF combat capability in a surprise attack. Such a shelter could hold wide-bodied aircraft and could protect $10 billion worth of USAF assets from attack.

If the Air Force can protect its aircraft, then an opponent such as the PLA can expect much less benefit from a quick strike. By targeting runways and taxiways, an adversary may be able to disrupt or temporarily halt sorties from a given base. When the attacking missiles run out, the Air Force could repair its bases and bring its full combat power to bear with little or no interference.

The key to success is protecting combat and support aircraft until an opponent's missile inventory is exhausted. Having more long-range bombers wouldn't hurt, either.

The Air Force has taken some initial steps toward beefing up its long-range combat capability in the region. International training exercises and bare-bones "lily pad" deployments have become common.



A U-boat takes shelter under a bunker at Lorient, France, in World War II. A hardened aircraft shelter of similar size would cost $700 million, but could protect 12 large aircraft or 36 fighters.

The Air Force may need to fight from a small number of "bunker spaces" in a future Western Pacific war, but steps taken even today to provide access through improved range, dispersal, and hardening can ease the strain. ■

John Stillion was an Air Force officer from 1984 to 1992 and over the past 15 years has published multiple analytic reports on airpower topics. He currently lives in Virginia and is an adjunct professor at the University of Richmond. This is his first article for Air Force *Magazine.*

Verbatim

By John T. Correll, Contributing Editor

Stern Warning

"We will not accept North Korea as a nuclear weapons state. ... We will not stand idly by as North Korea builds the capability to wreak destruction on any target in the region—or on us."***—Secretary of Defense Robert M. Gates, speech in Singapore, May 30.***

Presidential Promise

"This is the promise I make to you. It's a promise that as long as I am your Commander in Chief, I will only send you into harm's way when it is absolutely necessary, and with the strategy and the well-defined goals, the equipment and the support that you need to get the job done. This includes the job of bringing the Iraq war to a responsible end and pursuing a new comprehensive strategy to disrupt, dismantle, and defeat al Qaeda and its allies in Afghanistan and Pakistan."***—President Obama, Naval Academy commencement, May 22.***

Why the Cold War Ended

"In his second term, Ronald Reagan met with Soviet leader Mikhail Gorbachev, who proposed that the two countries end the Cold War and the arms race. Reagan agreed, and the danger of war between the two nuclear giants has since subsided."***—George McGovern, Democratic candidate for President in 1972,*** **Wall Street Journal** ***op-ed, June 1.***

Now, He Helps Us

"During speaking tours in the United States before university audiences and business groups, I have often told listeners that I feel Americans need their own change—a *perestroika,* not like the one in my country but an American *perestroika.* ... Halls filled with thousands of people have responded with applause."***—Former Soviet leader Mikhail Gorbachev, urging*** **perestroika** ***(far-reaching change) for the US,*** **Washington Post** ***"Outlook" column, June 7.***

Doctrine Out of Balance

"Counterinsurgency doctrine is on the verge of becoming an unquestioned orthodoxy, a far-reaching remedy for America's security challenges. But this would be a serious mistake. Not all future wars will involve insurgencies. Not even all internal conflicts in unstable states—which can feature civil wars, resource battles, or simple lawlessness—include insurgencies. Yet COIN is the new coin of the realm, often considered the inevitable approach to fighting instability in foreign lands."***—Celeste Ward, deputy assistant secretary of defense for stability operations capabilities in 2007-08,*** **Washington Post** ***op-ed, May 17.***

Fewer Exquisite Programs

"We have had a temptation to design and try to build the most exquisite systems, and we have proven we can do that. ... My observation is we went way over on trying to build too many things on the same 'bus' [or platform]. ...There's going to be a lot more of 'not bad' than there is of 'wow.'"***—Gen. Norton A. Schwartz, Air Force Chief of Staff, American Forces Press Service, May 22.***

Joint Enlightenment

"War cannot be precisely orchestrated. By its nature, it is unpredictable. You cannot change the fundamental nature of war. ... [The US military should avoid] grabbing concepts that are defined in three letters, and then wondering why the enemy dances nimbly around you."***—Marine Gen. James N. Mattis, commander, Joint Forces Command, who had earlier banished the referenced three-letter concept (EBO, or effects-based operations, which emphasized airpower instead of boots on the ground) from joint doctrine, Center for Strategic and International Studies, June 1.***

Justifying the Fleet

"Since the United States has not fought a real naval battle since World War II, justifying the high cost of a large fleet of warships and aircraft is a tall order."***—Historian Barrett Tillman, US Naval Institute*** **Proceedings,** ***June.***

Slippage in ISR

"Advances in air-to-air and surface-to-air systems are challenging our legacy ISR systems. The sensor alone used to be good enough, but not anymore. Now range, reach, endurance, survivability, and stealth must be integrated as part of the sensor's capability."***—Lt. Gen. David A. Deptula, USAF deputy chief of staff for intelligence, surveillance, and reconnaissance, speech at Burlington, Mass., June 10.***

False Strategy

"I'd much rather have a mismatch where we have set an honest strategy and failed to provide the resources ... than to set a false strategy that is somehow melded to a budget figure that has no relationship to the threat."***—Rep. John McHugh (R-N.Y.), questioning the 2010 defense budget proposal, House Armed Services Committee hearing, May 13, prior to his nomination June 2 to be Secretary of the Army.***

Overlap in Europe

"Of the 28 members of NATO, 21 are EU [European Union] members. So why do we need duplicative organizations when there's such a major overlap in membership? This whole approach is detrimental to NATO and a distraction from what we should be doing."***—Geoffrey Van Orden, British Conservative member of the European Parliament on the emergence of a European Union military force,*** **Washington Times,** ***May 28.***

That's Fast

"Historically, we have thought in terms of conventional bombers. The reality is conventional bombers for global strike is probably not credible—they are too slow, they are too intrusive, and require too many permissions to get from point A to point B. ... [The low end capability for global strike] is probably any place on the face of the Earth in an hour. The high end is any place on the face of the Earth in about 300 milliseconds—that's cyber."***—Marine Corps Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff, Center for Strategic and International Studies, June 4.***

Primary Budget Casualty

"All the services are under stress, wearing out equipment much more quickly, and experiencing reduced readiness levels across the board. The Air Force and the Navy, however, have had to live with flat or declining budgets for the past several years. As a result, modernization is the primary budget casualty. Gradually, falling budgets have led Air Force leaders to sign up for a future fighter fleet that will force those in uniform to bear increased risk."***—Heritage Foundation senior policy analyst Mackenzie Eaglen, June 11.***

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The Kremlin seeks to exorcise the humiliation of its post-Soviet collapse.

Russia on the Rebound?

By Peter Grier

This year, Russia's Victory Day military parade was spectacular. The May 9 procession through Red Square proved to be the largest such event since the fall of the Soviet Union some two decades earlier.

The ceremonial demonstration began with a fanfare and the playing of a drum band from the Moscow Military Conservatory. Then, 9,000 troops from various training academies and military units wheeled by, marching 20 abreast. They were followed by T90 main battle tanks, road-mobile ICBMs, and dozens of other vehicular weapons.

The flyby came near the end. Sixty-nine fixed wing and rotary aircraft that had taken off from Moscow military airfields passed in precise sequence over the GUM department store, just off Red Square's centerline. The climax was a nine-ship diamond formation of the Russian Knights and Swifts display team of Su-27 and MiG-29 aircraft, which dropped decoy flares as they roared away.

Victory Day is meant to celebrate the Soviet Union's hard-won triumph over Nazi German forces of World War II, but Kremlin leaders have long used it to advertise their military and geopolitical ambitions. This year, President Dmitry Medvedev used the occasion to insist, with words and deeds, that Russia's military pride is back.

"Among the descendants of war heroes marching in the square are those who in actual battle have demonstrated the great fighting efficiency of the modern Russian Army," said

Photo by Mikhail Kuznetsov

A pair of Kamov Ka-52 attack helicopters over Red Square and the Kremlin.

Medvedev, referring to the Georgian conflict of August 2008.

Nearly 20 years after the dissolution of the USSR led to the virtual collapse of the Soviet Union's once-feared armed forces, today's Kremlin appears intent on building a truly modern Russian military.

Russia has raised defense spending every year since the late 1990s. Russia has increased its weapon modernization efforts, inching up its conventional capabilities year by year. Russian air defense systems and fighter aircraft, by the middle of the next decade, could well possess capabilities approaching those of US counterparts, say US officials.

Both President Medvedev and his predecessor, Vladimir Putin, have vowed to reform the ossified structure of Russian forces. Planned changes include deep cuts in the bloated officer corps and the introduction of a Western-style cadre of strong noncommissioned officers.

A Fundamental Shift

But the days of "Soviet Military Power"—the Pentagon's series of annual, glossy reports detailing the threat from the USSR—are not coming back. Today's Russian military efforts are taking place in a totally different economic and geopolitical environment.

The Kremlin's purpose is to exorcise the humiliation of the post-Soviet breakdown, and build forces capable of dominating their neighbors, say US officials. Despite Medvedev's words at the May parade, last year's incursion into Georgia revealed grave faults in Russia's military machine.

"As someone who used to prepare estimates of Soviet military strength for several Presidents, I can say that Russia's conventional military, although vastly improved since its nadir in the late 1990s, remains a shadow of its Soviet predecessor," wrote Secretary of Defense Robert M. Gates earlier this year in the journal *Foreign Affairs*.

During the days of Communist rule, the Red Army and other branches of the armed services occupied a unique and privileged niche in Soviet society. Revered for the great triumph in World War II, held up as defenders of the homeland against the decadent West, the armed forces were sacrosanct in official ideology and propaganda.

And they were huge. By the mid-1980s, the USSR had some 4.3 million personnel in uniform.

Then it all fell apart. The Victory Day parade, a staple of Soviet propaganda since the days of Stalin, was canceled. The last such Communist-era celebration was held in 1990.

With the dissolution of the Soviet state at the end of the Cold War, hundreds of thousands of troops were withdrawn from former client states in Eastern Europe, from portions of the Soviet Union that were suddenly independent nations, and from the Third World. Massive budget cuts and troop reductions threw hundreds of thousands of personnel out of work in a depressed economy. Troop strength fell to about 1.2 million.

"Weapons procurement virtually came to a halt in the 1990s," says a 2008 Congressional Research Service report on Russian political and security issues.

Defense spending reeled downward. Determining the Russian military budget is a difficult matter, given that official figures can understate it by a factor of 10. But by 1997, Moscow's estimated defense expenditures bottomed out at a ruble equivalent of $36 billion, according to an April 2009 British House of Commons study of Russia's military posture.

Then two things happened which helped to reverse the trend. Russia's economy recovered, particularly when oil and gas prices began to rise. And Putin became the Russian President, following Boris Yeltsin's sudden resignation at the end of 1999.

"The election of Vladimir Putin ... precipitated a fundamental shift in Russian society, its politics, its economy, and ultimately within its military," says the House of Commons study.

Putin is now Prime Minister, following two terms as Russia's President. The former KGB officer is an assertive nationalist, having famously lamented that the breakup of the Soviet Union was the greatest geopolitical disaster in history. His attitude toward the military as a symbol of national purpose perhaps can best be seen in the fact that he is the one who revived the inclusion of military hardware in the Victory Day parade, in 2008.

And Putin did it with style. In the later Soviet years, aircraft were often excluded from the celebration for safety reasons. No longer, not under Putin and Medvedev, his hand-picked successor.

Year by year, Putin has pushed up the defense budget, to an estimated $81 billion in 2007, the latest year for which full figures are available. That is about four percent of Russian GDP, according to British government estimates.

Russian defense spending still lags far behind current US or former Soviet levels. But under Putin, Russia has resumed development and production of some major weapons, such as the SS-27 ICBM and the Bulava SS-NX-32 submarine-launched ballistic missile.

Photo by Mikhail Kuznetsov

A Tupolev Tu-160 Blackjack strategic bomber, normally based at Engels Air Base, Saratov, lifts off from the runway at Kubinka Air Base. The Blackjack is to be upgraded, adding precision guided weapons capability.

Russia has been working on a fifth generation fighter project since 2002, the PAK FA, with Sukhoi as prime contractor. The new aircraft reportedly will be about the same size as the US F-35 but with twin engines, supersonic cruise, a small radar cross section, and extreme maneuverability.

Sukhoi's prototype Su-47 Golden Eagle fighter, meanwhile, has wowed air show audiences with its forward-swept wings and turning ability. The PAK FA will incorporate some of the advances from this test aircraft, according to Russian media, but will have a more traditional wing form.

Russia already has capable air defense equipment. The Russian SA-20 is similar to the US Patriot PAC-2 missile, but with a longer range and a radar "that is very effective in detecting stealthy aircraft," according to the Congressional Research Service.

Some Western analysts worry that a true fifth generation aircraft, in tandem with the SA-20, could present a dire military problem to US forces. But Gates, for one, says that concern is misplaced.

"Russia is probably six years away from initial operating capability of a fifth generation fighter," Gates told lawmakers this spring. "By then, we expect to have more than 1,000 fifth generation fighters in our inventory."

Readiness has gone up, particularly in rapid-deployment units, and in recent years the Russian military has begun again to engage in "show-the-flag" activities. These include overseas port visits by naval warships and long-range bomber patrols along the edge of US and NATO airspace.

Overall, "Russia is trying to re-establish military power that it believes commensurate with its economic strength and general political confidence," said Army Lt. Gen. Michael D. Maples, then Defense Intelligence Agency director, at a March Senate hearing.

But despite all the effort and money devoted to improvement in recent years, the Russian military is still far from the polished, efficient machine of Medvedev's Victory Day boast.

Russia's modern weapons are good, but they account for only about 10 percent of the military's capability, according to a British estimate. Waste and fraud remain rampant, eating up perhaps a third of the Russian defense budget.

Problems Exposed

Commanders routinely overstate the number of troops in their units, to increase food rations and equipment draws. Conscripts still account for at least half of Russia's military manpower, and they are often from the lower rungs of society, too poor or inept to evade service.

"Readiness and morale remain low, and draft evasion and desertion are widespread," according to the CRS report.

Maintenance of complex weapons is often neglected. An investigation into the December 2008 crash of a MiG-29 in Trans-Baikal territory found that the cause was heavy corrosion in the aircraft's load-bearing structure. The head of the Air Force's flight safety program subsequently said that a servicewide inspection of MiGs found that only 30 percent were corrosion free.

These problems, and more, were exposed by Russia's five-day war with Georgia in August.

While Russian forces prevailed, their shortcomings were obvious. Medvedev heard as much firsthand in a visit to the headquarters of the North Caucasus Military District after the fighting was over.

Vehicles routinely broke down on the advance into Georgian territory, the troops told Medvedev.

Reactive armor mounted on tanks was defective—and an estimated 75 percent of the tanks themselves were older T62 and T72 models.

Lt. Gen. Anatoly Khrulyev, commander of Russia's 58th Army, had to borrow a satellite phone from a journalist to speak with his troops—in the midst of combat—since his military communications equipment was inadequate.

A lack of air controllers attached to Russian ground units allowed Georgian multiple launch rocket systems to fire unopposed on Russian-occupied territory for 14 hours.

"Despite the best efforts of the Russian government to present the five-day war with Georgia ... as a military success, the 'victory' proved pyrrhic," write Dale Herspring, a political science professor at Kansas State University, and Roger N. McDermott, a military research fellow at the University of Kent at Canterbury, Britain, in a recent analysis.

As a result of the Georgian war experience, the Kremlin's high command launched a major shake-up of its military establishment. The reforms could be as sweeping as any carried out in Russia since the end of World War II.

"The future Russian military could well be unrecognizable to those who have watched the evolution of the Soviet or current Russian armed forces," write Herspring and McDermott.

Among the key items of the shake-up is a reduction in the military's size. Total personnel are to be cut to one million men by 2012. The officer corps is set to be slashed from 355,000 to 150,000.

The Russian military's 65 institutions of higher learning are to be

consolidated into 10 locations. Russian armed forces are to establish a noncommissioned officer corps as a basis for training and discipline—something they currently lack.

If all goes according to plan, units not fully manned are to be disbanded, and all remaining units put on permanent high readiness status. Ground forces are to be reorganized into a brigade system—eliminating division, corps, and army echelons.

The Air Force plans to eliminate all its divisions and regiments, replacing them with squadrons.

As to weaponry, by 2015 the Russian government says it will spend $190 billion on a modernization program that will replace 45 percent of its entire arsenal.

Planned new systems include the fifth generation fighter, a new RS-24 ICBM, a fleet of eight new Borei-class nuclear submarines, and upgrades for long-range bombers, including conventional precision guided munitions capability for the Tu-160.

Overall, the reforms appear intended to reorient the Russian military toward more localized conflicts.

"These reforms, if carried out, would improve Russian capability to respond to limited, regional threats, but reduce their capability for large-scale conventional war," Maples of the DIA told the Senate Armed Services Committee. "Making all residual forces permanently ready and establishing the brigade as the basic ground unit would facilitate rapid mobilization and deployment of these relatively compact units to threatened areas."

But will these reforms be carried out? That is a large and difficult question.

For one thing, the world economic crisis has hit Russia hard. Spreading recession is not the only problem; half of the Russian state's cash comes from oil and gas revenues. Falling petroleum prices have thus deprived the Kremlin of anticipated resources. Russian Defense Minister Anatoly Serdyukov in February announced that the 2009 defense budget was being cut by 15 percent.

Then there is the nation's poor health and demographic outlook. Russia has the overall worst health indicators of any industrialized country, with an average life expectancy of 58 years for men. Combined with a birthrate that fell sharply in the post-Soviet years, this means that the pool of draft-age young men is about to get much smaller.

Photo by Sukhoi via Aleksey Mikhnyov

An Su-35 fighter is shown here on its first flight in 2008. US defense officials believe that Russia is about six years away from fielding a fifth generation fighter. Planned new systems also include a fleet of Borei-class nuclear submarines.

By 2018, the number of Russia's eligible military recruits will be only half as large as it was in 2005, said Dennis C. Blair, Director of National Intelligence, at a February hearing of the Senate select committee on intelligence.

Opposition Within

Furthermore, with the exception of such niche areas as air defense systems, the largely state-run Russian defense industrial complex has been unable to keep pace with the technological changes that have swept through the West and even China.

"Russia has been adept at developing prototype advanced capabilities such as next generation fighter aircraft and unmanned aerial vehicles, but the ability of industry to mass produce those capabilities is severely lacking," according to the British study.

Finally, there is the opposition within. Institutions generally resist major changes to their culture, and the Russian military is no exception. Putin and Medvedev have sacked several top generals and defense officials, including the heads of military intelligence and the personnel directorate, over perceived opposition to proposed changes.

The tens of thousands of officers who are slated to lose their posts as the result of the shuffle are another possible source of push back. Officers with less than 10 years of service are to receive only a severance package. Those with more are slated to get an apartment, and perhaps a retirement package, as well. But the housing could well be in an outlying rural area, not Moscow or St. Petersburg. Retraining efforts are questionable, according to Western analysts.

"There are clear indications of unhappiness inside the officer corps," write Herspring and McDermott.

Still, Putin has been the defining leader of Russia's initial emergence from its Soviet past, and it might be unwise to bet against his and Medvedev's ability to push through changes they want.

Two years ago, Putin's choice of Serdyukov as Defense Minister was a surprising one, given that Serdyukov had virtually no military background. Many of Russia's generals were not happy with the choice. But Serdyukov is still on the job, and by many accounts has attacked corruption in the armed forces with vigor.

"The Russian military at present is far more frightening on paper than in reality," concludes Zoltan Barany, a University of Texas political scientist, in a Hoover Institution report on Russia's military prospects. "Nevertheless, the period of deterioration and stagnation seems to have ended and the recovery has begun." ■

Peter Grier, a Washington editor for the Christian Science Monitor, *is a longtime defense correspondent and a contributing editor to* Air Force *Magazine. His most recent article, "CyberPatriot Smackdown," appeared in the June.*

USAF photo by Margo Wright

High Velocity Maintenance

If all goes as planned, this new initiative will cut the time that airplanes are out of service.

By Megan Scully

Beset by the manifold problems of an old fleet, the Air Force has launched a pilot maintenance program that USAF logistics officials hope will dramatically transform the way the service keeps up its air vehicles and systems.

The effort has been dubbed High Velocity Maintenance, or HVM. It is part of a broader campaign within USAF's air logistics centers to cut the amount of time that aircraft spend parked at depots undergoing overhaul and repairs.

The Air Force has started out small—with one special operations C-130 Hercules at Warner Robins Air Logistics Center, Ga. Even so, Air Force officials have high expectations for the overall effort.

Debra K. Walker, who is the Air Force's acting assistant secretary for installations, environment, and logistics, claimed, "It's going to completely revolutionize the way we perform overhaul on our airplanes."

The HVM concept emerged from the US commercial sector, as have many recent initiatives to streamline depot maintenance. The idea is to bring aircraft to air logistics centers on a more frequent basis but for shorter periods. Rather than overhaul the entire airframe, the theory goes, maintainers would service parts of the aircraft in a sequential fashion. Under this plan, aircraft would enter a depot once every 18 months or so instead of once every five to six years.

For the C-130, every 18 months the aircraft would go into the depot for 12 to 15 days, rather than the 160 days the cargo aircraft now sit at the depots.

In addition to reducing an airplane's out-of-service time, the more frequent checkups would give Air Force maintainers better insight into the effects of heavy usage on the fleet. This should decrease the number of surprises that have become common occurrences after nearly two decades on a war footing.

While the details of the program are still being hashed out, Walker indicated that the Air Force could also do inspections and most phased maintenance at the depots while maintainers conduct the periodic repairs.

"So that's going to take the work off the flight line, allow them to focus on sortie generation, not focus on inspections and repair," Walker said.

