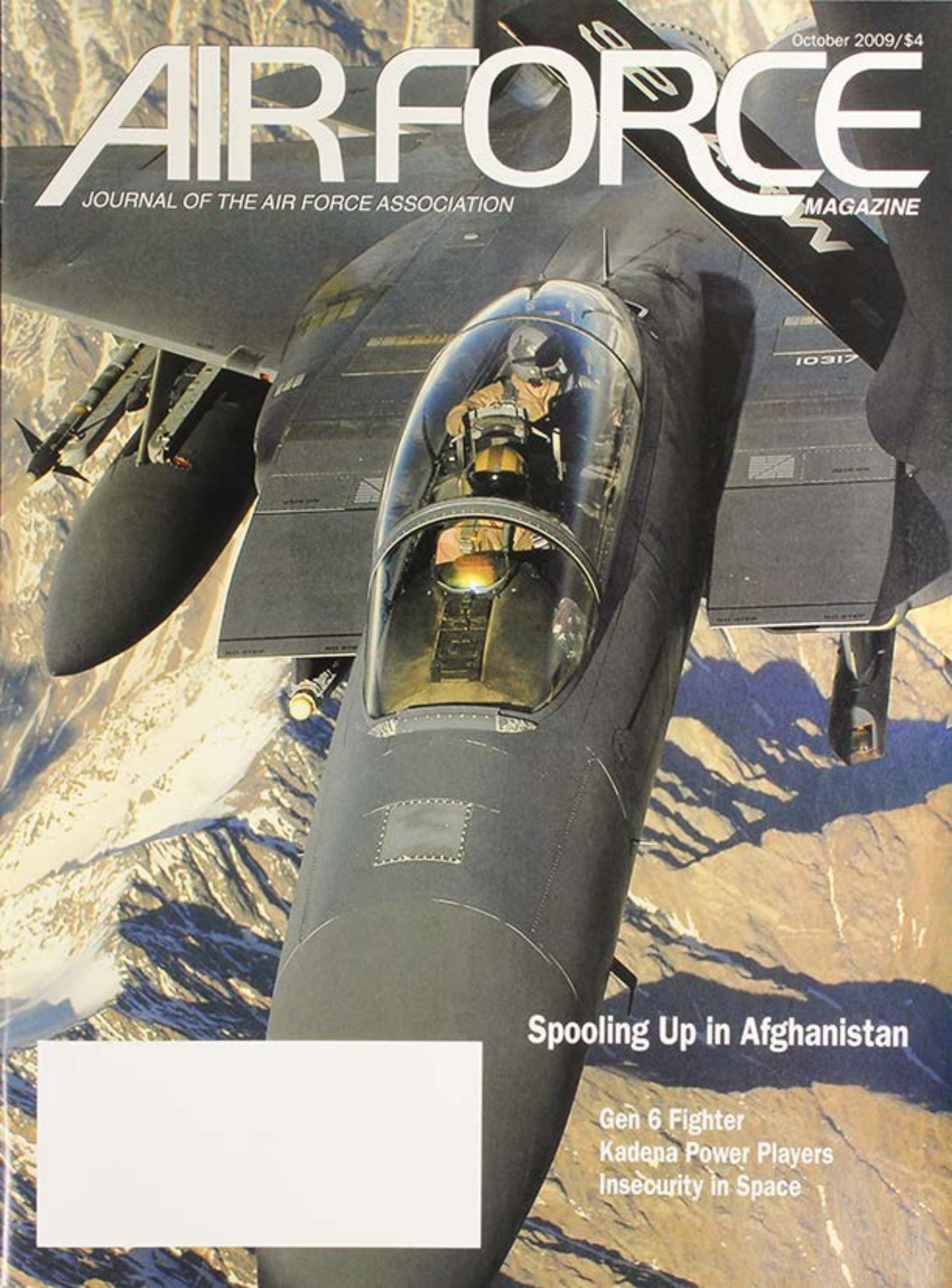


October 2009/\$4

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MAGAZINE



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October 2009, Vol. 92, No. 10



About the cover: An F-15E moves into refueling position under a KC-135 over Afghanistan. USAF photo by MSgt. Andy Dunaway. See "Spooling Up in Afghanistan," p. 22.

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Threats or Capabilities?

IN MARCH 1989, Dick Cheney, recently nominated to be Defense Secretary, went through his Senate confirmation hearing. He and the Senators mulled over threat scenarios, but no one mentioned Iraq. Mere months later, Iraq invaded Kuwait and Cheney faced war.