Operational statistics bear out the importance of sortie generation for today's Air Force. In 2008, USAF flew some 61,000 sorties over Iraq and another 37,000 sorties over Afghanistan. That works out to about 265 sorties per day, said Gen. Norton A. Schwartz, the Air Force Chief of Staff, in May 21 remarks to the Senate Armed Services Committee.

In testimony this year, Schwartz and Michael B. Donley, the Secretary of the Air Force, noted that the service's aged fleet requires "focused attention." Indeed, the Air Force over the past two years has grounded large numbers of F-15 and F-16 fighters, A-10 attack aircraft, C-130 transports, and T-6 trainers, not to mention having experienced problems with C-5 transports and KC-135 aerial tankers.

The two top USAF officials asserted, "The skill and determination of our maintainers have ensured that we return aircraft to service as quickly as possible, but two percent of the fleet remains grounded and many aircraft fly restricted profiles."

Problems enveloping Air Force special operations force aircraft probably are the most serious, but operational wear and tear is widespread. Even the workhorse C-17, a relatively new aircraft that is still in production, is seeing problems earlier than anticipated.

Wing cracks grounded some 130 A-10s—more than one-third of the fleet—last year.

Above: A KC-135 undergoes depot maintenance at Tinker AFB, Okla. Right: SSgt. Albert Zaletel works on the closure beam of an F-16 at Hill AFB, Utah.

For all that, the Air Force in recent years has seen a marked decrease in depot "flow days." Heavy investments in advanced depot facilities and equipment since 2004, combined with process improvements, have contributed to more streamlined and efficient air logistics centers.

Initiatives include formal training programs to develop more skilled technicians and managers, benchmarking programs to identify industry leaders in various production processes, and making so-called "lean" business practices the norm.

The Air Force must continue to develop new ways to seek greater efficiencies out of its depots, according to the US Air Force Depot Maintenance Strategic Plan, issued in April 2008.

"Our success is contingent upon the ability of our people and organizations to adopt new, relevant operational concepts and processes, suitable to the dynamics of an integrated strategic enterprise," according to the strategy. "To succeed, the [Air Force] must continuously validate and update our strategy across the ends, means, ways, and risk framework."

The HVM concept amounts to an outgrowth of those previous efforts, as well as a reaction to both the constant use of the airframes and the heightened age of the aircraft. The average age of an aircraft in USAF's total fleet is now 24 years—the highest in service history. The average age is expected to grow to 26.5 years by 2012, projects Air Force Materiel Command.

USAF photo by G.A. Volb

If all goes as planned, the HVM program will do much to prevent problems such as one that Walker witnessed on a recent trip to Warner Robins ALC. There, a C-5B in the hangar had not been to the depot in six years. Its overhaul was supposed to take 50,000 hours of work, but, because of unexpected problems, the program quickly grew to require 70,000 hours of work.

"That is significant and the reason why is [because the depot] hadn't seen that airplane in six years," Walker said. "So you want to continuously look at that airplane. You want that engineering assessment. You want the feedback from the field as to what's happening in it, and look at it and catch it before it becomes a big, difficult problem—before it becomes a grounding situation."

The Air Force first started down the path to HVM in Fiscal 2007, when officials outlined the concept in a paper. To flesh out the concept, the Air Force that year established a team comprising experts at Warner Robins and representatives from Air Force Special Operations Command. By the end of 2007, the team had twice briefed senior Air Force officials.

Testing the Concept

"Since that time, the [high performance team] has been identifying lean events and projects required to implement an HVM proof of concept prototype," according to an Air Force fact sheet on the effort.

Now begins the test of the concept itself. "We're going to see if we have the right data, if we can develop the right repairs, if we can get the parts support," Walker said.

For the pilot program, Warner Robins officials will go through the airplane and determine the parts that are needed and if the concept itself works. If successful, the Air Force will put a "couple more" C-130s through HVM within the next year, in the hopes of being at "full blown" in October 2010, Walker said.

Air Force Special Operations Command, Walker said, has been "very supportive" because it has a low-density, high-demand fleet. In short, special operators don't need airplanes at the depot—they need them out in the field.

If successful, the results would be tangible. According to the Air Force, a successful HVM program would return 52 to 55 C-130s to their operational wings. Currently, there are typically 70 C-130s unavailable at any given time, so increased availability has almost the same effect as buying new aircraft.

The Air Force, meanwhile, has already designated another aircraft for HVM: the B-1B bomber, which has had its own share of maintenance woes. Last year, more than half of the fleet was down for some form of maintenance.

In April, senior officials from Air Force Materiel Command, Air Combat Command, and the Air Staff gave the HVM team at Tinker AFB, Okla., approval to proceed with a B-1 HVM pilot program. The team has developed a detailed schedule for the program, in the hopes of implementing it as early as next October.

In 2008, for example, the B-1 fleet averaged 28 aircraft available—with 36 "Bones" down for some type of maintenance at any given time. That rate is "unacceptable, and that's why we're doing HVM," said Sam Malone, deputy director of the 427th Aircraft Sustainment Group at Tinker—the unit responsible for the B-1B fleet's depot maintenance and repair work. "Our case for change is all the B-1s trapped in maintenance right now," he added.

Unscheduled maintenance causes the biggest delays. The HVM processes are designed to "ensure the mechanic doesn't have to wait," he said. Some problems will be fixed right away, while others will be documented and deferred—helping maintainers fix the aircraft on their schedule, not that of the aircraft's components.

Similar to the C-130's HVM program, a B-1B would visit the depot for heavy maintenance four times in five years, with two light maintenance cycles performed in the field between visits.

It is unclear how many types of aircraft could benefit from shifting to the HVM process. But it appears, at least for now, that larger aircraft are best suited for HVM, Walker said.

Air Force officials expect implementing HVM to incur some costs, but they hope the program will ultimately generate overall savings—in addition to driving up aircraft availability rates.

Officials say the service most likely couldn't have taken on new initiatives such as HVM without the increased investment in its depot facilities, equipment, and other capital needs over the last five years.

Prior to Fiscal 2004, the level of capital investment—excluding maintenance and repair costs—averaged just three percent of revenue, or about $140 million annually.

Based on the commercial benchmark of six percent, the Air Force funded an additional $150 million a year starting in 2004. The plan initially was to continue that level of funding just through Fiscal 2009, but Congress intervened and, in Fiscal 2007, required the Air Force to maintain that level of investment indefinitely.

"I think it's phenomenal," Walker said. "It allows [the depots] to be much more efficient. And, obviously, if we can increase the throughput, you can take down the

USAF photo by Margo Wright

Maj. Tim Hines (l) and Maj. Cary Montgomery ferry a B-52 to Tinker Air Force Base for depot maintenance. The HVM program will begin with the C-130 and B-1, but other large aircraft are candidates.

cost and increase aircraft availability. To me, that's the responsibility of the Air Force depot."

AFMC has a "fairly robust process in place" to evaluate the return on investment—not just in financial terms, but also in terms of warfighter support, she said. The six percent investment, she added, seems like the right amount to put into the depots annually.

"I think that you need to ensure you're buying the right things with that six percent," she said. "I don't think it's too much if you're making the right investment in the right place."

"By embedding these initiatives into the maintenance culture, reductions are being made in shop flow days and cost," according to the Air Force's Fiscal 2010 budget documents.

Over the last five years, the Oklahoma Air Logistics Center at Tinker reduced programmed depot maintenance flow days for the B-1 bomber by 30 days, or 18 percent.

Ogden Air Logistics Center officials at Hill AFB, Utah, meanwhile, reduced the A-10 wing, F-16 wing, and F-16 stabilizer repair flow days by 39 percent. On-time delivery for A-10 wings is now 100 percent, and only slightly less—98 percent—for F-16 wings.

On the C-5 Galaxy, which is worked on at Warner Robins ALC at Robins AFB, Ga., the Air Force has reduced overhaul flow days by 103 days, or 31 percent. Doing so has freed up floor space for additional workload at the depot.

Meanwhile, the Air Force is working to decrease the flow days on its Eisenhower-era KC-135 tanker fleet to 120 days, Walker said. That would represent a 40 percent reduction—those aircraft now spend close to 200 days in depot.

Despite the recently improved efficiency, Air Force depots still face serious future challenges. Perhaps none of those challenges has been documented as well as the service's efforts to properly maintain its nuclear forces.

The Air Force is still working to correct problems with its handling of nuclear material—which, at least in part, involved depot work. Two general officers at Ogden were among the 15 senior Air Force officers disciplined in connection with the errant shipping of nuclear missile nose cone components to Taiwan in 2006.

More To Do

Problems identified at Ogden included ineffective command oversight of depot maintenance, engineering activities, and material control of sensitive components, a failure to adequately address logistics policy deficiencies, and failure to correct issues with intercontinental ballistic missile logistics.

"Just this last weekend, we were back at Ogden Air Logistics Center reviewing the progress made there over the past year in the handling of nuclear-related materials," Donley told a House panel in June. "They have made progress there, but there is more to do."

Donley added that USAF does not yet have all the automated systems it needs to "help us with end-to-end accountability and get us out of the paper environment."

As she looks at the state of the depots, Walker sees mostly positive signs. Still, she acknowledged, there are areas for improvement. The need to move away from mountains of paperwork isn't exclusive to the nuclear fleet. "We still have too much paperwork," she said, and this can hamper and slow down work at the depots.

The Air Force, Walker added, also needs to get its enterprise logistics and procurement system, the Expeditionary Combat Support System, deployed. Doing so would give logisticians new insight into deployed parts and other data.

"That is absolutely critical," she said.

ECSS, which would replace 250 legacy logistics and procurement systems when it is fully operational in Fiscal 2013, provides a single, integrated logistics system that includes transportation, supply, maintenance and repair, and other key business information.

Walker also would like to see the air logistics centers more involved with the private sector during the development of software for weapons systems. Today, the depots have to replicate the equipment in order to maintain the software.

The Air Force also faces some challenges in its supply chain—particularly on spare parts obsolescence as aircraft get older.

Meanwhile, Walker said she hopes for continued investments in technologies for depots—including potentially, one day, equipment that could see through multiple substructures on an airplane to diagnose a problem without taking the aircraft apart.

But, perhaps most importantly, Walker stressed the need to continue assessing industry best practices for application in Air Force depots.

"You tend to, as you do AFSO21 and lean, you think, 'I'm done. We're good. We're better than so-and-so,'" she said. "We'll never be done. We can always get better."

The stakes are too high for the Air Force depots to be satisfied with the progress so far.

"We continue to say, 'What else can we do?'" said Walker, "because we need to meet a certain aircraft availability in the Air Force. We are a key component to that because every moment the airplane's in the depot, it's not in there helping us in the fight." ■

Megan Scully is the defense reporter for National Journal's CongressDaily in Washington, D.C., and a contributor to National Journal *and* Government Executive. *Her most recent article for* Air Force *Magazine, "The State of the Arsenal," appeared in the July issue.*


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His spectacular combat run lasted just 18 days before he flew into myth and mystery on his last mission.

The Legend of Frank Luke

By John T. Correll

The afternoon train on July 25, 1918 brought four replacement pilots for the American 1st Pursuit Group based at the small French town of Saints, 19 miles southwest of Chateau-Thierry.

One of them was 2nd Lt. Frank Luke Jr., 21, of Phoenix, who had won his wings six months earlier. He had arrived in France in March, completed his advanced training at the US Aviation Instruction Center at Issoudun, and spent several weeks as a ferry pilot at Orly Field outside Paris, awaiting an operational assignment. He was eager to begin his combat tour.

The armistice, which would end World War I, was three months away. Luke would not live to see it, but his actions during two-and-one-half extraordinary weeks in September would earn him a lasting place in history. In that brief span, he shot down 14 German balloons and four German airplanes. For a while, Luke was the most famous airman in America and the leading American ace of the war, promoted by newspapers in the United States as the "Arizona Balloon Buster."

In the final tally, he was the second-ranking US ace of the war and the first airman ever awarded the Medal of Honor.

Second Lt. Frank Luke Jr. with his biplane in the fields near Rattentout Farm, France, on Sept. 19, 1918.

The true story of Luke's exploits was soon engulfed by legend and myth. This was not entirely the doing of freewheeling writers of popular books and articles. Eyewitness accounts of Luke's death in battle on Sept. 29 disagreed about what had happened. Even the citation for Luke's Medal of Honor got the facts wrong. Ninety years later, historians are still trying to sort it out.

When he reported in at Saints, Luke was assigned to the 27th Aero Squadron, one of four squadrons in the 1st Pursuit Group. The 27th had been at

Saints for only a few weeks, having moved forward to be closer to the front lines. It had seen hard fighting during the German offensive that summer and would have a leading role in the battle for the St. Mihel Salient, which was about to begin.

The squadron was still flying Nieuport 28s when Luke arrived, but it was re-equipped a week later with the French-built Spad XIII, the best Allied fighter of the war and an able match for the best German fighter, the Fokker D.VII.

Luke was an excellent pilot. Earlier, at the School of Military Aeronautics in Texas, he had finished the course in seven weeks instead of the regular nine. He was the first in his class to solo. At Issoudun, he was at the head of the class in flying and second in gunnery.

However, his first days in the 27th Squadron gave no indication of the heroism to come. Anything but. Luke was self-confident and brash, but also driven by desire for fame and glory. He wrote to his sister, "I will make myself known or go where most of them do."

Luke, who had yet to fly a combat mission, alienated the veteran pilots in the squadron by bragging about how many Germans he was going to shoot down. He made it worse on a patrol in early August. He was part of a formation assigned to protect two Salmson reconnaissance aircraft but broke away to go chasing enemy aircraft on his own, later claiming that he had "engine problems." No one believed him. He became known in the squadron mess as "the Arizona Boaster." Luke claimed to have shot down a German airplane on Aug. 16, but there were no witnesses and his claim was not confirmed.

Luke had only two friends in the 27th: Lt. Joseph Fritz Wehner, with whom he shared a room, and Maj. Harold E. Hartney, the squadron commander. Hartney, a Canadian, was an ace with five victories in the Royal Flying Corps before he accepted an appointment to the American air arm. He was made a US citizen by Presidential order in September 1917, promoted to major, and assigned to command the 27th Squadron. Hartney was not a strict disciplinarian. He liked Luke and gave him a great deal of leeway. Luke also managed to build cordial relationships with a few pilots in other squadrons, including the rising star of the 94th "Hat in the Ring" Squadron, Edward V. Rickenbacker.

On Aug. 21, Hartney was promoted to command of the 1st Pursuit Group. The new commander of the 27th was 1st Lt. Alfred Grant, a strict, by-the-book officer who enforced military discipline. He expected pilots to stay in formation and fly as part of the squadron. Luke, who was determined to fight his war his way, was on a collision course with his squadron commander.

The front lines were shifting rapidly, and on Aug. 30, the entire 1st Pursuit Group relocated to Rembercourt, near Verdun, closer to the fighting. Flying from there on Sept. 12—alone as usual—Luke found and destroyed a German observation balloon, his first aerial victory. Keenly aware from the denial of his previous claim of the need for confirmation, he landed at an American balloon site and got written statements from two officers who bore witness to his shootdown.

Enter the Dragon

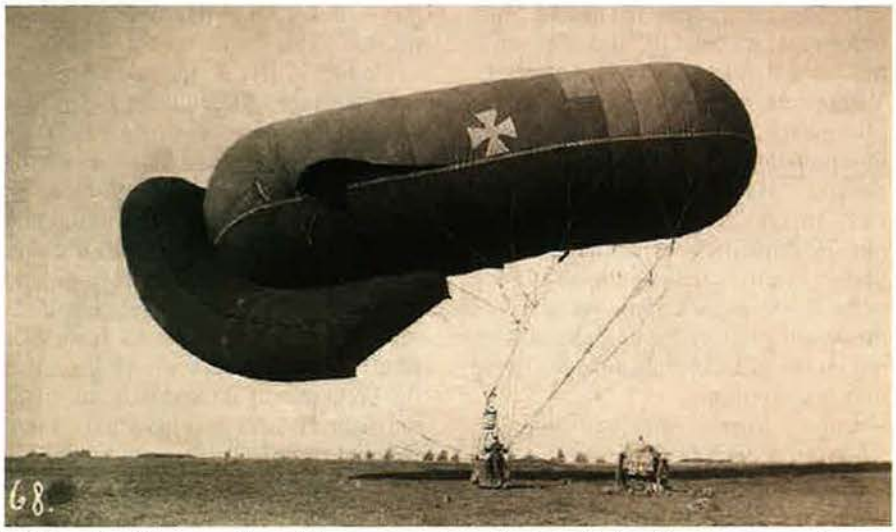
Both sides in World War I used observation balloons to correct artillery fire against enemy trenches. The big sausage-shaped German balloons were called Drachen ("Dragon") and were organized into Ballonzug (balloon companies or detachments). The credit for shooting down a balloon was the same as for an enemy airplane.

Attacking tethered balloons may sound like shooting fish in a barrel. In actuality, it was more dangerous and difficult than attacking airplanes or targets on the ground. The Drachen were heavily defended with anti-aircraft cannons, machine guns, and infantry small arms. The German guns, with an effective range of 12,000 to 14,000 feet, were lethal against approaching airplanes. Phosphorus AA rounds, called "flaming onions," burned as they rose in the air, and could set airplanes afire. The Spad, built of wood and doped fabric, offered no protection even against small-arms fire. The balloons were filled with hydrogen but they were not easily destroyed. A pilot might have to attack several times before setting the balloon afire.

The balloon threat loomed large in the minds of American soldiers. "The enemy balloons, although they did little actual good to their troops, were a source of constant irritation to our ground troops," said Col. William Mitchell, commander of the Air Service combat forces. "If a soldier on the ground saw any hostile aircraft in the sky, no matter how impotent it might be, he at once conceived the idea that, as a result, the enemy could direct his artillery fire against the reserves that were coming up from behind to help him."

Mitchell ordered Hartney's 1st Pursuit Group to attack and destroy the German balloons. In an excess of optimism, Hartney assured Mitchell that his pilots would destroy every balloon in the German line. Each squadron picked designated pilots for the task. The prescribed tactic was to send two airplanes, one high to protect the other and the lower one flying along close to the ground to attack at dusk or at night. The 27th Squadron chose Luke and his friend Wehner for the balloon mission. Sometimes Luke attacked alone, sometimes with Wehner flying his wing.

In the next two weeks, even Luke's worst enemies would have to admit that they may have misjudged him. Luke had a big mouth and he resisted military discipline, but two qualities he



Tethered balloons such as this one were heavily defended by German ground forces and anti-aircraft weapons. Shooting one down was no easy task.

Maj. Harold Hartney (shown here as a lieutenant colonel), Luke's squadron commander and later his group commander, was fond of the brash young pilot and took pains to protect him from the heated tempers of the other members of his squadron.

had in abundance: courage and combat flying ability.

Luke bagged two balloons on Sept. 14, diving on one of them six times before it went down. The next day, he shot down three more balloons. With six confirmed victories, he was now an ace. On Sept. 16, Mitchell came to Rembercourt, where Hartney had Luke and Wehner stage an exhibition for him. Two German balloons were visible on the horizon. The pilots told Mitchell they would destroy one at 7:15 p.m. and the other at 7:19. They took off into the dusk, and the explosions lit up the evening sky within seconds of the promised times. Mitchell was impressed.

On five occasions, Luke returned with so much battle damage that he had to use a new airplane for the next mission. Sgt. Jesse Saunders, a mechanic in the 27th Squadron, said that Luke "had more guts, more skill, and less sense than any man I ever saw." Lt. Jerry C. Vasconcells, a much-respected senior pilot in the squadron, had a different interpretation. "It isn't courage exactly," he said. "He has no imagination. He can't imagine anything happening to him. He thinks he's invincible. If he ever finds himself, he may be almost as good as he thinks he is." Some members of the squadron may have changed their minds about Luke, but most still held him in contempt.

Luke's biggest day was Sept. 18, when he scored five victories in less than 10 minutes. Over St. Mihel, Luke dropped down to destroy two balloons while Wehner circled above. Almost immediately, they were engaged by Fokker D.VIIs. Luke shot down two of the German airplanes but he and Wehner were separated in the swirling battle. Headed home, Luke encountered a Halberstadt observation airplane and shot it down southeast of Verdun. However, one of the Fokkers, flown by a leading German ace, shot down Wehner, who was killed.

Fame Calling

Luke now had 13 confirmed victories, putting him ahead of Rickenbacker, who had eight. Luke's five victories became front page news in the *New York Times* Sept. 20. The Phoenix Chamber of Commerce cabled congratulations. Luke took off and landed when he wanted to, and often left the field or was absent without leave. "Luke was flagrantly flaunting this position as the Ace of Aces," said historian Blaine Pardoe in *Terror of the Autumn Skies*. Hartney protected his star pilot.

Hoping to give tempers some time to cool, Hartney ordered Luke away from the squadron for five days of leave. When Luke returned on Sept. 25, he resumed his familiar habits, flying off alone to hunt balloons without permission and without filing a flight plan. On Sept. 28, he shot down another balloon and a Hanover CL ground attack airplane, raising his victory total to 15. Instead of returning to Rembercourt, he landed at the French field at Cigognes and spent the night. He later gave his usual reason: "engine trouble."

Luke returned to Rembercourt the next morning. Sept. 29, and was confronted by Grant about where he had been. A row ensued. Luke claimed to have permission from Hartney to fly when he pleased and specific authorization to fly a balloon busting mission that day from the squadron's advanced base at Verdun. It was not true, but Hartney covered for him again.

Hartney had a problem. As historian Stephen Skinner has said, "The loss of the United States Air Service's top scorer to an insubordination charge would be a public relations nightmare." Furthermore, Hartney was under pressure from Mitchell to rid the sector of German balloons as he had promised. Still, Luke's behavior had become too notorious to ignore, and Hartney had a duty to support Grant.

Grant decided to force the issue by grounding Luke with a written order that would be difficult for Hartney to avoid supporting. Luke took off without permission before the order could be drawn up. Grant called the field at Verdun with instructions to hold Luke if he showed up. Luke did indeed turn up at Verdun, where Vasconcells, commanding the squadron's B flight, was in charge. The order to hold Luke was superseded when Hartney arrived at Verdun that afternoon. Hartney chided Luke a bit, but Luke was allowed to go balloon hunting again that evening, with Hartney's tacit approval.

Luke took off shortly before 6 p.m. He passed low over the US 7th Balloon Company at Avocourt, where he dropped a message weighted with a piece of metal and with a white streamer attached. It said: "Watch for burning balloons. Lt. Luke." He wanted confirmation for any balloons he might shoot down.

With that, he flew east, across the Meuse, then swung northwest along the German balloon line. At 6:38 p.m. near Gremilly, he attacked a Drachen that failed to ignite but fell to the ground with hundreds of bullet holes in it. Minutes later, he found and attacked another balloon, which exploded. Witnesses confirmed a third balloon destroyed near the small town of Murvaux just before 7 p.m.

Nothing further was heard from Luke. He did not return from the mission that night. He was declared missing in action and nothing more would be known of his fate for months. Rickenbacker retook the lead in aerial victories to be the top-scoring American ace of the war. The armistice on Nov. 11 ended the fighting.

On Nov. 20, Grant, prodded by Hartney, nominated Luke for the Medal of Honor. Luke was promoted posthumously to first lieutenant. At this point,

Luke's story crossed over into the realm of mystery and myth. What happened on that last day has been the subject of speculation, exaggeration, disagreement, and doubt ever since.

It was not until January 1919 that details about Luke's death began to emerge. A graves registration unit located the remains of an unknown aviator killed Sept. 29 in Murvaux. The airman was subsequently identified as Luke.

Early reports, filed by officers who spoke no French, quoted local inhabitants as saying the aviator had killed 11 Germans in a strafing attack, was shot down, and then fought on the ground until he was killed. An affidavit signed by 14 citizens of Murvaux was later called into question when it was discovered that villagers had lined up to sign the document on the back side without turning it over to see what it said on the front. Another officer, who did speak French, reinterviewed the witnesses, who told him that no shots had been exchanged. Yet another visiting American officer reported that Luke, using two pistols, had killed seven Germans. There is also doubt about how much the village people could actually see, since the action occurred 100 yards to a quarter-mile away, near sundown.

The Medal of Honor nomination, submitted the previous November, was still working its way through the system when the barrage of reports from Murvaux hit Air Service headquarters in France. There, a junior officer rewrote the nomination. The revised text of the citation made only passing reference to the content of the original write-up, the high-risk missions in which Luke destroyed 18 enemy airplanes and balloons. The new emphasis was on the last day in Murvaux, where Luke, supposedly pursued by eight German airplanes, killed six Germans on the ground in a low-level attack, made a forced landing, and "surrounded on all sides," drew his pistol and "defended himself gallantly until he fell dead from a wound in the chest." On that basis, the Medal of Honor was approved and presented on May 29, 1919 to Luke's father in Phoenix.

The story has been told many times, usually with embellishments and errors. One version had Luke killing 11 Germans in an epic gun battle. An article in *Air Force* Magazine in 1955 claimed that Luke was attacked by 10 Fokkers, which he fought for "a full five minutes," shooting down two of them. The version of events currently posted on the Internet by the US Air Force says Luke was wounded in an air engagement with Fokkers, but instead of returning to base for medical care, he continued on to other targets, crash-landed at Murvaux, drew his pistols instead of surrendering, and "was killed in a gun battle."

The facts of Luke's last hours have been established with reasonable certainty, thanks to the work in the 1960s of Royal D. Frey, chief of the research division at the Air Force Museum, and especially the research of Skinner, who spent years studying original documents, visiting the area, and analyzing the evidence in relentless detail for his book, *The Stand: The Final Flight of Lt. Frank Luke Jr.*, published last December.

How It Happened

It was still daylight when Luke reached Murvaux, 37 miles north of Verdun. Sunset on Sept. 29 was at 7:06 p.m., with twilight until 7:38. The little town lay in a valley running east and west, with a small stream, Bradon Creek, flowing through it. On the north side of the valley was a high hill, the Cote St. Germain, which bristled with German guns.

Luke's last target was Ballonzug 35, a mile west of Murvaux and 109 yards beyond the western end of the big hill. The Drachen was tethered at 1,312 yards.

Luke approached from the east, on the north side of the hill, which he used as a screen. To attack, he crossed over the western tip of the hill and bore down on the Ballonzug. As he cleared the crest, every gun in the area opened up on him. Luke flew unharmed through the defenses and set the balloon afire on his second pass. Then he flew eastward along the south side of the Cote until he reached Murvaux and got his bearings. Just beyond the village, he turned and headed back west. The big hill was now on his right.

At that point, his luck ran out. He was hit and mortally wounded in the air by a machine gun on the Cote, firing from above him and to his right. (It is often claimed that Luke was shot down by gunners at the balloon site. The Ballonzug 35 batteries, on the ground shooting upward, could not have inflicted Luke's wound, which was inflicted from above. Also, the balloon site was two miles west of where Luke's airplane came down, headed west.)

Luke was hard hit. He landed his Spad in the valley, ran toward Bradon Creek, and collapsed 221 yards from his airplane. He had one sidearm, a 1911 Colt semiautomatic with seven rounds in the clip. He probably fired three shots. It is possible but not likely that Germans returned fire. The big gunfight, as imagined, did not happen. According to Skinner's reconstruction of events, Luke began his attack on the balloon at 6:55 p.m. and died at 7:04.

The next day, Luke was buried in a shallow grave near the village church. His Spad was dismantled and hauled away by the Germans. After the war, Luke was reburied in the American Meuse-Argonne Cemetery, 10 miles from Murvaux. In addition to the Medal of Honor, he was awarded the Distinguished Service Cross and the Italian War Cross.

Luke has not been forgotten, either in France or in the United States. In 1957, the 388th Fighter-Bomber Wing put up a monument to Luke just west of Murvaux. It deteriorated in the ensuing years, but was restored in 2000.

Luke Air Force Base is named for him, as is the Frank Luke Chapter of the Air Force Association in Phoenix. His statue stands on the grounds of the Arizona state capitol. In 1930, the American Society for Promotion of Aviation named Luke America's greatest air hero. The Air Force Academy Class of 2010 chose Luke as its class exemplar. His old squadron, the 27th, is still active at Langley AFB, Va., and was the first combat squadron to fly the F-22 fighter.

"No one had the sheer contemptuous courage that boy possessed," Hartney said. "He was an excellent pilot and probably the best flying marksman on the Western Front. We had any number of expert pilots and there was no shortage of good shots, but the perfect combination, like the perfect specimen of anything in the world, was scarce. Frank Luke was the perfect combination."

The highest praise came from Rickenbacker, who declared Luke to be "the most daring aviator and greatest fighter pilot of the entire war." Rickenbacker noted Luke's unsurpassed combat effectiveness—18 victories in only 10 sorties flown on eight different days—and said, "No other ace, even the dreaded Richthofen, had ever come close to that." ■

John T. Correll was editor in chief of Air Force *Magazine for 18 years and is now a contributing editor. His most recent article, "But What About the Air Corps?," appeared in the July issue.*

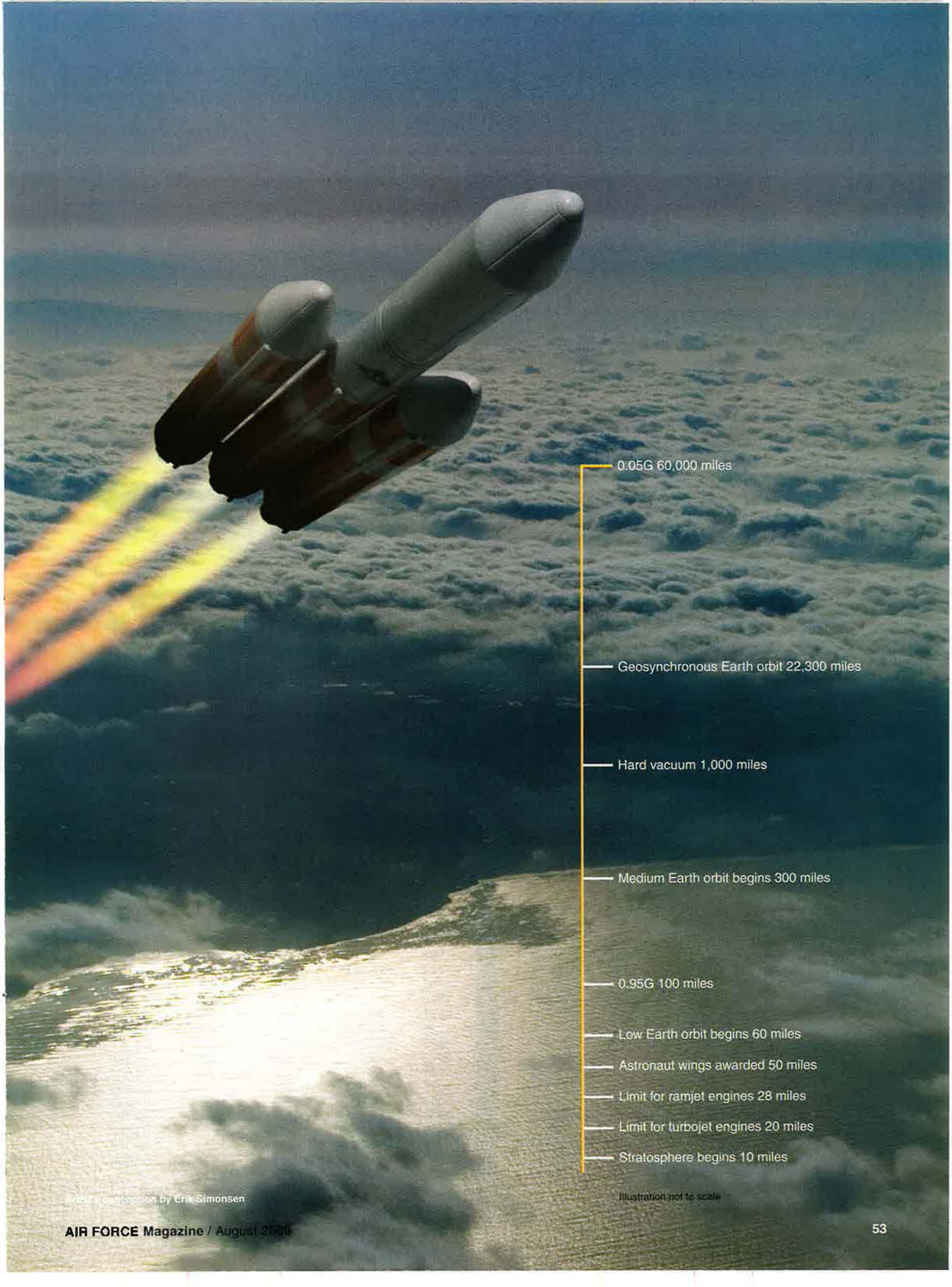
2009 Space Almanac

The US military space operation in facts and figures.

Compiled by **Tamar A. Mehuron,** Associate Editor, and the staff of *Air Force* Magazine

This almanac was compiled by *Air Force* Magazine, with assistance and information from Celinda Marsh, OMB, Science and Space Branch; researcher Joseph J. Burger; researcher Jeremy Singer; and US Strategic Command and Air Force Space Command Public Affairs Offices.

Figures that appear in this section will not always agree because of different cutoff dates, rounding, or different methods of reporting. The information is intended to illustrate trends in space activity.



Artist's conception by Erik Simonsen

US Military Missions in Space

Space Support
Deploy, launch, and sustain military and intelligence systems in space.

Space Force Enhancement
Provide satellite command and control communications, positioning, navigation, and timing; environmental monitoring; missile warning; and intelligence-surveillance-reconnaissance to the warfighter as well as support other intelligence, civil, and commercial users.

Space Control
Ensure freedom of action in space for the US and its allies and, when directed, deny an adversary freedom of action in space.

Space Force Application
Provide capabilities for the application of combat operations in, through, and from space to influence the course and outcome of conflict.

US Space Funding

Figures in millions of constant Fiscal 2009 dollars

Year	NASA	DOD	Other	Total
1959	1,932	3,627	252	5,811
1960	3,363	4,083	313	7,759
1961	6,673	5,866	490	13,029
1962	12,822	9,261	1,420	23,503
1963	25,540	10,918	1,810	38,268
1964	34,877	11,118	1,481	47,476
1965	35,163	10,772	1,649	47,584
1966	33,686	11,233	1,423	46,343
1967	31,157	10,734	1,374	43,266
1968	27,425	11,899	1,078	40,402
1969	22,428	11,812	1,000	35,240
1970	19,692	9,316	783	29,790
1971	16,490	8,040	861	25,391
1972	15,824	7,250	687	23,761
1973	15,007	7,875	715	23,597
1974	12,060	7,719	691	20,470
1975	11,679	7,580	632	19,891
1976	12,213	7,509	637	20,359
1977	12,232	8,576	688	21,496
1978	11,973	9,048	747	21,767
1979	11,965	9,014	736	21,716
1980	12,243	10,066	605	22,913
1981	11,839	11,450	556	23,845
1982	12,345	14,916	698	27,959
1983	13,694	19,517	708	33,918
1984	14,229	21,152	819	36,200
1985	13,868	25,570	1,169	40,607
1986	14,081	27,762	937	42,780
1987	18,608	30,897	884	50,388
1988	15,165	32,216	1,350	48,732
1989	17,557	31,136	974	49,667
1990	18,906	25,763	834	45,503
1991	20,655	22,452	1,223	44,330
1992	20,289	23,092	1,226	44,607
1993	19,496	21,051	1,091	41,638
1994	18,941	19,151	920	39,012
1995	17,747	15,061	1,074	33,882
1996	17,266	15,817	1,137	34,220
1997	16,728	15,747	1,060	33,535
1998	16,285	16,335	1,110	33,729
1999	16,112	17,075	1,270	34,457
2000	15,660	16,185	1,320	33,166
2001	16,186	17,430	1,292	34,908
2002	16,610	18,848	1,432	36,891
2003	16,809	22,695	1,528	41,032
2004	16,324	21,787	1,669	39,780
2005	16,804	21,872	1,707	40,383
2006	16,839	23,621	1,759	42,219
2007	16,176	23,293	1,746	41,214
2008	16,519	24,820	1,696	43,034
Total	**$848,183**	**$790,028**	**$51,565**	**$1,648,437**

The Year in Space

July 21, 2008
Defense acquisition chief John J. Young Jr. directs DOD offices to consider building fewer Space Radar satellites and buying foreign commercial satellite radar imagery.

Aug. 29
RapidEye AG launches a five satellite imagery constellation aboard a single DNEPR-1 rocket. Pentagon officials say the RapidEye constellation is one option for meeting some of the requirements assigned to Space Radar.

Sept. 6
GeoEye-1, the highest-resolution commercial Earth-imaging satellite, enters orbit following launch from Vandenberg AFB, Calif. The National Geospatial-Intelligence Agency funded its development and procurement.

Sept. 28
The Falcon 1 rocket, seen as a key launcher of small satellites under the Operationally Responsive Space program, puts into orbit a SpaceX satellite.

Oct. 8
Air Force officials announce that Air Force Space Command will shift ICBMs to Global Strike Command, one of several steps to strengthen and consolidate the Air Force's nuclear mission.

Oct. 24
A Delta II launcher at Vandenberg boosts into orbit a Thales Alenia-Space satellite, COSMO-SkyMed 3, for civilian-military use.

Nov. 12
USAF accepts the first Space Based Infrared System HEO (Highly Elliptical Orbit) payload and ground system into operational service. The Lockheed Martin system had successfully completed trial operations, in which live data was inserted into operational networks.

Jan. 7, 2009
Boeing announces that it has reconfigured a UHF Follow-On Satellite that services a variety of military users at fixed sites and on mobile platforms to boost communications capacity by 30 percent.

Jan. 17
A United Launch Alliance Delta IV heavy rocket lofts a National Reconnaissance Office payload into orbit from Cape Canaveral AFS, Fla. It was the booster's first launch of an NRO satellite.

Feb. 10
A defunct Russian military communications satellite and an operational Iridium commercial satellite are destroyed when they collide 480 miles above Siberia, creating a wide debris field in space.

Feb. 12
Marine Corps Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff, says that avoiding the debris from the Feb. 10 crash will likely affect US space operations.

Feb. 19
Missile Defense Agency officials announce the transfer of the Cobra Dane phased-array radar at Shemya, Alaska, to Air Force Space Command. AFSPC will maintain and operate the radar for missile defense, space surveillance, and intelligence missions.

Feb. 26
Air Force Gen. Kevin P. Chilton, commander of US Strategic Command, announces that all debris created by the US shootdown of a tumbling spy satellite in February 2008 has de-orbited.

March 24
Airmen with the 45th Space Wing, Cape Canaveral AFS, Fla., launch a Delta II booster carrying the newest GPS satellite, the GPS IIR-20(M), into orbit. The new version includes tougher encryption for military signals and a more jam-resistant signal.

April 3
An Atlas V rocket launched at Cape Canaveral puts the second Wideband Global SATCOM system into orbit. It will augment and later replace the Defense Satellite Communications System.

April 6
Defense Secretary Robert M. Gates terminates USAF's Transformational Satellite (TSAT) Communications System program. Instead, USAF will buy two additional Advanced Extremely High Frequency Satellite Communications System satellites.

April 7
The Air Force begins seeking commercial sources for the space weather data that it gets today from Defense Meteorological Satellite Program—and would have gotten in the future from the National Polar-orbiting Operational Environmental Satellite System, but which was removed from NPOESS in a 2006 restructuring.

April 9
NRO Director Scott F. Large resigns; Air Force Maj. Gen. Ellen M. Pawlikowski, deputy director of the office, takes over on an interim basis.

April 28
The Army takes delivery of its SMDC-ONE communications nano-satellites, which were developed and built in less than a year and are the first Army-bought satellites in several decades.

May 19
Air Force Research Laboratory's TacSat-3 is launched from NASA's Wallops Island, Va., launch facility and successfully placed in orbit with a Minotaur I booster.

May 21
The GPS III team successfully completes the Preliminary Design Review for the GPS IIIA spacecraft program. GPS IIIA will deliver enhanced Earth coverage and a new civil signal compatible with Europe's Galileo program. Plans call for a constellation of 12 satellites with initial launch in 2014.

June 2
USAF awards Lockheed Martin a $1.5 billion contract for key SBIRS components, including the third highly elliptical orbit (HEO-3) payload, the third geosynchronous orbit (GEO-3) satellite, and ground modifications. The system will provide early warning of missile launches, battlespace awareness, and technical intelligence. The system is designed to replace the Defense Support Program.

June 12
Retired Air Force Gen. Bruce Carlson, who had served as commander of Air Force Materiel Command before retiring from active duty on Jan. 1, is tapped to replace Large as NRO director.

Space and Missile Badges

Space Badge

Space/Missile Badge

Air Force Astronaut

Missile Badge

Missile Badge With Operations Designator

Air Force Space Command, Peterson AFB, Colo.

(As of July 1, 2009)

Commander
Gen. C. Robert Kehler

Vice Commander
Maj. Gen. Thomas F. Deppe

Command CMSgt.
CMSgt. Richard T. Small

14th Air Force
Vandenberg AFB, Calif.
Commander
Lt. Gen. Larry D. James

21st Space Wing
Peterson AFB, Colo.
Col. John W. Raymond

30th Space Wing
Vandenberg AFB, Calif.
Col. David J. Buck

45th Space Wing
Patrick AFB, Fla.
Brig. Gen. Edward L. Bolton

50th Space Wing
Schriever AFB, Colo.
Col. Cary C. Chun

460th Space Wing
Buckley AFB, Colo.
Col. Donald McGee Jr.

Space & Missile Systems Center
Los Angeles AFB, Calif.
Commander
Lt. Gen. John T. Sheridan

GPS Wing
Col. David W. Madden

MilSatCom Systems Wing
Brig. Gen. Samuel A. Greaves

Space Development & Test Wing (Kirtland AFB, N.M.)
Col. Burke E. Wilson

Space Innovation & Development Center
Schriever AFB, Colo.
Commander
Col. Robert F. Wright Jr.

Launch and Range Systems Wing
Col. Gary N. Henry

Space Based Infrared Systems Wing
Col. Roger W. Teague

Space Superiority Systems Wing
Col. Michael D. Taylor

20th Air Force
F. E. Warren AFB, Wyo.
Commander
Maj. Gen. Roger W. Burg

90th Missile Wing
F. E. Warren AFB, Wyo.
Col. Michael J. Morgan

91st Missile Wing
Minot AFB, N.D.
Col. Christopher B. Ayres

341st Missile Wing
Malmstrom AFB, Mont.
Col. Michael E. Fortney

Hq. Air Force Space Command A-Staff

A1 Personnel
Col. William E. Hampton

A2 Intelligence
Col. Karen A. Cleary

A3 Operations
Brig. Gen. Tod D. Wolters

A4/7 Logistics
Mary Christine Puckett

A5 Requirements
Brig. Gen. John E. Hyten

A6 Communications Systems
Brig. Gen. David B. Warner

A8/9 Programs
Brig. Gen. Jack Weinstein

Space Leaders

(As of June 30, 2009. A = Acting)

US Space Command

Gen. Robert T. Herres	Sept. 23, 1985	Feb. 5, 1987
Gen. John L. Piotrowski	Feb. 6, 1987	March 30, 1990
Gen. Donald J. Kutyna	April 1, 1990	June 30, 1992
Gen. Charles A. Horner	June 30, 1992	Sept. 12, 1994
Gen. Joseph W. Ashy	Sept. 13, 1994	Aug. 26, 1996
Gen. Howell M. Estes III	Aug. 27, 1996	Aug. 13, 1998
Gen. Richard B. Myers	Aug. 14, 1998	Feb. 22, 2000
Gen. Ralph E. Eberhart	Feb. 22, 2000	Oct. 1, 2002

US Strategic Command

Adm. James O. Ellis Jr.	Oct. 1, 2002	July 9, 2004
Gen. James E. Cartwright, USMC	July 9, 2004	Aug. 10, 2007
Lt. Gen. C. Robert Kehler, USAF (A)	Aug. 10, 2007	Oct. 3, 2007
Gen. Kevin P. Chilton, USAF	Oct. 3, 2007	

US Space Command was inactivated Oct. 1, 2002, and its mission transferred to US Strategic Command.

Air Force Space Command

Gen. James V. Hartinger	Sept. 1, 1982	July 30, 1984
Gen. Robert T. Herres	July 30, 1984	Oct. 1, 1986
Maj. Gen. Maurice C. Padden	Oct. 1, 1986	Oct. 29, 1987
Lt. Gen. Donald J. Kutyna	Oct. 29, 1987	March 29, 1990
Lt. Gen. Thomas S. Moorman Jr.	March 29, 1990	March 23, 1992
Gen. Donald J. Kutyna	March 23, 1992	June 30, 1992
Gen. Charles A. Horner	June 30, 1992	Sept. 13, 1994
Gen. Joseph W. Ashy	Sept. 13, 1994	Aug. 26, 1996
Gen. Howell M. Estes III	Aug. 26, 1996	Aug. 14, 1998
Gen. Richard B. Myers	Aug. 14, 1998	Feb. 22, 2000
Gen. Ralph E. Eberhart	Feb. 22, 2000	April 19, 2002
Gen. Lance W. Lord	April 19, 2002	March 3, 2006
Lt. Gen. Frank G. Klotz (A)	March 3, 2006	June 26, 2006
Gen. Kevin P. Chilton	June 26, 2006	Oct. 3, 2007
Lt. Gen. Michael A. Hamel (A)	Oct. 3, 2007	Oct. 12, 2007
Gen. C. Robert Kehler	Oct. 12, 2007	

Army Space & Missile Defense Command/ Army Forces Strategic Command

Lt. Gen. John F. Wall	July 1, 1985	May 24, 1988
Brig. Gen. R. L. Stewart (A)	May 24, 1988	July 11, 1988
Lt. Gen. Robert D. Hammond	July 11, 1988	June 30, 1992
Brig. Gen. W. J. Schumacher (A)	June 30, 1992	July 31, 1992
Lt. Gen. Donald M. Lionetti	Aug. 24, 1992	Sept. 6, 1994
Lt. Gen. Jay M. Garner	Sept. 6, 1994	Oct. 7, 1996
Lt. Gen. Edward G. Anderson III	Oct. 7, 1996	Aug. 6, 1998
Col. Stephen W. Flohr (A)	Aug. 6, 1998	Oct. 1, 1998
Lt. Gen. John Costello	Oct. 1, 1998	March 28, 2001
Brig. Gen. J. M. Urias (A)	March 28, 2001	April 30, 2001
Lt. Gen. J. M. Cosumano Jr.	April 30, 2001	Dec. 16, 2003
Lt. Gen. Larry J. Dodgen	Dec. 16, 2003	Dec. 18, 2006
Lt. Gen. Kevin T. Campbell	Dec. 18, 2006	

Army Space and Missile Defense Command was the Army Strategic Defense Command until August 1992 and the Army Space and Strategic Defense Command until October 1997.

National Reconnaissance Office

Joseph V. Charyk	Sept. 6, 1961	March 1, 1963
Brockway McMillan	March 1, 1963	Oct. 1, 1965
Alexander H. Flax	Oct. 1, 1965	March 11, 1969
John L. McLucas	March 17, 1969	Dec. 20, 1973
James W. Plummer	Dec. 21, 1973	June 28, 1976
Thomas C. Reed	Aug. 9, 1976	April 7, 1977
Charles W. Cook (A)	April 7, 1977	Aug. 3, 1977
Hans Mark	Aug. 3, 1977	Oct. 8, 1979
Robert J. Hermann	Oct. 8, 1979	Aug. 2, 1981
Edward C. Aldridge Jr.	Aug. 3, 1981	Dec. 16, 1988
Martin C. Faga	Sept. 26, 1989	March 5, 1993
Jimmie D. Hill (A)	March 5, 1993	May 19, 1994
Jeffrey K. Harris	May 19, 1994	Feb. 26, 1996
Keith R. Hall (A)	Feb. 27, 1996	March 27, 1997
Keith R. Hall	March 28, 1997	Dec. 13, 2001
Peter B. Teets	Dec. 13, 2001	March 25, 2005
Dennis D. Fitzgerald (A)	March 25, 2005	July 22, 2005
Donald M. Kerr	July 22, 2005	Oct. 8, 2007
Scott F. Large (A)	Oct. 9, 2007	Oct. 18, 2007
Scott F. Large	Oct. 19, 2007	April 18, 2009
Betty J. Sapp (A)	April 18, 2009	July 13, 2009
Bruce Carlson	July 13, 2009	

Naval Space Command

RAdm. Richard H. Truly	Oct. 1, 1983	Feb. 28, 1986
Col. R. L. Phillips, USMC (A)	March 1, 1986	April 30, 1986
RAdm. D. Bruce Cargill	April 30, 1986	Oct. 24, 1986
RAdm. Richard C. Macke	Oct. 24, 1986	March 21, 1988
RAdm. David E. Frost	March 21, 1988	April 2, 1990
Col. C. R. Geiger, USMC (A)	April 2, 1990	May 31, 1990
RAdm. L. E. Allen Jr.	May 31, 1990	Aug. 12, 1991
RAdm. Herbert A. Browne Jr.	Aug. 12, 1991	Oct. 28, 1993
RAdm. Leonard N. Oden	Oct. 28, 1993	Jan. 31, 1994
RAdm. Lyle G. Bien	Jan. 31, 1994	Dec. 13, 1994
RAdm. Phillip S. Anselmo	Dec. 13, 1994	April 18, 1995
RAdm. Katharine L. Laughton	April 18, 1995	Feb. 28, 1997
RAdm. Patrick D. Moneymaker	Feb. 28, 1997	Sept. 10, 1998
Col. M. M. Henderson, USMC (A)	Sept. 10, 1998	Oct. 1, 1998
RAdm. Thomas E. Zelibor	Oct. 1, 1998	June 8, 2000
RAdm. J. J. Quinn	June 8, 2000	March 31, 2001
RAdm. Richard J. Mauldin	March 31, 2001	Dec. 10, 2001
RAdm. John P. Cryer	Dec. 10, 2001	July 11, 2002

Naval Space Command on July 11, 2002 ceased functioning as the Navy's primary space component. Its functions were transferred to the Naval Network Warfare Command.

Naval Network Warfare Command

VAdm. Richard Mayo	July 11, 2002	March 26, 2004
VAdm. James D. McArthur Jr.	March 26, 2004	June 15, 2007
VAdm. H. Denby Starling II	June 15, 2007	

Some Milestones in Military Space

March 22, 1946. JPL-Ordnance WAC, first US rocket to leave Earth's atmosphere, reaches 50-mile height after launch from White Sands Proving Ground, N.M.

July 1, 1954. USAF establishes space-oriented Western Development Division in California under Brig. Gen. Bernard A. Schriever.

Oct. 4, 1957. USSR launches Sputnik 1, first man-made satellite, into Earth orbit.

Jan. 31, 1958. US launches its first satellite, Explorer 1.

Dec. 18, 1958. Project Score spacecraft conducts first US active communication from space.

Aug. 7, 1959. Explorer 6 spacecraft transmits first television pictures from space.

April 1, 1960. US launches TIROS 1, world's first meteorological satellite, from Cape Canaveral, Fla.

April 13, 1960. Transit 1B becomes first US navigation satellite in space.

May 24, 1960. MIDAS 2 becomes the first early warning satellite in orbit.

June 22, 1960. US launches Galactic Radiation and Background (GRAB) satellite, the nation's first successful reconnaissance spacecraft. It collects Elint from Soviet air defense radars.

Aug. 18, 1960. Discoverer/Corona satellite takes first-ever image of Soviet territory snapped from space.

March 6, 1961. Secretary of Defense Robert S. McNamara formally assigns to USAF the responsibility for development of military space systems.

Oct. 17, 1963. Vela Hotel satellite performs first space-based detection of nuclear explosion.

June 18, 1965. USAF accepts Titan III, its first vehicle specifically designed and developed as a military space booster.

Oct. 20, 1968. Soviet Kosmos 249 spacecraft carries out first co-orbital anti-satellite test, exploding Kosmos 248 target satellite into cloud of debris.

Feb. 22, 1978. Atlas booster launches into orbit the first test vehicle of the Navstar GPS constellation.

Sept. 1, 1982. Air Force establishes Space Command (later, Air Force Space Command) in Colorado Springs, Colo.

Sept. 13, 1985. F-15-launched ASM-135A ASAT missile destroys a target satellite orbiting at a speed of 17,500 mph some 290 miles above Earth.

Jan. 11, 2007. Chinese ASAT weapon destroys orbiting Chinese satellite, making China only the third nation (after the United States and Russia) to carry out such a strike.

Major Military Commands With Space Functions

The Unified Command

US Strategic Command

Headquarters: Offutt AFB, Neb.
Established: Oct. 1, 2002
Cmdr.: Gen. Kevin P. Chilton, USAF

MISSIONS

Deter attacks on US vital interests and defend the nation should deterrence fail; lead, plan, and execute strategic deterrence operations
Ensure US freedom of action in space and cyberspace
Deliver integrated kinetic and nonkinetic effects in support of US joint force commanders
Synchronize global missile defense plans and operations and regional combating of weapons of mass destruction plans
Plan, integrate, and coordinate intelligence-surveillance-reconnaissance in support of strategic and global operations as directed
Advocate for capabilities as assigned

The Service Components

Air Force Space Command

Headquarters: Peterson AFB, Colo.
Established: Sept. 1, 1982
Cmdr.: Gen. C. Robert Kehler

MISSIONS

Defend the US through control and exploitation of space
Provide strategic deterrence by operating, testing, and maintaining ICBM forces for STRATCOM
Operate and employ space forces for strategic and tactical missile warning, battlespace characterization, environmental monitoring, satellite communications, precision navigation and timing, spacelift, and space control
Acquire, launch, and sustain space systems for USAF and DOD
Develop tactics, techniques, and procedures to integrate space capabilities with air, land, and sea forces
Develop space professionals

AFSPC will transfer control and operation of ICBM forces to Global Strike Command in fall 2009.

Naval Network Warfare Command

Headquarters: Norfolk, Va.
Established: July 11, 2002
Cmdr.: Vice Adm. H. Denby Starling II

MISSIONS

Deliver integrated cyber mission capabilities in information operations, intelligence, network operations, and space that enable warfighters across the full range of military operations
Provide highly trained forces, interoperable and well-maintained equipment, and clear processes and governance

US Army Space & Missile Defense Command/Army Forces Strategic Command

Headquarters: Redstone Arsenal, Ala.
Established: Oct. 1, 1997
Cmdr.: Lt. Gen. Kevin T. Campbell

MISSIONS

Conduct space and missile defense operations and provide planning, integration, control, and coordination of Army forces and capabilities in support of US Strategic Command missions
Serve as Army's specified proponent for space, high-altitude, and ground-based midcourse missile defense
Serve as Army's operational integrator for global missile defense
Conduct space- and missile-related R&D for Army Title 10 responsibilities

Major US Agencies With Roles in Space

Central Intelligence Agency

Headquarters: McLean, Va.
Established: 1947
Director: Leon E. Panetta

Mission

Provide national security intelligence to senior US policymakers

Direct Space Role

Support the National Reconnaissance Office in designing, building, and operating satellite reconnaissance systems

National Geospatial-Intelligence Agency

Headquarters: Bethesda, Md.
Established: Nov. 24, 2003
Director: Vice Adm. Robert B. Murrett

Mission

Provide geospatial intelligence (analysis and depiction of Earth's physical features and geographic references) to aid national security operations

Formerly National Imagery and Mapping Agency (NIMA).

National Reconnaissance Office

Headquarters: Chantilly, Va.
Established: September 1961
Director: Bruce Carlson

Mission

Engage in the research and development, acquisition, launch, and operation of overhead reconnaissance systems necessary to meet the needs of the Intelligence Community and DOD
Conduct other activities as directed by the Secretary of Defense and the Director of National Intelligence

National Security Agency

Headquarters: Ft. Meade, Md.
Established: November 1952
Director: Lt. Gen. Keith B. Alexander, USA

Mission

Protect US communications
Produce foreign signals intelligence

US Military Payloads by Mission, 1958-2008

(Orbital only)

Applications	**409**
Communications	*127*
Weather	*48*
Navigation	*100*
Launch vehicle/spacecraft tests	*6*
Other military	*128*
Weapons-Related Activities	**47**
SDI tests	*11*
Anti-satellite targets	*2*
Anti-satellite interceptors	*34*
Reconnaissance	**445**
Photographic/radar imaging	*256*
Electronic intelligence	*56*
Ocean surveillance	*48*
Nuclear detection	*12*
Radar calibration	*37*
Early warning	*36*
Total	**901**

US Satellites Placed in Orbit or Deep Space

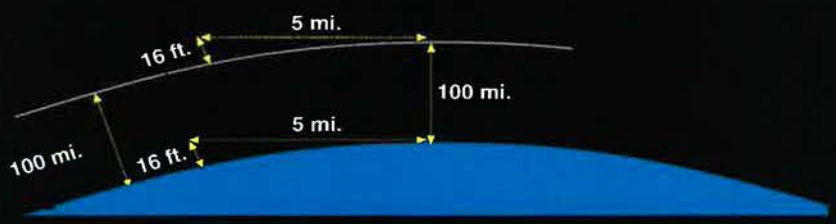
(As of Dec. 31, 2008)

Year	Military	Civil*	Total
1958	0	7	7
1959	6	5	11
1960	12	5	17
1961	20	12	32
1962	35	20	55
1963	33	22	55
1964	44	25	69
1965	49	39	88
1966	52	47	99
1967	51	34	85
1968	35	26	61
1969	32	27	59
1970	23	8	31
1971	26	18	44
1972	18	14	32
1973	14	10	24
1974	11	8	19
1975	12	16	28
1976	17	12	29
1977	14	5	19
1978	16	17	33
1979	10	7	17
1980	12	4	16
1981	7	10	17
1982	8	9	17
1983	16	12	28
1984	17	16	33
1985	13	17	30
1986	7	4	11
1987	10	1	11
1988	11	9	20
1989	15	9	24
1990	22	17	39
1991	22	13	35
1992	12	18	30
1993	12	18	30
1994	18	18	36
1995	15	23	38
1996	16	22	38
1997	9	81	90
1998	7	87	94
1999	8	74	82
2000	15	36	51
2001	8	24	32
2002	2	25	27
2003	12	14	26
2004	5	11	16
2005	6	14	20
2006	16	21	37
2007	13	31	44
2008	5	22	27
Total	**869**	**1,044**	**1,913**

*Includes some military payloads.

Orbits

Orbits result from the mutual attraction of any two bodies with a force proportional to the product of their individual masses and inversely proportional to the square of the distance between them. The curvature of the Earth, on average, drops 16 feet below the horizontal over a distance of about five miles. A spacecraft circling above would "fall" that same amount over the same distance. It travels five miles in one second if gravitational pull equals one G. Therefore, spacecraft velocity of five miles per second (18,000 mph) produces perpetual orbit at sea level, unless the spacecraft's flight is upset by perturbations, such as solar wind or mechanical anomalies.

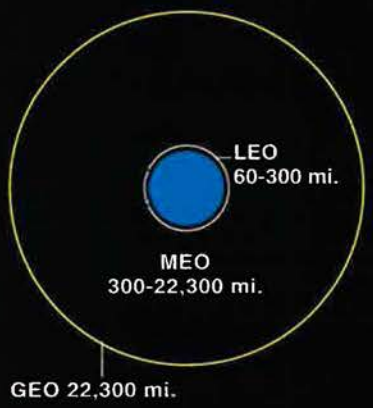


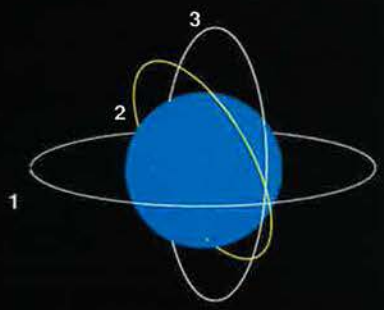
Orbital Altitude

LEO Low Earth orbit
MEO Medium Earth orbit
GEO Geosynchronous Earth orbit
HEO High Earth orbit

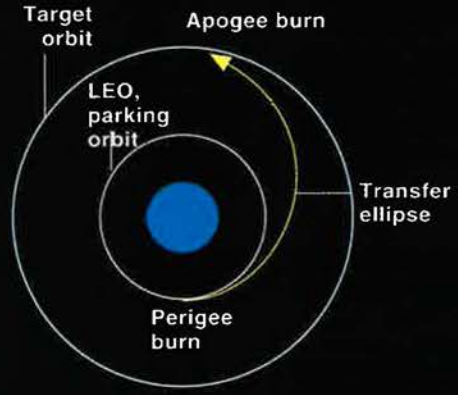
Orbital Inclinations

1 Equatorial
2 Sun synchronous
3 Polar





Geosynchronous Transfer Orbit



It is common procedure to pick an initial "parking" orbit, usually at LEO, then boost payloads to higher altitude. Engines are fired first (at perigee) to reach the apogee of an elliptical transfer orbit and then are fired again to put the spacecraft into a circular orbit at that higher altitude.

Illustrations are not drawn to scale.

US Military/Civil Launches

(As of Dec. 31, 2008)

Year	Military	Civil	Total	Year	Military	Civil	Total	Year	Military	Civil	Total	Year	Military	Civil	Total
1958	0	7	7	1971	16	16	32	1984	11	11	22	1997	8	29	37
1959	6	5	11	1972	14	17	31	1985	4	13	17	1998	5	29	34
1960	11	5	16	1973	11	12	23	1986	4	2	6	1999	7	23	30
1961	19	10	29	1974	8	16	24	1987	6	2	8	2000	11	17	28
1962	32	20	52	1975	9	19	28	1988	8	4	12	2001	7	14	21
1963	25	13	38	1976	11	15	26	1989	11	7	18	2002	1	16	17
1964	33	24	57	1977	10	14	24	1990	11	16	27	2003	11	12	23
1965	34	29	63	1978	14	18	32	1991	6	12	18	2004	5	11	16
1966	35	38	73	1979	8	8	16	1992	11	17	28	2005	6	6	12
1967	29	29	58	1980	8	5	13	1993	12	11	23	2006	7	10	17
1968	23	22	45	1981	7	11	18	1994	11	15	26	2007	8	10	18
1969	17	23	40	1982	6	12	18	1995	9	18	27	2008	4	12	16
1970	18	11	29	1983	8	14	22	1996	11	22	33				
												Total	**607**	**752**	**1,359**

Data changes in prior years reflect recategorization from civil to military launches.

What's Up There

As of Dec. 31, 2008

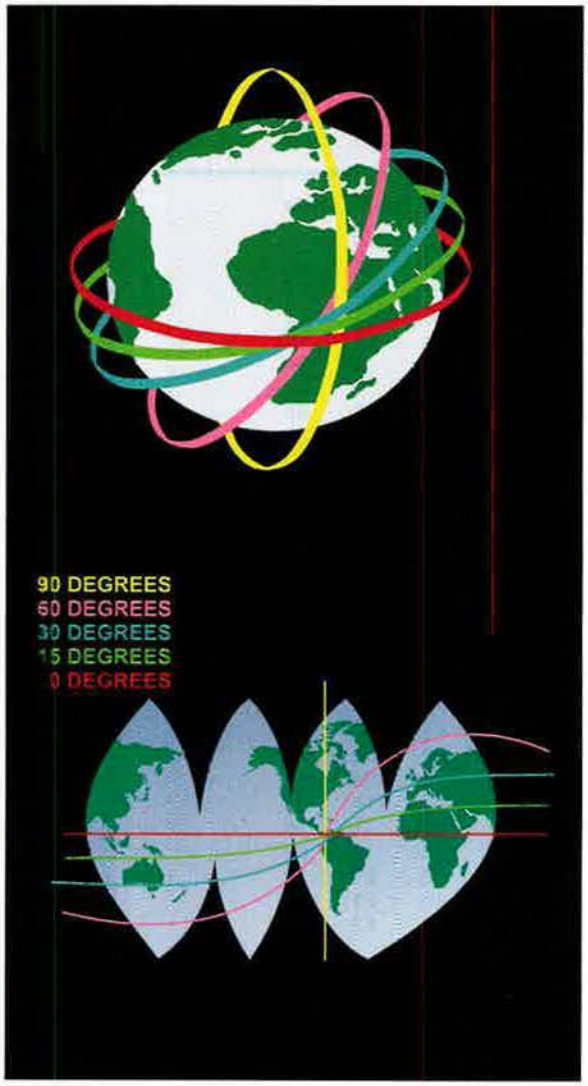
Country Organization	Payloads in Orbit: Satellites	Payloads in Orbit: Space Probes	Debris	Total
US	1,003	61	2,590	3,654
Russia*	1,379	35	2,104	3,518
People's Republic of China	78	1	2,650	2,729
France	49	0	219	268
Japan	105	10	32	147
India	36	1	98	135
European Space Agency	38	6	30	74
Intl. Telecom Sat. Org.	65	0	0	65
CHBZ	3	0	59	62
Globalstar	60	0	0	60
Germany	33	2	0	35
Orbcomm	35	0	0	35
Canada	29	0	2	31
European Telecom Sat. Org.	28	0	0	28
United Kingdom	26	0	0	26
Luxembourg	16	0	0	16
Italy	15	0	0	15
Saudi Arabia	12	0	0	12
Brazil	12	0	0	12
Int. Maritime Sat. Org	12	0	0	12
Australia	11	0	0	11
Sweden	11	0	0	11
Argentina	10	0	0	10
Indonesia	10	0	0	10
South Korea	10	0	0	10
Arab Sat. Comm. Org	9	0	0	9
Israel	9	0	0	9
Spain	9	0	0	9
NATO	8	0	0	8
Taiwan	8	0	0	8
Mexico	7	0	0	7
Thailand	7	0	0	7
Netherlands	6	0	0	6
Turkey	6	0	0	6
Czech Republic	5	0	0	5
International Space Station	1	3	2	6
Other**	47	0	3	50
Total	**3,208**	**119**	**7,789**	**11,116**

* Russia includes Commonwealth of Independent States (CIS) and former Soviet Union.

** Other refers to countries or organizations that have placed fewer than five objects in space.

Satellite Inclination

Inclination is the angle between the Earth's equatorial plane and a satellite's orbital plane. A satellite at the wrong inclination—passing over the wrong spot on Earth—may hinder its ability to perform its mission.

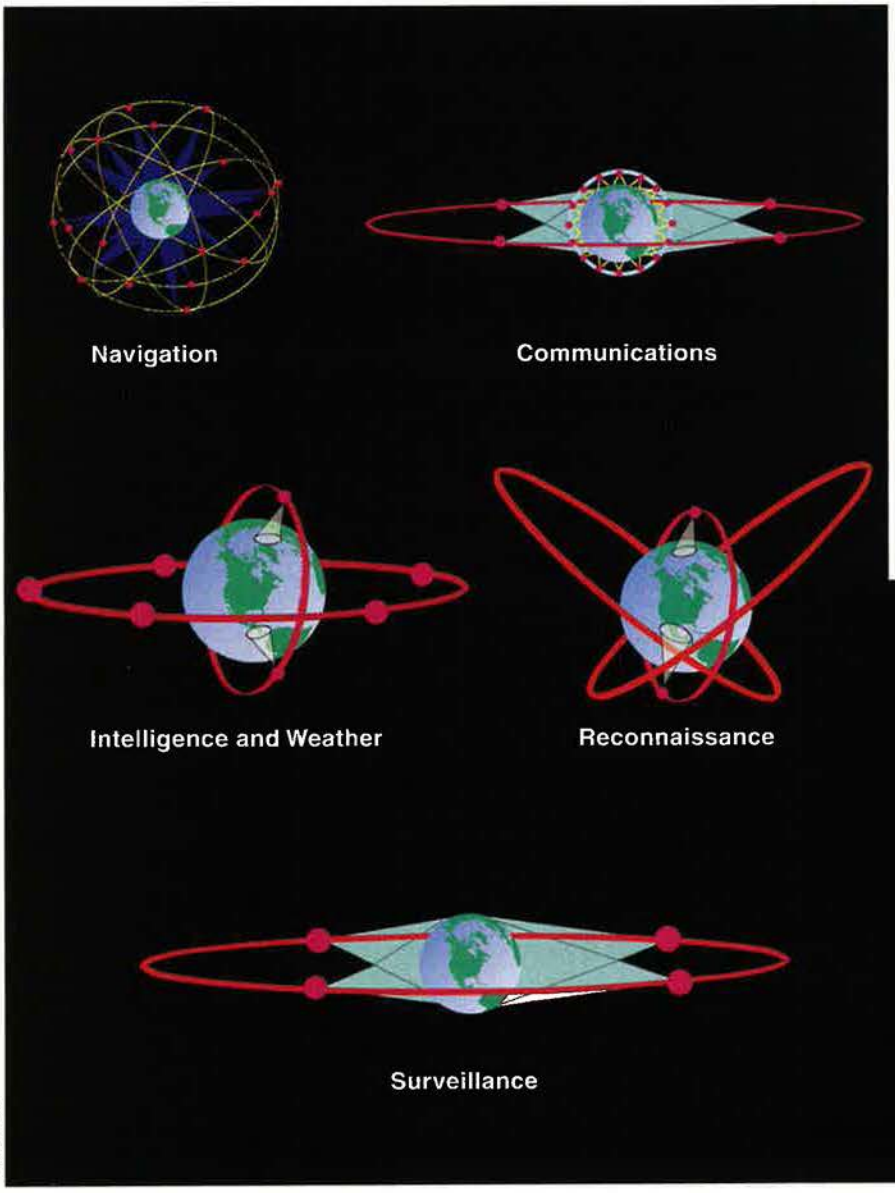


DOD image

AFSPC Squadrons by Mission Type

(As of Sept. 30, 2008)

Component	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
Active force										
ICBM	14	14	14	14	11	11	10	10	10	10
Space operations	10	8	8	8	8	9	8	8	7	7
Space communications	1	1	1	0	0	6	7	7	6	5
Space warning	8	7	7	8	8	6	6	6	6	7
Space surveillance	6	6	4	3	3	3	0	0	0	0
Space launch	5	3	3	3	4	4	3	3	3	3
Range	2	2	2	2	2	2	2	2	2	3
Space control and tactics	1	2	3	3	3	3	5	6	6	4
Space aggressor	0	0	0	0	1	1	1	1	0	0
Total active force	**47**	**43**	**42**	**41**	**40**	**45**	**42**	**43**	**40**	**39**
Reserve forces										
ANG										
Space operations	0	0	0	1	1	3	4	3	1	2
Space warning	0	0	0	1	1	1	2	1	2	2
AFRC										
Space operations	3	3	4	4	4	4	4	4	4	4
Space warning	1	1	1	1	1	1	1	1	1	1
Space aggressor	0	0	0	0	0	1	1	1	1	1
Total reserve forces	**4**	**4**	**5**	**7**	**7**	**10**	**10**	**10**	**9**	**10**
Total all components	**51**	**47**	**47**	**48**	**47**	**55**	**54**	**53**	**49**	**49**



DOD image

US Manned Spaceflights

Year	Flights	Persons
1961	2	2
1962	3	3
1963	1	1
1964	0	0
1965	5	10
1966	5	10
1967	0	0
1968	2	6
1969	4	12
1970	1	3
1971	2	6
1972	2	6
1973	3	9
1974	0	0
1975	1	3
1976	0	0
1977	0	0
1978	0	0
1979	0	0
1980	0	0
1981	2	4
1982	3	8
1983	4	20
1984	5	28
1985	9	58
1986	1	7
1987	0	0
1988	2	10
1989	5	25
1990	6	32
1991	6	35
1992	8	53
1993	7	42
1994	7	42
1995	7	42
1996	7	43
1997	8	53
1998	5	33
1999	3	19
2000	5	32
2001	6	38
2002	5	34
2003	1	7
2004	0	0
2005	1	7
2006	3	20
2007	3	21
2008	4	29
Total	**154**	**813**

The Constellations

Multiple satellites working in groups to perform a single mission can provide greater coverage than a single satellite, enabling global coverage or increasing timeliness of coverage.

Navigation constellations provide simultaneous signals from multiple satellites to a location on the ground.

Communications constellations ensure at least one satellite is in line of sight of both ends of the communications link.

Weather and **reconnaissance** constellations generally contain both high and low altitude systems.

Some **surveillance** systems need continuous access to areas of interest, calling for high-altitude, long dwell-time orbits.

Major US Launchers in US Military Use

Atlas V
Function: lift medium to heavy weights.
Variants: 400 and 500 series.
First launch: Aug. 21, 2002.
Launch site: Cape Canaveral AFS, Fla.; Vandenberg AFB, Calif.
Contractor: Lockheed Martin.
Stages: two.
Propulsion: (400 and 500 series) stage 1: one RD AMCROSS LLC RD-180 engine with two chambers, 860,200 lb thrust; stage 2: Centaur, one or two Pratt & Whitney RL10A-4-2 engines, 16,500-22,300 lb thrust. Strap-on solid rocket boosters, up to three (400), up to five (500).
Dimensions: (stage 1) length 106.2 ft, max body diameter 12.5 ft; (stage 2) length 41.6 ft, max body diameter 10 ft.
Weight: 741,061-1.2 million lb.
Payload: (400 series) 27,558 lb to LEO, 10,913-17,196 to GTO; (500 series) 22,707-45,238 lb to LEO, 8,752-19,180 lb to GTO. (500 series supports 16.5 ft diameter payload fairing.)

Delta II
Function: lift medium weights.
First launch: Feb. 14, 1989.
Launch site: CCAFS; VAFB.
Contractor: Boeing.
Stages: up to three.
Propulsion: stage 1 (Rocketdyne RS-27A), 237,000 lb thrust; stage 2 (Aerojet AJ10-118K), 9,753 lb thrust; stage 3 (Thiokol STAR 48B solid rocket motor), 14,920 lb thrust; nine strap-on SRMs (Alliant Techsystems), 100,270 lb thrust.
Dimensions: length 125.2 ft, max body diameter 8 ft.
Weight: 511,190 lb.
Payload: 5,960-13,440 lb to LEO.

Delta IV
Function: lift medium to heavy weights.
Variants: Medium, Medium-Plus, and Heavy.
First launch: Nov. 20, 2002.
Launch site: CCAFS; VAFB.
Contractor: Boeing.
Stages: two.
Propulsion: stage 1, Rocketdyne RS-68 (Heavy, two additional core engines), 650,000 lb thrust; stage 2 (Medium), P&W RL10B-2, 24,750 lb thrust.
Dimensions: (core booster, all versions) length 125 ft, max body diameter 16.7 ft.
Weight: (Medium) 64,719 lb; (heavy) 196,688 lb.
Payload: 20,170-49,740 lb to LEO; 9,480-28,620 lb to GTO. (Heavy supports 16.6 ft diameter payload fairing.)

Minotaur I
Function: lift low weights.
First launch: January 2000.
Launch site: CCAFS; Kodiak Launch Complex, Alaska; VAFB; Wallops Island, Va.
Contractor: Orbital Sciences.
Stages: four
Propulsion: stage 1 and stage 2: Minuteman rocket motors (reusing motors decommissioned as a result of arms reduction treaties); stages 3 and 4 shared with Pegasus XL and Taurus XL commercial SLVs.
Dimensions: length 62.9 ft, max body diameter 5.5 ft.
Weight: N/A
Payload max: 1,278 lb to LEO.

Pegasus
Function: lift low weights.
Variants: Standard and XL.
First launch: (Standard) April 5, 1990; (XL) June 27, 1994.
Launch site: dropped from L-1011 aircraft.
Contractor: Orbital Sciences, Alliant.
Stages: three.
Propulsion: (XL) (all Alliant Techsystems) stage 1, 109,400 lb thrust; stage 2, 27,600 lb thrust; stage 3, 7,800 lb thrust.
Dimensions: length 49 ft, wingspan 22 ft, diameter 4.17 ft.
Weight: 42,000 lb.
Payload max: (Standard) 850 lb to LEO; (XL) 1,050 lb to GEO.

Space Shuttle
Function: lift heavy weights.
First launch: April 12, 1981.
Launch site: John F. Kennedy Space Center, Fla.
Contractor: Boeing (launch).
Stages: delta-winged orbiter.
Propulsion: three main engines, 394,000 lb thrust; two SRMs, 3.3 million lb thrust.
Dimensions: system length 184 ft; span 78 ft.
Weight: 4.5 million lb (gross).
Payload max: 55,000 lb to LEO.

Taurus
Function: lift low weights.
Variants: Standard and XL.
First launch: March 13, 1994.
Launch site: CCAFS; Kodiak Launch Complex, Alaska; VAFB; Wallops Island, Va.
Contractor: Orbital Sciences.
Stages: four.
Propulsion: Castor 120 SRM, 495,400 lb thrust; stage 1, 109,140 lb thrust; stage 2, 26,900 lb thrust; stage 3, 7,200 lb thrust. (Stages 1-3, Alliant Techsystems)
Dimensions: length 89 ft, max body diameter 7.6 ft.
Weight: 170,000 lb max.
Payload max: 3,000 lb to LEO.

USAF photo

Atlas V

USAF photo

Delta II

Orbital Sciences Corp. photo

Pegasus

Orbital Sciences Corp. photo

Taurus

USAF photo

Delta IV

Orbital Sciences Corp. photo

Minotaur I

USAF photo

Space Shuttle

Major Military Satellite Systems

Advanced Extremely High Frequency Satellite Communications System
Common name: AEHF
In brief: successor to Milstar, AEHF will provide assured strategic/tactical, worldwide C2 communications with at least 10 times the capacity of Milstar II but in a smaller package.
Function: EHF communications.
Operator: MILSATCOM JPO (acquisition); AFSPC.
First launch: late 2010.
On orbit: four, planned.
Orbit altitude: 22,000+ miles.

Defense Meteorological Satellite Program
Common name: DMSP
In brief: satellites that collect air, land, sea, and space environmental data to support worldwide strategic and tactical military operations. Operational control transferred to NOAA in 1998; backup operation center at Schriever AFB, Colo., manned by Air Force Reserve Command personnel.
Function: environmental monitoring.
Operator: NPOESS Integrated Program Office.
First launch: Aug. 23, 1962.
On orbit: two (primary).
Orbit altitude: approx 527 miles.

Defense Satellite Communications System III
Common name: DSCS
In brief: nuclear-hardened and jam-resistant spacecraft used to transmit high-priority C2 messages to battlefield commanders.
Function: SHF communications.
Operator: AFSPC.
First launch: October 1982.
On orbit: five (primary).
Orbit altitude: 22,000+ miles.

Defense Support Program
Common name: DSP
In brief: early warning spacecraft whose infrared sensors detect heat generated by a missile or booster plume.
Function: strategic and tactical missile launch detection.
Operator: AFSPC.
First launch: November 1970.
On orbit: classified.
Orbit altitude: 22,000+ miles.

Enhanced Polar System
Common name: EPS
In brief: next generation polar communications to replace interim polar system (see Interim Polar System, next column), which provides polar communications capability required by aircraft, submarines, and other forces operating in the high northern latitudes. Pre-acquisition, system definition, and risk reduction efforts started in Fiscal 2006.
Function: EHF polar communications.
Operator: MILSATCOM JPO (acquisition); AFSPC.
First launch: availability 2013.
On orbit: two, planned.
Orbit altitude: 22,300+ miles.

Global Broadcast System
Common name: GBS
In brief: wideband communications program, initially using leased commercial satellites, then military systems, to provide digital multimedia data directly to theater warfighters.
Function: high-bandwidth data imagery and video.
Operator: Navy.
First launch: March 1998 (Phase 2 payload on UHF Follow-On). Continued on Wideband Global SATCOM (WGS) in 2008.
On orbit: two.
Orbit altitude: 23,230 miles.

Global Positioning System
Common name: GPS
In brief: constellation of satellites used by military and civilians to determine a precise location and time anywhere on Earth. Block IIR began replacing older GPS spacecraft in mid-1997; first modified Block IIR-M with military signal (M-code) on two channels launched in 2005. Next generation Block IIF with extended design life, faster processors, and new civil signal on third frequency launches in 2009. Generation after next GPS III with advanced anti-jam and higher quality data is slated for initial launch in 2014.
Function: worldwide positioning, navigation, and precise time transfer.
Operator: AFSPC.
First launch: Feb. 22, 1978 (Block I).
On orbit: 30.
Orbit altitude: 10,988 miles.

Interim Polar System
Common name: IPS
In brief: USAF deployed a modified EHF payload on a host polar-orbiting satellite to provide an interim solution to ensure warfighters have protected polar communications capability. Polar 3 launched in 2007.
Function: EHF polar communications.
Operator: Navy.
First launch: 1997.
On orbit: two.
Orbit altitude: 25,300 miles (apogee).

Milstar Satellite Communications System
Common Name: Milstar
In brief: joint communications satellite that provides secure, jam-resistant communications for essential wartime needs.

Major Military Satellite Systems, Continued

Function: EHF communications.
Operator: AFSPC.
First launch: Feb. 7, 1994.
On orbit: five.
Orbit altitude: 22,300 miles.

Mobile User Objective System
(also known as Advanced Narrowband System)
Common name: MUOS
In brief: next generation narrowband UHF tactical communications satellite to replace the UHF Follow-On Satellite (see below). Concept study contracts awarded in 1999; production award to Lockheed Martin in September 2004; initial launch in 2010.
Function: UHF tactical communications.
Operator: Navy.
First launch: 2010, planned.
On orbit: none.
Orbit altitude: 22,300 miles.

Space Based Infrared System High
Common name: SBIRS High
In brief: advanced surveillance system for missile warning, missile defense, battlespace characterization, and technical intelligence. System initially will complement, then replace, Defense Support Program spacecraft (see p. 63).
Function: infrared space surveillance.
Operator: AFSPC.
First launch: 2009, planned.
On orbit: none.
Orbit altitude: 22,300 miles.

Space Based Surveillance System
Common name: SBSS
In brief: Will replace the Midcourse Space Experiment/Space Based Visible (MSX/SBV) satellite that performs tracking and optical signature collection on Earth-orbiting objects.
Function: space surveillance.
Operator: AFSPC.
First launch: 2009, planned.
On orbit: one Pathfinder satellite to be launched in 2009 and four operational satellites are planned for the 2014 timeframe.
Orbit altitude: 528 miles.

Space Tracking and Surveillance System
(formerly SBIRS Low)
Common name: STSS
In brief: infrared surveillance and tracking satellites to detect and track ballistic missiles from launch to impact. System is sensor component of layered ballistic missile defense system and will work with SBIRS High (see above).
Function: infrared surveillance.
Operator: MDA (acquisition); AFSPC.
First launch: May 5, 2009
On orbit: one.

UHF Follow-On Satellite
Common name: UFO
In brief: new generation satellites providing secure, anti-jam communications; replaced FLTSATCOM satellites.
Function: UHF and EHF communications.
Operator: Navy.
First launch: March 25, 1993.
Constellation: four primary, four redundant.
On orbit: nine.
Orbit altitude: 22,300 miles.

Wideband Global SATCOM
Common name: WGS
In brief: multiservice program leveraging commercial methods to rapidly design, build, launch, and support a constellation that will augment X-band satellite communications (DSCS) and one-way Ka-band (Global Broadcast System) while providing a new two-way Ka-band service (see p. 63).
Function: wideband communications and point-to-point service (Ka-band and X-band frequencies).
Operator: AFSPC (bus); SMDC/ARSTRAT (payload).
First launch: Oct. 10, 2007.
On orbit: six, planned.
Orbit altitude: 22,000+ miles.

Dark and Spooky
A number of intelligence satellites are operated by US agencies in cooperation with the military. The missions and, especially, the capabilities are closely guarded secrets.
Most of the names of satellites, such as White Cloud (ocean reconnaissance), Aquacade (electronic ferret), and Trumpet (Sigint), are essentially open secrets but cannot be confirmed by the Intelligence Community.

Major Civilian Satellites in US Military Use

AMERICOM Government Services
Common name: AGS
In brief: Global commercial satellite communications solutions for the US government, including the military (hosted payloads, custom networks, bandwidth).
Function: communications.
Operator: SES.
First launch: December 1975.
Constellation: 40.
Orbit altitude: GEO (22,300 miles).

GeoEye-1
Common name: GeoEye-1
In brief: high-resolution imagery providing geospatial intelligence to National Geospatial-Intelligence Agency as part of NGA's Nextview program, in support of national security.
Function: Earth imagery.
Operator: Geo-Eye Inc.
First launch: Sept. 6, 2008.
Constellation: one.
Orbit altitude: 423 miles.

Geostationary Operational Environmental Satellite
Common name: GOES
In brief: in equatorial orbit to collect weather data for short-term forecasting.
Function: storm monitoring and tracking, meteorological research.
Operator: NOAA.
First launch: Oct. 16, 1975 (GOES-1).
Constellation: two, with on-orbit spare.
Orbit altitude: 22,300 miles.

Globalstar
Common name: Globalstar
In brief: mobile communications with provision for security controls.
Function: communications.
Operator: Globalstar L.P.
First launch: February 1998.
Constellation: 48.
Orbit altitude: 878 miles.

Ikonos
Common name: Ikonos
In brief: one-meter resolution Earth imaging.
Function: remote sensing.
Operator: GeoEye Inc.
First launch: Sept. 24, 1999.
Constellation: one.
Orbit altitude: 423 miles.

Inmarsat
Common name: Inmarsat
In brief: peacetime mobile communications services, primarily by US Navy.
Function: communications.
Operator: International Maritime Satellite Organization.
First launch: February 1982 (first lease), Oct. 30, 1990 (first launch).
Constellation: nine.
Orbit altitude: 22,300 miles.

Intelsat
Common name: Intelsat
In brief: routine communications and distribution of Armed Forces Radio and TV Services network.
Function: communications.
Operator: International Telecommunications Satellite Organization.
First launch: April 6, 1965 (Early Bird).
Constellation: 51.
Orbit altitude: 22,300 miles.

Iridium
Common name: Iridium
In brief: voice, fax, data transmission.
Function: handheld, mobile communications.
Operator: Iridium L.L.C.
First Launch: May 5, 1997.
Constellation: 66 (six on-orbit spares).
Orbit: 485 miles.

Landsat
Common name: Landsat
In brief: imagery use includes mapping and planning for tactical operations.
Function: remote sensing.
Operator: US Geological Survey.
First launch: July 23, 1972.
Constellation: one.
Orbit altitude: 438 miles (polar).

National Polar-orbiting Operational Environmental Satellite System
Common name: NPOESS
In brief: advanced joint civil-military polar environmental satellite that provides weather, atmosphere, ocean, land, and near-space data. Managed by tri-agency

(DOD, Department of Commerce, and NASA) integrated program office. Designed to replace USAF's DMSP and NOAA's Polar-orbiting Operational Environmental Satellite (POES) (see below).
Function: worldwide environmental forecasting.
Operator: IPO (AFSPC for acquisition and launch; NOAA for operations).
First launch: 2010, planned.
Constellation: three.
On orbit: none.
Orbit altitude: 550 (LEO) miles.

Orbcomm
Common name: Orbcomm
In brief: potential military use under study in Joint Interoperability Warfighter Program.
Function: mobile communications.
Operator: Orbcomm Global L.P.
First launch: April 1995.
Constellation: 30.
Orbit altitude: 500-1,200 miles.

Pan Am Sat
Common name: Pan Am Sat
In brief: routine communications providing telephone, TV, radio, and data.
Function: communications.
Operator: Pan Am Sat.*
First launch: 1983.
Constellation: 21.
Orbit altitude: 22,300 miles.
*Merged with Intelsat 2005-06

Polar-orbiting Operational Environmental Satellite
(also known as NOAA-K, L, and M before launch; NOAA-15, 16, and 17, respectively, once on orbit)
Common name: POES
In brief: two advanced third generation environmental satellites (one morning orbit and one afternoon orbit) provide longer-term weather updates for all areas of the world. Final two spacecraft in this series are NOAA-N (launched in 2005) and N Prime. To be replaced by NPOESS.
Function: extended weather forecasting.
Operator: NOAA (on-orbit); NASA (launch).
First launch: May 13, 1998 (NOAA-15).
Constellation: two.
Orbit altitude: 517 miles.

Quickbird 2
Common name: Quickbird 2
In brief: high-resolution imagery for mapping, military surveillance, weather research, and other uses.
Function: remote sensing.
Operator: DigitalGlobe.
First launch: Oct. 18, 2001.
Constellation: one.
Orbit altitude: 279 miles.

Satellite Pour l'Observation de la Terre
Common name: SPOT
In brief: terrain images used for mission-planning systems, terrain analysis, and mapping.
Function: remote sensing.
Operator: SPOT Image S.A. (France).
First launch: Feb. 22, 1986.
Constellation: three.
Orbit altitude: 509 miles.

Telstar
Common name: Telstar
In brief: commercial satellite-based, rooftop-to-rooftop communications for US Army and other DOD agencies.
Function: communications.
Operator: Loral Skynet.
First launch: November 1994.
Constellation: three.
Orbit altitude: 22,300 miles.

Tracking and Data Relay Satellite System
Common name: TDRSS
In brief: global network that allows other spacecraft in LEO to communicate with a control center without an elaborate network of ground stations.
Function: communications relay.
Operator: NASA.
First launch: April 1983.
Constellation: seven.
Orbit altitude: 22,300 miles.

WorldView-1
Common name: WorldView-1
In brief: high-resolution Earth imagery for mapping, military surveillance, and other uses.
Function: remote sensing.
Operator: DigitalGlobe.
First launch: Sept. 18, 2007
Constellation: one.
Orbit altitude: 308 miles.

Major US Military Ground-Based Space Surveillance Systems

Air Force Space Surveillance System
Common name: Air Force Fence
In brief: continuous wave radars located across the southern US to track man-made objects in Earth orbit.
Function: space surveillance.
Operator: AFSPC.
Operational: March 31, 1959 (US Navy).
Unit location: Dahlgren, Va. (command & control); receivers in Arkansas, California, Georgia, Mississippi, and New Mexico; transmitters in Alabama, Arizona, and Texas.
Components: One command & control center, six receiver sites, and three transmitter sites.

AN/FPS-85 Phased-Array Radar
Common name: Eglin radar
In brief: active phased-array radar used in all weather to track man-made objects in Earth orbit.
Function: space surveillance.
Operator: AFSPC.
Operational: Jan. 29, 1969.
Unit location: Eglin AFB, Fla.
Components: AN/FPS-85 solid-state phased-array radar.

Ballistic Missile Early Warning System
Common name: BMEWS
In brief: phased-array radar used for tactical warning and attack assessment and tracking Earth-orbiting satellites.
Function: ballistic missile attack and space surveillance.
Operator: AFSPC.
Operational: 1959 (Trinidad, British West Indies); July 1, 1961 (Clear AFS, Alaska).
Unit location: Clear AFS, Alaska; RAF Fylingdales, Britain; Thule AB, Greenland.
Components: (Clear AFS) AN/FPS-120 solid-state phased-array radar (SSPAR) with two faces; computers for radar control and data processing.

Ground-based Electro-optical Deep Space Surveillance
Common name: GEODSS
In brief: optical system that tracks objects such as Earth-orbiting satellites in deep space.
Function: space surveillance.
Operator: AFSPC.
Operational: June 30, 1982.
Unit location: Socorro, N.M.; Diego Garcia, Indian Ocean; Maui, Hawaii.
Components: three telescopes, low-light-level EO cameras, and high-speed computers.

Morón Optical Space Surveillance
Common name: MOSS
In brief: optical system that tracks objects such as Earth-orbiting satellites in deep space.
Function: space surveillance.
Operator: AFSPC.
Operational: June 1998.
Unit location: Morón, Spain.
Components: optical telescope and high-speed computers.

Pave Phased-Array Warning System
Common Name: Pave PAWS
In brief: Phased-array radar used to detect and track sea-launched and intercontinental ballistic missiles, as well as Earth-orbiting satellites.
Function: missile warning and space surveillance.
Operator: AFSPC.
Operational: August 1980.
Unit location: Beale AFB, Calif.; Cape Cod AFS, Mass.
Components: AN/FPS-115 phased-array radar; computers for radar control and data processing.

Perimeter Acquisition Radar Attack Characterization System
Common name: PARCS
In brief: ICBM and SLBM warning and space surveillance of Earth-orbiting satellites in deep space.
Function: ballistic missile warning and space surveillance.
Operator: AFSPC.
Operational: 1977.
Unit location: Cavalier AFS, N.D.
Components: One AN-FPQ-16 single-faced, phased-array radar. ■

Keeper File

De Severskys Definition

"Most everyone is for airpower these days, yet the term means different things to different people." So said the editors of Air Force Magazine *in introducing a piece by Alexander de Seversky, the airpower theorist. His title—"What Is Airpower"—made things seem simple. Even de Seversky, however, had to take a few swings at it. In July 1954, he wrote a version for the* American People's Encyclopedia. *The version in the August 1955 issue of* Air Force Magazine *added two long notes. De Seversky wrote three more notes before, having completed his work, he rested.*

"What Is Airpower?"

Alexander P. de Seversky
Air Force Magazine
Arlington, Va.
August 1955

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

Airpower is the ability of a nation to assert its will via the air medium. The military instrument by which a nation applies its airpower is an air force. In time of peace, the existence of an air force of proper size and capabilities—what is termed an air force in being—can be used by a country to implement its national policy. In time of hostilities, the primary use of airpower is for the establishment of command of the air, the condition in which one side retains its freedom of air navigation and has the ability to deny that freedom to the enemy. Freedom of air navigation when maintained by one side through successful, sustained combat is known as air superiority.

Because the aim of war is to impose the will of one side upon the other, the enemy must be disarmed; his industrial power to make war and the stockpiles of his armed forces must be neutralized. For that reason, the offensive air force must carry the threat of a lethal dose of destruction.

Though the main objective of war is to disarm the adversary, it must be assumed from the outset that the belligerents' industrial vitals and other sinews of war will be properly shielded by a defensive air force and that access to the decisive targets will be challenged. It is for this reason, as well as to deprive the enemy of his retaliatory capacity, that the primary mission of the air force must be the elimination of the opposing air forces, through (1) the destruction of its operational facilities and equipment on the ground and (2) combat in the air. This is termed air battle.

In the past, when the range of aircraft was limited, it was possible to maintain local command of the air. Global command of the air could be achieved only after the establishment of a worldwide complex of air bases so located, that in terms of a given practical range of aircraft, their air peripheries would interlock to form an uninterrupted air canopy over the theaters of operation. This arrangement was not unlike the system maintained in the 19th century for sea power, which, for the exercise of its global functions, required the establishment of bastions of naval strength on foreign soil throughout the world.

There are emerging among the major powers, however, aircraft, that for all practical purposes, possess global range. They can rise directly from their respective home bases, strike at any target in the northern hemisphere, and return nonstop. At the current rate of advance in aeronautical science, it is only a matter of a short time before aircraft of a truly global range (25,000 miles) will be a reality. In the meantime, global range is being achieved through the perfection of in-flight refueling.

Because of this global range, airpower can be applied directly from the continental base of its industrial origin without intermediary bases and the international complications attendant upon their establishment and maintenance on foreign soil. ...

With the development of the global range of aircraft and the advent of nuclear weapons, local control of the air anywhere on the face of the Earth, except over the continental base of airpower containing the source of its industrial origin, can no longer be maintained. ...

It follows, also, that because local control of the air cannot be maintained, airpower can no longer be applied on a sustained basis against a continent from intermediary bases located on its periphery, whether those bases are fixed on land or are floating, as aircraft carriers. If, for example, a floating base ventures beyond the protective canopy of a friendly continental air force, it becomes untenable. It stands to reason that, like an intermediary base, a floating base can never contain enough airpower to challenge or ward off the entire air force of a hostile continent. Further, with the development of nuclear weapons of a size conveyable by small, supersonic aircraft, the floating base, like any other intermediary base, becomes extremely vulnerable and once destroyed, has no powers of recuperation.

From the above assumptions, it becomes clear that command of the air means a global command, exercised directly from the continent of its industrial origin. Either one controls the entire air ocean clear around the globe or one controls nothing. ...

In order to acquire maximum airpower, a nation must adhere to these principles of military art: singleness of purpose, unity of command, and concentration and economy of force. This means that the entire airpower potential of a country must be unified, under a single air command, into a single force—an air force in being that can go anywhere and do the necessary. ■

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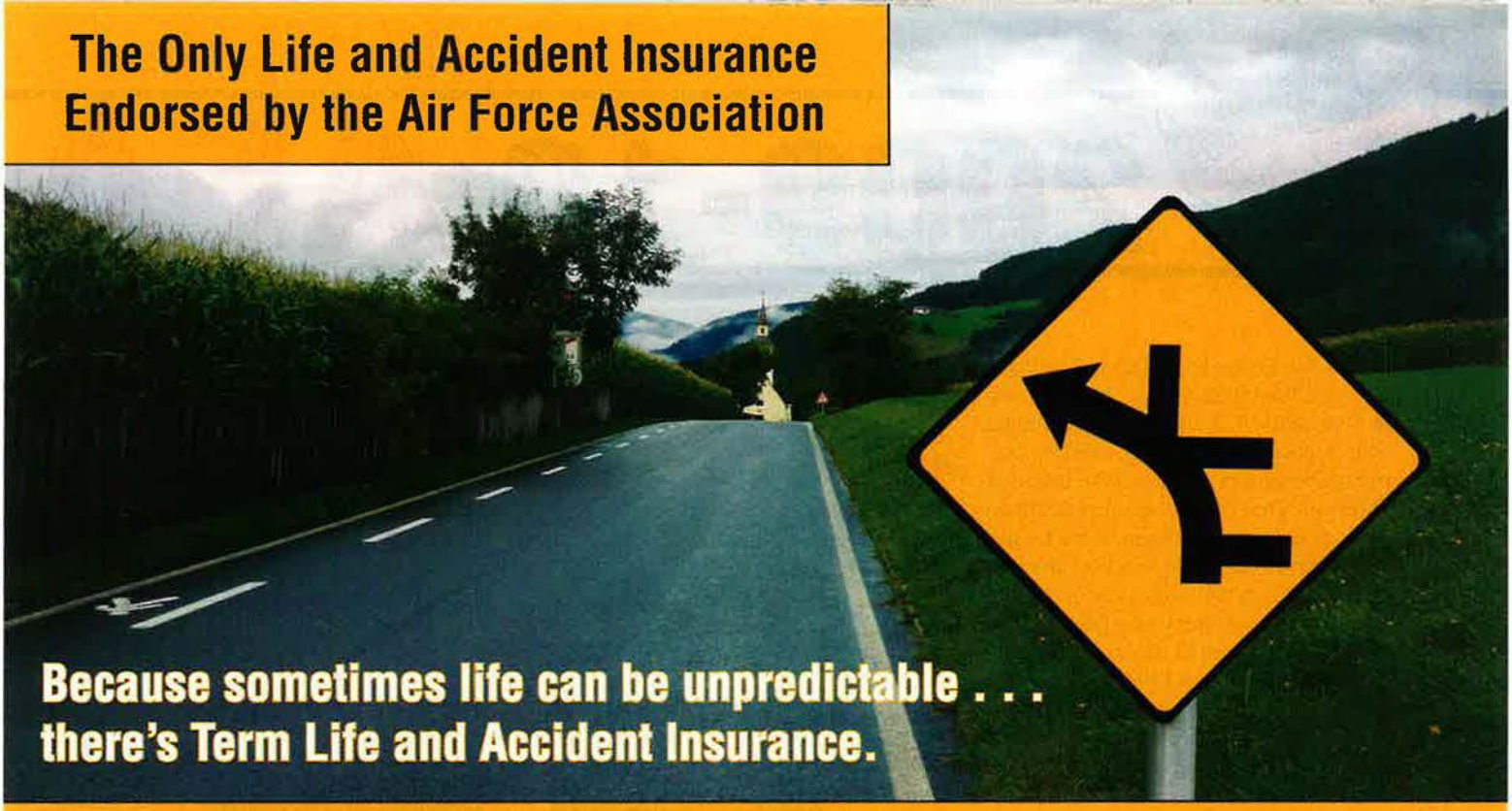

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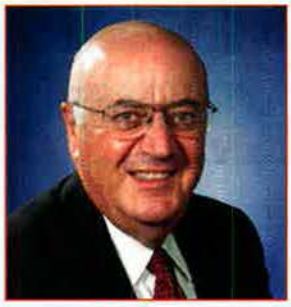
2009-10 AFA

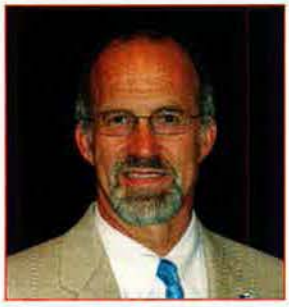
The Air Force Association Nominating Committee met on April 17 and selected candidates for five national officer positions and three elective National Director positions on the Board of Directors. The committee comprises three most recent past Chairmen of the Board, one person selected by each of the two Vice Chairmen, two persons from both the Central and East areas, one person from each of the regions in the West area, and one person each from Total Air Force, Air Force veterans, and aerospace industry. The slate will be presented to the delegates at the National Convention in Washington, D.C., in September.

Sutter
incumbent

Schlitt
incumbent



Lauducci
incumbent



Lundgren
incumbent

Chairman of the Board

Joseph E. Sutter, Knoxville, Tenn., nominated for a second one-year term. He is a Life Member and has been active in AFA since 1987, serving on the Board of Trustees of the Aerospace Education Foundation (now part of AFA) and in AFA at chapter, state, and national levels. Nationally, he was Vice Chairman of the Board-Field Operations, National Director, Chairman of AFA's Strategic Planning Committee, and Chairman of the afa21 Governance Team. He received the AFA Chairman's Citation, AFA Presidential Citation, Exceptional Service Award, and Medal of Merit, and was twice AFA Tennessee Volunteer Member of the Year. Sutter is past President of the Rotary Club of Knoxville and the East Tennessee Military Affairs Council, and sits on the Board of a Tennessee health care system. He served on active duty 28 years, mostly in ICBM units, commanding a missile squadron, operations group, and wing, and had staff assignments at the Pentagon and in major commands. Sutter received a bachelor's degree from University of Florida and master's degree from University of Southern California, and is a graduate of the Naval War College, College of Command and Staff, and Industrial College of the Armed Forces. He now consults on defense matters to USAF and other clients.

Vice Chairman for Aerospace Education

S. Sanford Schlitt, Sarasota, Fla., nominated for a third one-year term. He served as an AEF Trustee and, after AEF and AFA merged in 2006, on AFA's Board of Directors. He was a member of the afa21 Governance Team and was architect of the Aerospace Education Council and Field Council concepts. He served on the AEF Nominating and Program Committees, AFA Strategic Planning and Constitution Committees, as Chair of the AEF Audit Committee, and Co-Chair of the AFA/AEF Audit Committee. Schlitt served on the staffs of Sen. Hubert H. Humphrey and Sen. Walter Mondale and, in 1980, stood for Congress. He established (or purchased) and sold (or successfully liquidated) several companies, also serving as Chairman of one firm and board member of a NASDAQ-listed company. He was commissioned into the West Virginia ANG, transferred to the Reserve, and served 34 years in various assignments, mainly in contracts management and acquisition. Schlitt retired in 2001 as a brigadier general. He holds a degree from The American University and also attended SOS, ACSC, AWC, and the Leadership Institute at Eckerd College. He is Senior Managing Director of a mortgage investment trust, with responsibilities for financial portfolio management.

Vice Chairman for Field Operations

James R. Lauducci, Alexandria, Va., nominated for second one-year term. Lauducci is a Life Member and has served in many AFA positions. He is past President of the Steele Chapter in Northern Virginia, and is a former Virginia State President, VP Programs, VP Special Projects, and VP Membership. At the national level, Lauducci served on AFA's afa21 Governance Task Force, Membership Committee (two years as Chairman), Strategic Planning Committee, Nominating Committee, and as a National Director. Lauducci was Virginia AFA's Member of the Year and was awarded AFA's Medal of Merit, Exceptional Service Award, and Presidential Citation. He spent 24 years on active duty, serving in communications and information-related assignments at Strategic Air Command, NORAD, Joint Staff, NATO, and USAF Secretariat. He is a 2007 inductee into the Air Force Communi-

Nominees

cations and Information Hall of Fame. In private industry, he has held posts in program management, government relations, and business development. Lauducci holds a bachelor's degree from LeMoyne College and master's degree from Troy State University. He was also a Senior Executive Fellow at Harvard University's JFK School of Government. He is currently Director of Air Force Field Marketing for Harris Corp.

National Treasurer

Steven R. Lundgren, Fairbanks, Alaska, nominated for a fifth and final one-year term. Lundgren has been an AFA member for 27 years and has served in many leadership posts, including Chapter, State, and Region President. He chairs the AFA Finance Committee and President's Evaluation and Compensation Committee. He also received the Exceptional Service Award and Presidential Citation. Lundgren's professional career of more than 30 years has been spent entirely within the financial services industry. In Alaska, he is also active as a leader in civic organizations, serving as Chairman of Fairbanks Economic Development Corp. and on the Board of the Greater Fairbanks Chamber of Commerce. In the military field, he is a member of the Alaskan Command Civilian Advisory Board and Greater Fairbanks Chamber's Military Affairs Committee, and is Vice Chairman of the Alaska State Committee for Employer Support of the Guard and Reserve. He received top ESGR volunteerism awards, the Honorary Iceman Award-Eielson AFB, Alaska, and Alaska Commendation Medal. Lundgren holds a bachelor's degree from Oregon State University and has completed graduate work at Portland State University and University of Alaska, plus studies at professional schools. He is Executive Vice President of Denali State Bank, Fairbanks.

The Nominating Committee submits two names—Joan Sell and Marvin L. Tooman—as candidates for a one-year term as National Secretary.

National Secretary

Joan Sell, Colorado Springs, Colo., nominated for a first one-year term. Sell has been an active member of AFA since 1993 and is a Life Member. She has been a Community Partner since 1995. She has served as the Lance P. Sijan Chapter President, leading the chapter when it received the Donald W. Steele Sr. Memorial Award as Unit of the Year. She has also served as Colorado State President and is currently the Rocky Mountain Region President. Nationally, Sell was a member of the first class of the Field Council, chaired the Credentials Committee, and served on the Long-Range Planning Committee, and she has twice received the AFA Presidential Citation. She served six years on the board of the Colorado Aerospace Education Foundation (three as Chairwoman); 16 years on the Rocky Mountain Chapter Board of the National Defense Industrial Association (two as President); 10 years on the board of the Peterson Air and Space Museum (five as Director of Development; six years on the Armed Services YMCA Board; three years on the board of the Colorado Springs Chamber of Commerce; and five years as Co-chair of the Care & Share Food Bank of Southern Colorado's annual fundraiser, "Taste of the Springs." Sell enjoyed a 40-year career in the aerospace industry, retiring as a Director of Business Development. She also provided program development direction for Air Force Space Command, NORAD, US Northern Command, and Space and Missile Systems Center. She owns and operates a full-service spa in Falcon, Colo.

National Secretary

Marvin L. Tooman, West Des Moines, Iowa, nominated for a first one-year term. Tooman has been an AFA member since 1991 and is a Life Member. During his undergraduate studies, he was a member of the Arnold Air Society. Within AFA, he has served as Gen. Charles A. Horner Chapter President, Iowa State President, and Midwest Region President. Nationally, he is a member of the Field Council and has previously served on the Membership Committee. Tooman is recipient of the AFA Medal of Merit and Exceptional Service Award and was Midwest Member of the Year 2004. Tooman has served as President and CEO of a regional health care corporation providing rehabilitation services for individuals with brain injury. He served as a volunteer as Secretary and then President of the National Association of Health Facility Survey Agencies. In the Air Force, Tooman served five years on active duty as Electronic Combat Countermeasures Officer on a B-52 and 22 years in the 132nd Fighter Wing, Iowa Air National Guard. Within this unit, he was Chief of Base Administration, Chief of Personnel, Wing Electronic Combat Measures Officer, Chief of Intelligence, and Support Group Commander. Tooman holds a bachelor's and doctoral degree from Drake University and a master's degree from Central Michigan University. He retired as Iowa's Chief Regulator for Health Care.

Sell

Tooman

2009-10 AFA Nominees

The Nominating Committee submits two names—Wayne R. Kauffman and Peter D. Robinson—for National Director, West geographic area. One will be elected.

National Director West

Wayne R. Kauffman, Agoura, Calif., nominated for a first one-year term. Kauffman has been an AFA member since 2000. He has served as President and Vice President of Gen. B. A. Schriever Chapter in Los Angeles, California Area Vice President, California State Senior Vice President, and California State President and is currently serving as Far West Region President. He has also served on the AFA National Audit Committee. He

Kauffman

has received the AFA Medal of Merit along with numerous state awards. In addition to his active involvement in AFA, he is a member of a number of other professional organizations, including the National Defense Industrial Association (NDIA), AFCEA, Association of the US Army, American Institute of Aeronautics and Astronautics, and the California Space Authority. Kauffman has worked for a number of leading aerospace firms in the Los Angeles area. Before that, he served for two years in the US Army at the Aviation Test Board, Ft. Rucker, Ala., where he was involved in helicopter testing and served as a project manager. Kauffman holds a Bachelor of Science degree from the University of Florida. He is now Raytheon's Director of the Corporate Business Development Office for the Greater Los Angeles Area.

National Director West

Peter D. Robinson, Albuquerque, N.M., nominated for a first one-year term. Robinson has been an AFA

Robinson

member since the 1950s. He has been the New Mexico State President and the Southwest Region President and is currently serving as the New Mexico State Treasurer. He has received the AFA Medal of Merit. He is active in Daedalians and has been on the board of two nonprofit organizations in the area. He is currently Treasurer for Catholic Charities of Albuquerque and Santa Fe and has been active with that organization for 13 years. He retired with 33 years of active duty in USAF. His assignments included fighter operations, personnel, testing, training, and education. He flew 435 combat missions in Vietnam and commanded six different organizations at squadron level and above. After retirement from the Air Force, he consulted privately on defense issues. Robinson is a graduate of the US Air Force Academy and holds a master's degree from Pepperdine University. He also studied for two years at University of Freiburg in Germany. He completed SOS, Air Command and Staff College, the Air War College, Industrial College of the Armed Forces, and the Royal College of Defence Studies in London. He is now supporting nonprofit activities in Albuquerque.

The Nominating Committee submits five names—Karen L. Halstead, Larry Lawson, William R. Looney III, Eric P. Taylor, and David L. Veseley—for National Director at-large. Two will be elected.

National Director at Large

Karen L. Halstead, Tucson, Ariz., nominated for a first one-year term. Halstead joined AFA in 1983 and has been involved in it ever since. She has served as Tucson Chapter President and now is Vice President for Public Affairs and Communications. She has received the AFA Medal of Merit, the Exceptional Service Award, and the Chairman's Citation, and was President of the Tucson Chapter when it was recognized for special community achievement. Under her leadership, the Tucson Chapter created a charitable foundation to accept donations for programs to help deployed airmen, their families, and airmen with financial needs who are unable to qualify for other aid programs. In the Air Force, Halstead served in the public affairs career field and wrote for several military publications. Halstead has

Halstead

served her community as a member of Tucson's Military Community Relations Committee and a member of the Arizona Governor's Veterans' Roundtable Panel 2008. She was recently recognized as the Air Combat Command Zachary and Elizabeth Fisher Distinguished Civilian Humanitarian of the Year 2008. Halstead currently serves as the Chairman of the Board-CEO, Tucson Community Cares Foundation Inc. and active member of the Board of Directors, STARBASE Arizona Inc.

National Director at Large

Larry Lawson, Atlanta, Ga., nominated for a first one-year term. Lawson is a Life Member of AFA and has hosted and participated in numerous AFA events, briefings, and forums.

Lawson

Lawson, an engineer by profession, is a senior member of National Defense Industrial Association, American Institute of Aeronautics and Astronautics, and the National Management Association, from which he received the Silver Knight of Leadership Award in 2008. He is active in his community and serves on the American Diabetes Fund Raising Board and was formerly on the Kid's House Board of Directors. He volunteers for educational outreach programs such as Society of Automotive Engineers, leadership forums, and Atlanta's Good Fathers Summit. Lawson was named the Atlanta Father of the Year in 2007. He is an ardent supporter of the US Air Force, having dedicated to it more than 30 years of professional service. He holds a bachelor's degree from Lawrence Technological University and a master's degree from University of Missouri. In addition, he is a graduate of Harvard Business School's Advanced Management Program and was an MIT Seminar XXI Fellow. He is today Executive Vice President and General Manager of the F-22 Program at Lockheed Martin Aeronautics Co., Marietta, Ga.

National Director at Large

William R. Looney III, of Garden Ridge, Tex., nominated for a first one-year term. Looney became a Life Member of AFA in 1972 and was a supporter of AFA during his time in uniform. He has been recognized by AFA as the 2002 California Person of the Year, 2003 Schriever Fellow,

Looney

and 2008 Vandenberg Recipient. In addition, Looney has served as a member of AFA's Force Capabilities Committee, AFA's policy advisory group. Looney retired in 2008 as a general, after 36 years of active duty service. During his military career, Looney commanded air, space, and acquisition organizations in Air Combat Command, US Air Forces in Europe, Air Force Space Command, and Air Force Materiel Command. His last assignment was commander of Air Education and Training Command. Looney acquired a bachelor's degree from the United States Air Force Academy and a master's degree from Central Michigan University. He also attended Squadron Officer School, Armed Forces Staff College, National War College, as well as various other professional courses. Looney is now consulting on defense issues.

National Director at Large

Eric P. Taylor, West Grove, Pa., nominated for a first one-year term. Taylor has been a member of AFA since joining the Arnold Air Society in 1957. He has served as President at the chapter and region levels and

Taylor

as State President of two states and in two different regions. He is currently serving as the Pennsylvania State Vice President for Leadership Development and Membership. Nationally, he is a member of the Field Council and is in his fourth year on the Strategic Planning Committee. Taylor has been awarded the AFA Medal of Merit, the Exceptional Service Award, the Presidential Citation, and the Outstanding State Organization while New Hampshire State President. Taylor retired after 23 years' service in USAF—first as a Maintenance Officer for aircraft and ICBMs and then as an officer in systems development and acquisition of tactical weapons. He served in assignments on the Air Staff and at major command level. Upon retirement, Taylor worked for 16 years in the defense industry. Taylor holds a bachelor's degree from Pennsylvania State University and an MBA from University of Southern California. He is also a graduate of ICAF, in residence. Taylor is now in his third career in a family-owned business.

National Director at Large

David L. Vesely, of Lusby, Md., nominated for a first one-year term. Veseley is a Life Member who joined AFA in 1974. He has been an active member of the Board of Directors of

Vesely

Nation's Capital Chapter and a supporter of chapters across AFA. Vesely spent 33 years on active duty in the Air Force, retiring in 1999 as a lieutenant general. His final assignment was assistant vice chief of staff, Hq. USAF. He held numerous command and staff positions, primarily in operational units in the US and Europe. Vesely commanded an Air Force squadron, wing, and the 14th Air Force "Flying Tigers." He commanded two centers, the Air Force-Army Warrior Preparation Center in Germany and Space Warfare Center in Colorado. Vesely's staff assignments included positions at NATO's Southern Command, on the staff of the Secretary of the Air Force, the Joint Staff, and Hq. USAF. Vesely holds a bachelor's degree from Michigan Technological University and a master's degree from Auburn University. He attended Squadron Officer School, Air Command and Staff College, and Air War College. He is Senior Vice President and Air Force Strategic Account Executive for Science Applications International Corp., McLean, Va. ■

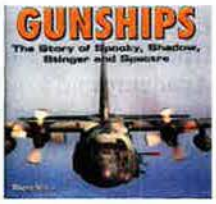
Full-length biographies are at: www.airforce-magazine.com, "2009-10 AFA Nominees"

Books

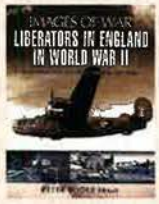
Compiled by Chequita Wood, Media Research Editor

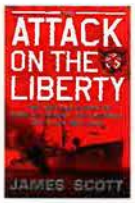
Apollo: Through the Eyes of the Astronauts. Robert Jacobs, Michael Cabbage, Constance Moore, and Bertram Ulrich, eds. Abrams, New York (212-206-7715). 130 pages. $24.95.

Gunships: The Story of Spooky, Shadow, Stinger, and Spectre. Wayne Mutza. Specialty Press, North Branch, MN (800-895-4585). 204 pages. $34.95.



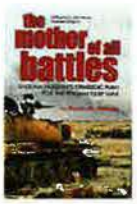
Liberators in England in World War II: Rare Photographs From Wartime Archives. Peter W. Bodle. Casemate Publishing, Drexel Hill, PA (610-853-9131). 139 pages. $25.99.





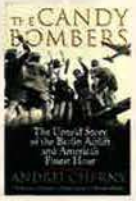
The Attack on the Liberty: The Untold Story of Israel's Deadly 1967 Assault on a US Spy Ship. James Scott. Simon & Schuster, New York (800-223-2336). 374 pages. $27.00.

Hey Dad, What Did You Do During the Cold War? Robert E. Schmaltz. Order from: www.lulu.com. 104 pages. $19.78.

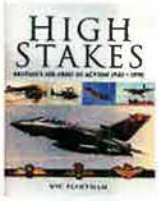


The Mother of All Battles: Saddam Hussein's Strategic Plan for the Persian Gulf War. Kevin M. Woods. Naval Institute Press, Annapolis, MD (800-233-8764). 352 pages. $28.00.

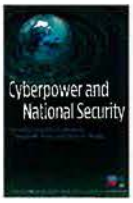
The Candy Bombers: The Untold Story of the Berlin Airlift and America's Finest Hour. Andrei Cherny. Berkley Caliber, New York (800-631-8571). 624 pages. $18.00.



High Stakes: Britain's Air Arms in Action 1945-1990. Vic Flintham. Casemate Publishing, Drexel Hill, PA (610-853-9131). 418 pages. $80.00.



Orville's Aviators: Outstanding Alumni of the Wright Flying School, 1910-1916. John Carver Edwards, McFarland & Co., Jefferson, NC (800-253-2187). 189 pages. $45.00.



Cyberpower and National Security. Franklin D. Kramer, Stuart H. Starr, and Larry K. Wentz eds. Potomac Books Inc., Dulles, VA (800-775-2518). 642 pages. $39.95.

Historical Dictionary of Air Intelligence. Glenmore S. Trenear-Harvey. Scarecrow Press Inc., Lanham, MD (800-462-6420). 218 pages. $85.00.

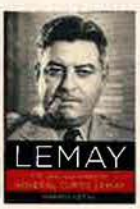
Smithsonian Atlas of Space Exploration. Roger D. Launius and Andrew K. Johnston. HarperCollins, New York (800-242-7737). 230 pages. $34.99.

A Fighter Pilot in Buchenwald. Joseph F. Moser and Gerald R. Baron. Edens Veil Media, Bellingham, WA (360-671-8708). 205 pages. $18.50.

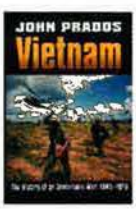
The Illustrated History of American Military Commissaries, Vol. 2: The Defense Commissary Agency and its Predecessors Since 1989. Peter D. Skirbunt and Kevin L. Robinson, ed. GPO, Supt. of Documents, Washington, DC (866-512-1800). 765 pages. $89.00.

A Trash Hauler in Vietnam: Memoir of Four Tactical Airlift Tours, 1965-1968. Bill Barry. McFarland & Co., Jefferson, NC (800-253-2187). 207 pages. $35.00.

Flying From the Black Hole: The B-52 Navigator-Bombardiers of Vietnam. Robert O. Harder. Naval Institute Press, Annapolis, MD (800-233-8764). 299 pages. $34.95.



LeMay: The Life and Wars of General Curtis LeMay. Warren Kozak. Regnery Publishing, Washington, DC (202-216-0600). 434 pages. $27.95.



Vietnam: The History of an Unwinnable War, 1945-1975. John Prados. University Press of Kansas, Lawrence, KS (785-864-4155). 665 pages. $34.95.

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Flashback

Great Guns!

USAF photo. Text by Andrea K. Dudney

In the early 1960s, one of the wings flying the new B-52G was the 4135th Strategic Wing, Eglin AFB, Fla. The bomber had been improved with the addition of television and electronic controls on its rear gun turret. The TV camera, located above the guns, eliminated the need for positioning the tail gunner in the back of the aircraft; he was able to sit in the control compartment in the front of the aircraft, where he watched a screen showing the view at the rear of the bomber. Here, MSgt. Jerry O. Magee, crew chief, checks the ammunition booster that fed the four .50-caliber "stingers," each of which could fire as many as 600 rounds.

AFA National Report

natrep@afa.org

By Frances McKenney, Assistant Managing Editor

Air Force Week in Utah

Air Force Association chapters have celebrated Air Force Week in two cities so far, this year—the **Northern Utah Chapter, Salt Lake Chapter,** and **Ute-Rocky Mountain Chapter** in Salt Lake City, Utah, and the **Langley Chapter** in Hampton Roads, Va.

In 2006, Gen. T. Michael Moseley, then USAF Chief of Staff, established Air Force Week as a way to spotlight the service's personnel, missions, and equipment and to thank residents of three different US cities each year for supporting US airpower. Air Force Week combines activities such as an open house, symposium, and entertainment, and ends with an air show featuring the US Air Force Air Demonstration Squadron, the Thunderbirds. The third city chosen for an Air Force Week celebration in 2009 is Sacramento, Calif., where events will take place from Sept. 5 to 13.

In Salt Lake City, Air Force Week took place June 1-7 and included the Utah Air Force Association's 30th annual Focus on Defense symposium, held at a convention center in Layton, Utah.

Secretary of the Air Force Michael B. Donley and USAF Chief of Staff Gen. Norton A. Schwartz both helped Utah Gov. Jon M. Huntsman Jr. proclaim Air Force Week with a ceremony on the State Capitol steps.

US Sen. Orrin G. Hatch (R) and Sen. Robert F. Bennett (R) attended a presymposium social for keynote speakers. Symposium presenters were: Gen. Donald J. Hoffman, commander of Air Force Materiel Command; Lt. Gen. Raymond E. Johns Jr., deputy chief of staff for strategic plans and programs; Lt. Gen. Loren M. Reno, deputy chief of staff for logistics, installations, and mission support; Maj. Gen. R. Mike Worden, Air Combat Command vice commander; and Brig. Gen. Everett H. Thomas, commander of the Air Force Nuclear Weapons Center.

The symposium gave USAF, defense industry, and local business leaders a chance to understand each others' mission and requirements. Karl E. McCleary, chairman of the event and a Northern Utah Chapter member, told the Hill Air Force Base newspaper that attendees always come away from this symposium with firsthand information that they can directly apply in their everyday work.

As part of Utah's Focus on Defense event, AFA Board Chairman Joe Sutter (r) joined (l-r) retired CMSAF Gerald Murray, Jack Murphy, and Pat Condon for a fundraising golf outing. Murphy commanded Ogden Air Logistics Center (1978-81). Condon is a former AFA Board Chairman. The tournament raised $40,000 for aerospace education projects.

Focus on Defense and fundraising social events held in conjunction with it have raised more than $770,000 for AFA Utah's aerospace education foundation.

Air Force Week in Virginia

In Hampton Roads, Air Force Week ran from April 18 to 26 and incorporated Airpower Over Hampton Roads, Langley Air Force Base's annual air show.

Among other roles, the **Langley Chapter** facilitated commercial sponsorships, raising funds to cover the civilian air show performers' costs. These expenses included fuel, ground transportation, and catering. Chapter President Blair Ellis said the chapter's contributions allowed the 1st Fighter Wing at Langley to carry out the show without relying solely on government funds.

Ellis said chapter member Jeffrey J. Blessing took the lead as air show liaison to the wing, with Ellis and Monte R. Correll, the chapter treasurer, keeping the planning and execution "on track." However, the "true architect of the event," Ellis said, was Dale Drumright, who works for the chapter as air show manager.

Ellis said the chapter "is honored to help the 1st Fighter Wing showcase Air Force capabilities, enhance recruiting, and enhance the public image of the Air Force."

Airpower Over Hampton Roads 2009 drew 188,000 visitors. Periodically throughout the two-day air show, the announcer specifically thanked the Langley Chapter for its sponsorship.

Helping Them Move Forward

S. Sanford Schlitt, AFA's Vice Chairman of the Board for Aerospace Education, received orientations to Florida's Hurlburt Field and Eglin Air Force Base, including the Air Armament Center, in May. He also spoke at the **Eglin Chapter's** dinner meeting, met with Eglin and **Hurlburt Chapter** officials, visited with AFA's National Teacher of the Year, and toured the Air Force Enlisted Village, home for surviving spouses of USAF retirees, in Shalimar.

At an education-appreciation banquet held at Eglin's Air Force Armament Museum, Schlitt was guest speaker and helped honor eight AFA scholarship recipients from local JROTC units and two aviation institutes. *Northwest Florida Daily News* reported that 120

attended this banquet. Schlitt said of the awardees, "These are kids who've already expressed a love for country and an interest in serving. We're just helping them move forward."

While in the area, Schlitt met six aerospace teachers, including Tom D. Godbold, named the Eglin Chapter's 2009 Teacher of the Year, and Leo F. Murphy, AFA's 2008 National Aerospace Teacher of the Year.

Apollo 10 Commemoration

In Oklahoma, the **Central Oklahoma (Gerrity) Chapter** carried out a special request from the guest of honor of a 40th anniversary spaceflight commemoration.

Retired Air Force Lt. Gen. Thomas P. Stafford, who was Apollo 10's commander for the May 1969 mission, was the main honoree of the anniversary, held in May in his home state. Apollo 10 was, in effect, a dress rehearsal for the Moon landing that took place two months later.

As planning for the 40th anniversary got under way, Stafford asked that 10 high school students be invited to the celebration. Chapter member Rick A. Buschelman said that the chapter—headed by James F. Diehl—took on the task and set Mark L. Tarpley, aerospace education VP, to work. Tarpley contacted schools that had ties to AFA through the teacher of the year program, Air Force JROTC, or the Visions of Exploration Program. Visions is a joint effort by AFA and USA Today to interest students in studying science, technology, engineering, and mathematics through newspaper articles on those subjects.

The chapter paid all costs for the 10 students selected to attend the banquet and assigned them escorts: Buschelman, James Putnam, Jennifer Condon-Pracht, and Marcia Walker.

Before a reception that opened the evening's commemoration, the students met Stafford and former astronaut Eugene A. Cernan, who was the lunar module pilot for the mission. The students also received commemorative coins and were formally introduced to the audience of some 350 guests.

Convention: California

The **Bob Hope Chapter** hosted an event-filled California State Convention at March Air Reserve Base near Riverside, Calif., over three days in May.

A Thursday evening reception at the base's Hap Arnold Conference Center kicked off events. Friday's golf tournament raised funds for the state's AFA aerospace education foundation. Convention-goers toured the base to take in the Predator unit, a C-17 simulator, the Air and Marine Operations Center, and the F-16 alert area.

An awards ceremony that evening took place at the March Field Air Museum, where David T. Buckwalter, AFA's executive vice president, was guest speaker. Thirty-one awards went to the state's outstanding AFA members that night.

AFA state leaders were elected at Saturday's business session: Martin W. Ledwitz from the **San Gabriel Valley Chapter,** as president; George E. Williams, from the same chapter, secretary; Nancy J. Driscoll—currently president of the host Bob Hope Chapter—treasurer; and as area VPs, Enrico R. Valentia from the **Brig. Gen. Robert F. Travis Chapter,** Frank D. Walterscheid from the **Maj. Gen. Charles I. Bennett Jr. Chapter,** and Louis J. Kridelbaugh of the **General Doolittle Los Angeles Area Chapter.**

Norman A. Marous of the **Robert H. Goddard Chapter** was master of ceremonies for the evening's Military Awards Ceremony, also held at the Hap Arnold Conference Center. The 4th Air Force commander, Brig. Gen. Eric W. Crabtree, served as guest speaker, addressing the convention's theme, "Women in Flight History and the Air Force." Awards that evening went to outstanding personnel and units of the Total Force, AFROTC, AFJROTC, Civil Air Patrol, and—for the first time—the California State Military Reserve. The CSMR is the state defense force, controlled by the governor, trained to handle National Guard responsibilities.

Educational scholarships and area and state Teachers of the Year received recognition at the awards ceremony, as did Driscoll—named Member of the Year—and Brig. Gen. Robert P. Otto, the Person of the Year. Otto is 9th Reconnaissance Wing commander at Beale

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

AFA Conventions

Aug. 1	**Massachusetts State Convention,** Cape Cod AFS, Mass.
Aug. 1	**Pennsylvania State Convention,** Carlisle, Pa.
Aug. 29	**Washington State Convention,** Ellensburg, Wash.
Sept. 12-13	**AFA National Convention,** Washington, D.C.
Sept. 14-16	**AFA Air & Space Conference,** Washington, D.C.

Reunions

reunions@afa.org

307th ARS. Oct. 15-18 at the Dedham Hilton Hotel in Dedham, MA. **Contact:** Dix Howard (dixhow@aol.com).

340th BW, including all **Whiteman AFB** personnel (1950-63). Sept. 10-13 in Branson, MO. **Contact:** Bob Barnhill, 277 Sandhill Rd., Lonoke, AR 72086 (501-676-2305) (rjbarnhill@aol.com).

610th/618th ACW Sq, including the **527th ACW Gp, 43rd AD,** Japan (1945-60). Sept. 27-30 in Branson, MO. **Contact:** John Rosso (661-832-6036) (godfather1501@hotmail.com).

1198th Operational Evaluation & Tng Sq. Oct. 25-27 at the Rio Hotel in Las Vegas. **Contact:** Norm Pfeifer, 9201 Fallworth St., San Antonio, TX 78254 (210-522-1309) (npfeifer@satx.rr.com).

7405th and 7580th Ops Sq, Rhein-Main AB, Germany. Oct. 2-4 at the Holiday Inn in Fairborn, OH. **Contact:** Michael Hushion (937-320-1998) (mhushion@woh.rr.com).

B-57 Canberra Assn. Sept. 17-21 in Colorado Springs, CO. **Contact:** Gayle Johnson (920-261-3879) (gaylepj35@att.net).

Lockbourne AFB, OH. Oct. 15-18 at Nativo Lodge, Albuquerque, NM. **Contacts:** Betty Cea (740-392-7750) (bcea@roadrunner.com) or Gus Letto (505-821-8740) (lettog@att.net).

Pilot Tng Class 61-D. Oct 18-22 in San Antonio. **Contacts:** Lee Taylor (leroyctaylor@earthlink.net) or Dick Trzaskoma (texastrz@aol.dom). ▪

E-mail unit reunion notices four months ahead of the event to reunions@afa.org, or mail notices to "Reunions," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information. We reserve the right to condense notices.

AFB, Calif., site of next year's convention in the Golden State.

You Will Be Impressed

In encouraging the **Tennessee Valley Chapter (Ala.)** members to volunteer to present AFJROTC awards to local cadets, Chapter President Frederick Driesbach wrote that they would see "great things the ROTC instructors have accomplished in making some 'True Blue' citizens out of some otherwise Xbox-oriented kids—You will be impressed."

He added, "Being in uniform is not a requirement, but wear of dress blues is appropriate if they still fit."

The uniform still fit retired Col. John R. Phillip, chapter aerospace education VP. He presented three Air Force Junior ROTC cadets in the Huntsville, Ala., area with $500 college scholarships from the chapter.

At Huntsville High School, Anya Mullins was the recipient. Marcell Battle received the award at Butler High School. At Bob Jones High School, chapter members Russell V. Lewey and Otha H. Vaughan Jr. joined Phillip to present Matthew Jones with a scholarship. Phillip said this is the third year that the chapter has awarded these scholarships. They are "a performance motivator among the seniors within each ROTC unit," he said.

More Chapter News

■ In May, Iowa's AFA chapters, including the **Gen. Charles A. Horner Chapter** and the **Fort Dodge Chapter,** paid tribute to a hometown hero, Medal of Honor recipient retired Col. George E. Day. Born in Sioux City, Iowa, Day now lives in Florida, a member of the Eglin Chapter. In August 1967, he was a forward air controller-pilot on an F-100 that was shot down over North Vietnam. He became a POW but managed to escape to the demilitarized zone before being recaptured. He spent 5.5 years in captivity. Day became an attorney and championed Tricare for Life—military health care coverage to beneficiaries 65 years of age or older. Iowa's AFA dinner for Day took place at a hotel in a Des Moines suburb and, along with a presentation by Day, featured the musical group Raptor from Offutt AFB, Neb. As State President Marvin L. Tooman said, "It was a gala evening."

■ The **Charleston Chapter (S.C.)**—headed by Ronald I. Powell—hosted the South Carolina State Convention in May, with James R. Lauducci, AFA's Vice Chairman of the Board for Field Operations, as the awards luncheon guest speaker. Charleston Chapter VP Arthur J. Rooney Jr. reported that Lauducci encouraged chapters to offer activities that will interest younger USAF and defense-industry personnel to become involved in AFA. State President Rodgers K. Greenawalt took home the state's Member of the Year award. USAF awardees from Charleston Air Force Base were SSgt. Daniel Gutowski, 15th Airlift Squadron, named both Outstanding Aviator and Outstanding Air Force Person, and a husband and wife team: Capt. Heather Mueller, 437th Aerial Port Squadron, who received the logistics award, and Capt. Frederick Mueller, 437th Airlift Wing, receiving the mission support award. Conventioneers included **Strom Thurmond Chapter** President Victor Janushkowsky, **Swamp Fox Chapter** President David T. Hanson, and **Columbia Palmetto Chapter** President Deborah L. Marshall.

■ With chapter members handling key elements, the **Tidewater Chapter (Va.)** hosted a major event, its second annual Aviation Heritage Gala. First, Community Partner Gerald Yagen provided the program and the venue: the Military Aviation Museum in Virginia Beach, Va. Second, chapter member retired Lt. Col. Gordon R. Strong organized his AFJROTC cadets from Grassfield High School in Chesapeake for setup, serving, and cleanup duties. A Kiwanis Club provided the food, and some 250 guests enjoyed music from an Army band. The museum is located at the Virginia Beach Airport and comprises about 30 World War II and Korean War aircraft. Chapter President William M. Cuthriell noted that another 30 are undergoing restoration and that Yagen told the gala audience that more buildings are planned for the museum.

■ In Alabama, **Tennessee Valley Chapter** and State Teacher of the Year, Lynn Toney, received such an abundance of awards at a school board meeting in May that at least two local newspapers highlighted the presenta-

tion from among more than 100 teachers and students receiving recognition that evening. Chapter President Frederick Driesbach first presented Toney, a resource teacher at Boaz (Ala.) Intermediate School, with $250 and an AFA tote bag, as chapter Teacher of the Year. Susan Mallett, state aerospace education VP and a **Montgomery Chapter** member, then presented Toney with State Teacher of the Year awards: $500, a commemorative plaque, and an AFA windbreaker. Toney was selected for the awards in part for developing a science lab that gives students experience with robotics, hydraulics, and engineering.

■ The **Langley Chapter (Va.)** joined with the Virginia Air and Space Center in presenting the 2009 Chapter Teacher of the Year Award to Penny Vaughn during a luncheon June 9 at the Langley Air Force Base Officers Club. Vaughn teaches sixth grade science at Tabb Middle School in Yorktown. Chapter President Blair Ellis, Jerry L. Levesque, chapter aerospace education VP, and the center's deputy director, Kim K. Hinson, presented the award to Vaughn. She received $1,000 and a year's membership in both AFA and the VASC, and the center will honor her with an engraved gold star displayed at its Hampton, Va., facility. This is the second year that the Langley Chapter has partnered with the center for this award. In addition to supplementing the award, the VASC advertises it at workshops and in their educational guide.

■ The **Columbus-Bakalar Chapter's** May meeting in Columbus, Ind., featured State President William R. Grider as guest speaker. A member of the **Grissom Memorial Chapter** in Kokomo, Grider presented an overview of trends in the military budget, end strength, and age and readiness of equipment, as well as information on the F-22 and F-35.

■ On Memorial Day weekend, the **Long Island Chapter (N.Y.)** manned a display table, as spectators streamed by during the Bethpage Federal Credit Union New York Air Show at Jones Beach State Park. Fred Di Fabio, chapter treasurer, said the AFA table was so close to the vintage aircraft on display that chapter members had "a great opportunity to interact with the spectators as they came to see the aircraft." Crowd numbers? The official count was more than 400,000, according to the air show Web site. Lending support to the AFA table were New York State President Alphonse A. Parise, chapter communications VP William Birnbach, and members Frank T. Logan III, Robert Braverman, and Paul R. DeVaul.

■ Jerry E. White from the **Lance P. Sijan Chapter (Colo.)** represented AFA at the US Air Force Academy's 50th annual Outstanding Squadron celebration. The academy's Cadet Squadron 3, nicknamed "Cerberus Dogs of War," received the honors this year, with cadets Elijah Culpepper—now a second lieutenant—and Bradley Sapper accepting the prestigious award from White at the academy's organizational awards parade. AFA partners with the academy's Association of Graduates in sponsoring the Outstanding Squadron award and formal banquet.

■ **Hawaii Chapter** President Nora Ruebrook selected the chapter vice president, Capt. Stephanie A. Dye, to represent the Air Force Association at the Memorial Day ceremony held at Honolulu's National Memorial Cemetery of the Pacific. Accompanied by Capt. Billy Dye, Stephanie Dye presented an AFA wreath. The Dyes were among more than 35 veterans organizations participating in the ceremony, which was attended by L. Tammy Duckworth, assistant secretary of veterans affairs, US Sen. Daniel K. Akaka (D), US Rep. Neil Abercrombie (D), and US Rep. Mazie Hirono (D). Stephanie Dye is assigned to Pacific Command's plans directorate. Billy Dye is from the 535th Airlift Squadron, Hickam AFB, Hawaii.

■ As part of the Francis Marion Military Academy's "Rocketry Days" in May, the **Red Tail Memorial Chapter** in Ocala, Fla., sponsored its first workshop. Chapter President Michael H. Emig said the charter school's students, their families, and teachers from middle and high schools in the county all took part in a six-hour rockets-and-math session. They built model "rockets" with construction paper, a rocket from a kit, and a payload-capable rocket model. The workshop's math segment taught them how to calculate time, distance, and altitude for their rockets. Among the instructors were the school's John R. Edsall, who is also a chapter member, and Gregory S. Stritch, from the **Falcon Chapter.**

■ **Col. H. M. "Bud" West Chapter (Fla.)** members manned an information table during AirFest 2009, sponsored by the Experimental Aircraft Association and held at Tallahassee Regional Airport on May 16. Chapter President Gary B. Sharpe, VP John E. Schmidt Jr., and chapter member Kevin Vislocky provided visitors with AFA information and distributed copies of the May Almanac issue of *Air Force* Magazine.

■ Welcome aboard! At a luncheon meeting in Marina, Calif., the **Monterey Bay Area Chapter** president, John J. Branson Jr., presented a Community Partner plaque to Robert O. Grimes, commander of the local American Legion post. Branson, a retired Navy commander and former carrier pilot, credited Richard B. Peckham, the communications VP, and Stanley J. Hryn, chapter secretary-treasurer, for recruiting Grimes as a Community Partner—part of the chapter's effort to encourage like-minded organizations to join AFA.

■ The **Southern Indiana Chapter's** quarterly meeting in Bloomington, Ind., featured local resident and motivational speaker Elizabeth Lyon. Diagnosed with multiple sclerosis, a central nervous system disease, she continues to compete in marathons. Chapter President Marcus R. Oliphant reported that 60 people attended the meeting, and the chapter donated $200 to the National Multiple Sclerosis Society. ■

Have AFA News?

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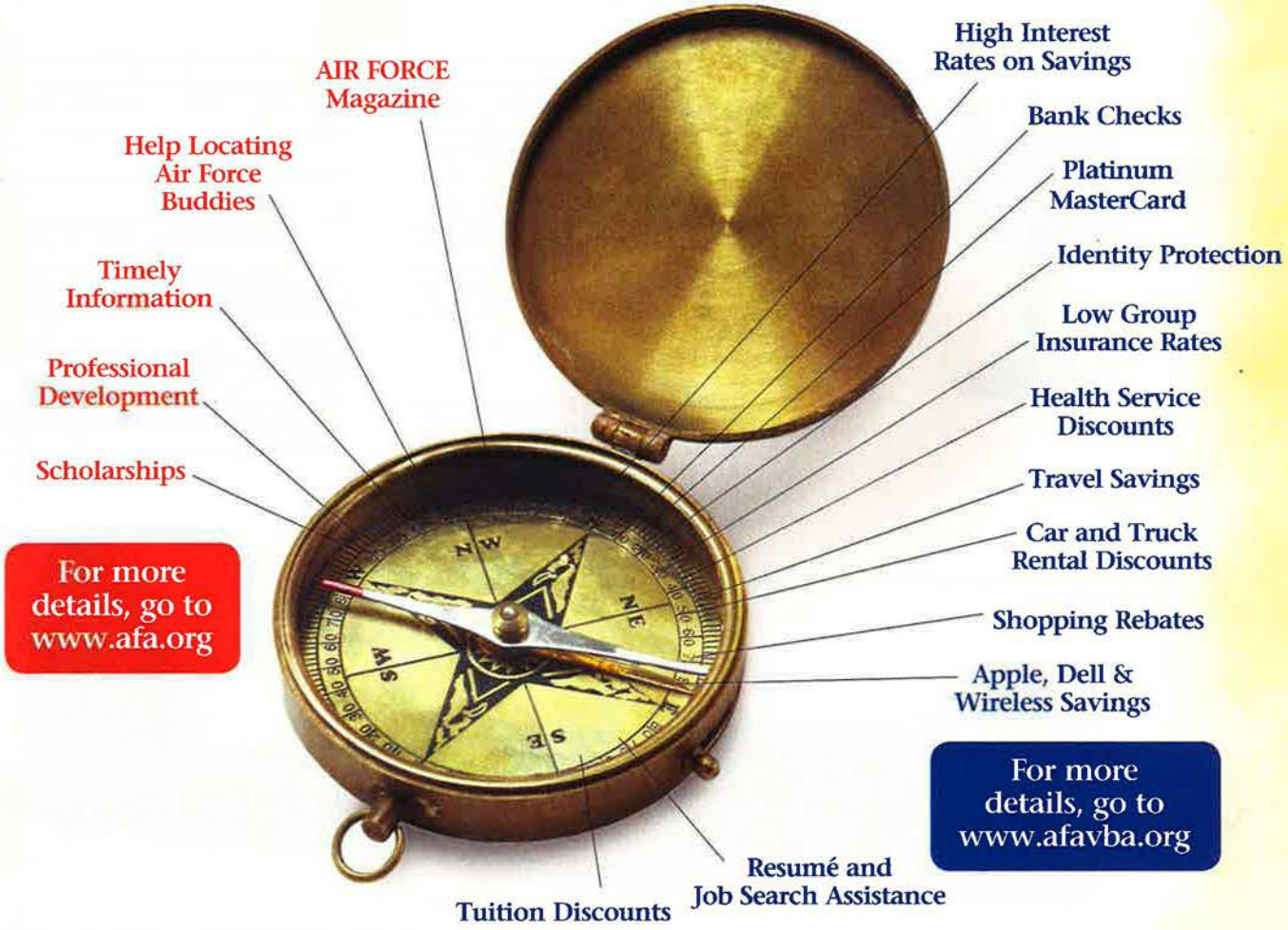

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Airpower Classics

Artwork by Zaur Eylanbekov

Mosquito

The Royal Air Force Mosquito proved to be perhaps the most versatile aircraft of World War II. This de Havilland product—a light bomber that could outrun many fighters—starred in many roles, including those of fighter, bomber, fighter-bomber, night fighter, torpedo attack, reconnaissance, minelayer, pathfinder, trainer, and high-speed transport. No aircraft frustrated the Luftwaffe as much. It ranged over European skies day and night, keeping the air raid sirens blaring. The aircraft's high speed and low radar signature let it operate in relative safety so that it posted the lowest loss rate (.7 percent) of any British bomber.

Britain initially rejected the de Havilland concept of a clean, low-drag, all-wood, unarmed warplane, but Air Chief Marshal Wilfred Freeman, the RAF armament chief, supported the project and authorized the first contract in 1940. Work proceeded quickly on three prototype aircraft, one each for bomber, night-fighter, and photo-reconnaissance versions. Powered by two Rolls Royce Merlin engines, the Mosquito's design adapted quickly to different missions.

The Mosquito entered combat in May 1942 and served with distinction in almost every theater of war. Even the US Army Air Forces used Mosquitos for photo and electronic reconnaissance, chaff dispensing, special operation missions, and bomber scout work. The Mosquito was famous for mounting pinpoint attacks on special German targets—the first of which (Sept. 25, 1942) hit Gestapo headquarters in Oslo and destroyed German records of the Norwegian resistance. These early raids proved the basic principle that, in an air war, speed is life. Even the vaunted German FW 190 struggled to keep up with the Mosquito.

—Walter J. Boyne

This aircraft: Royal Air Force Mosquito B Mk IV as it looked in early 1943, when assigned to No. 139 Squadron at RAF Marham in Britain.

Americans studied the Mosquito's stability and control.

In Brief

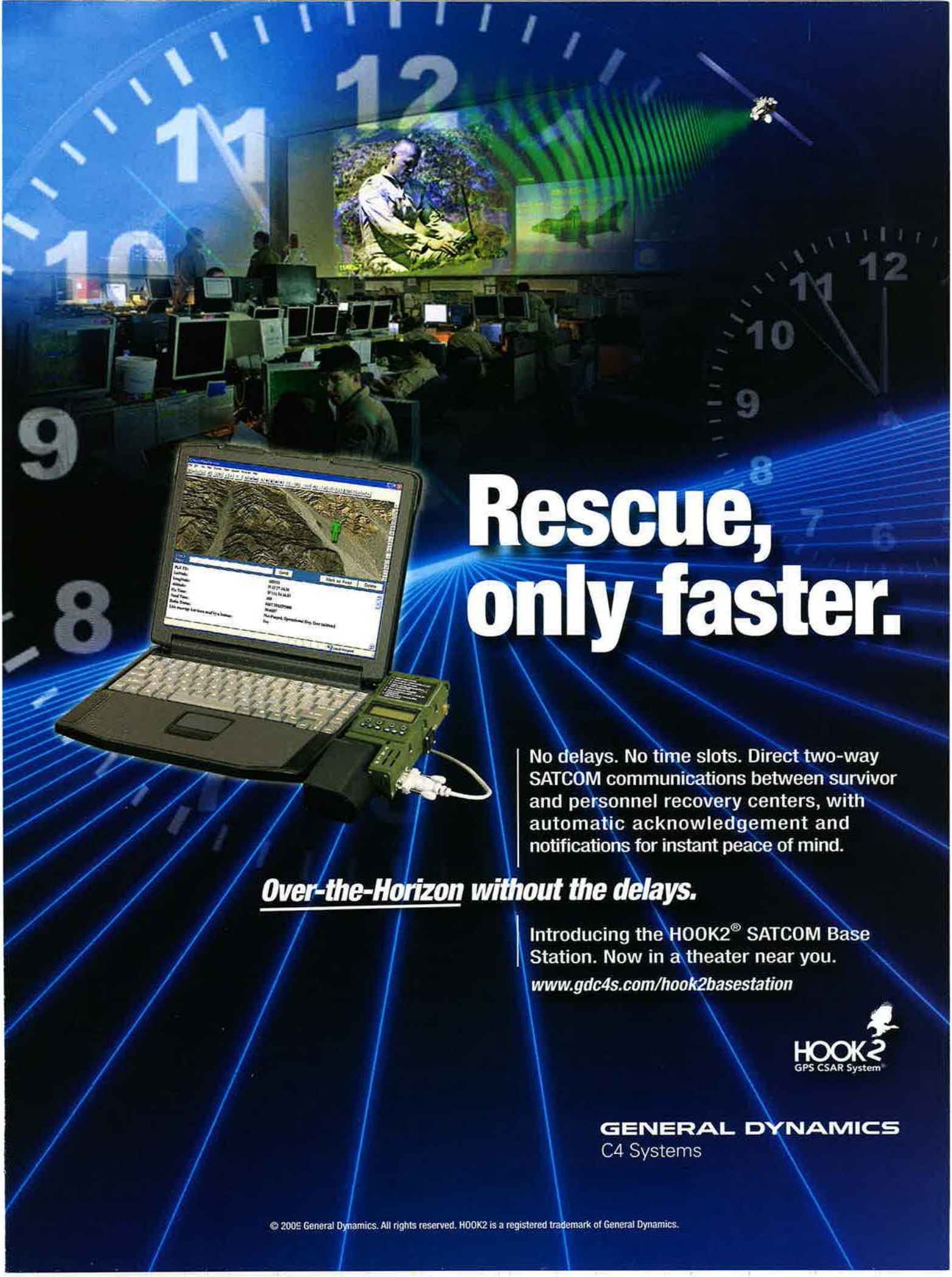
Designed by de Havilland ★ built by de Havilland, Airspeed, Percival, and Standard ★ first flight Nov. 25, 1940 ★ crew of two ★ number built 7,781 ★ two RR Merlin V-12 engines ★ **Specific to F. B. Mk VI:** max speed 380 mph ★ cruise speed 325 mph ★ max range 1,270 miles ★ armament four 20 mm cannons ★ bomb load, 2,000 lb or 1,000 lb and eight 60-lb rockets ★ weight (max) 22,300 lb ★ span 54 ft 2 in ★ length 40 ft 11 in ★ height 15 ft 3 in.

Famous Fliers

Victoria Cross: Leonard Cheshire. **RAF Aces:** Robert Braham, Branse Burbridge, Peter Green, J. W. Allan, Charles Scherf, John Cunningham, "Dam Buster" leader Guy Gibson. **Other notables:** Sidney Cotton, Bill Edrich, Geoffrey de Havilland Jr., John de Havilland, Kirk Kerkorian, Boleslaw Orlinski.

Interesting Facts

Featured one-piece wing made almost entirely of wood ★ used by some 20 air forces ★ landed on an aircraft carrier (first British twin-engine aircraft to do so) ★ made specialized pinpoint attacks on German prisons, Gestapo headquarters ★ claimed 600 victories as night fighter ★ shot down 600 V-1 buzz bombs ★ flown by Israel in 1956 Suez War ★ nicknamed "Mossie," "Wooden Wonder" ★ featured in 1964 film "633 Squadron" (with Cliff Robertson) and 1969 film "Mosquito Squadron" (with David McCallum).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