It was a classic case of poor threat forecasting. Still, Cheney was not without means. He had access to new weapons—most notably the F-117 stealth fighter—which would bring swift victory in the Gulf War. Cheney later publicly thanked Harold Brown. Brown, the late 1970s Pentagon chief, was the man who actually started the weapons programs Cheney used to such great effect.

When war comes, US leaders must fight with the forces in hand. Their predecessors cannot foresee all possible foes and construct forces to defeat them. They can only bequeath broad capabilities useful in unknown scenarios.

Today's Pentagon, under Secretary of Defense Robert M. Gates, appears to be de-emphasizing that goal; it now chooses to plan US forces mostly in response to specific, current dangers—those Gates calls the “real threats, posed by real-world adversaries, with real limitations.”

Unless someone can match a weapon to a clear and present (or near-present) danger, the Pentagon likely won't spend money on it.

It is a notable shift, and it marks a more or less explicit abandonment of one of the Bush Administration's signature defense policies. In 2001, Donald H. Rumsfeld, Bush's Pentagon chief, established that, when planning future forces, we should move away from a “threat-based” posture, which was traditional, to a “capabilities-based” one.

Planners began focusing on how a potential adversary might fight, rather than on the identity of a foe or a specific scenario. In turn, DOD concentrated on the capabilities adversaries might have or acquire—anti-satellite arms, ballistic missiles, cyber-war systems—in order to determine needed US capabilities.

In short, said the Pentagon, the US would not “over-optimize the joint force for a limited set of threat scenarios,” as it had for years, and leave itself open to potentially lethal surprises.

It was a hard sell. Over eight years, the concept drew numerous critics,

zealous in their condemnation of its alleged defects.

The most consequential critique grew out of the two long and painful wars in Iraq and Afghanistan. Ground-force partisans said Rumsfeld's approach shortchanged soldiers and marines fighting unglamorous irregular wars and placed excessive emphasis on high-tech systems deemed critical for future conflicts, the most obvious being the F-22 fighter.

The case was put this way by Ralph Peters, columnist and retired Army of-

Without “prudent worrying,” we run a greater risk of a nasty military surprise.

ficer: “If you found your hilltop house on fire, would you (A) put out the flames or (B) buy flood insurance? If your answer is ‘B,’ you are suited for a job in the Office of the Secretary of Defense.”

Others argued that Rumsfeld's way undermined political support for defense. The public, the argument ran, won't pay for nebulous “capabilities.” “As we divorced ourselves from a threat-based approach, we also divorced ourselves from [public] support, perhaps,” said Marine Corps Gen. James N. Mattis, commander of US Joint Forces Command.

In truth, capabilities-based planning was not at all new. One would be hard-pressed to find a more “capabilities-based” concept than USAF's air mobility planning. Nuclear force planning since the 1960s has spurned specific scenarios in favor of broad capabilities.

Even so, it is now clear that US war-fighting needs are being defined and funded in a different way. In the current Quadrennial Defense Review, which will shape future forces, DOD has moved to heavy use of specific country-oriented scenarios to define missions.

Critics charge this has unavoidably focused most attention on here-and-now challenges, which can be quantified, and shifted it away from more-distant dangers, which cannot be.

The QDR, for example, has identified shortfalls in US capabilities to deal with irregular-type threats as well as major “asymmetric” challenges from

large nations such as China. These are not speculative dangers; they exist today.

In response, Gates plans to add some 20,000 soldiers to the Army's ranks, while the Air Force, for its part, is flattening its fighter force structure and moving more toward UAVs, propeller-driven aircraft, and other weapons suited to lower-end conflict.

Pentagon officials would do well to recall why Rumsfeld pushed for capabilities-based force planning in the first place.

For 40 years—from Robert S. McNamara's arrival at the Pentagon in 1961 until Rumsfeld took charge in 2001, US defense planning was “threat-based.” More importantly, it was based on a “bounding” threat—first the Soviet Union, and then regional powers. These were “point-scenario” concepts, fixated on specific enemies, specific wars, specific places, and specific assumptions.

This produced two weaknesses. First, flexible and adaptive planning became a near impossibility.

Second, military planners became so blinkered that they missed potential dangers. The Gulf War was a surprise. Kosovo was a surprise. The Sept. 11, 2001 terrorist attack was a surprise. The Iraqi insurgency was a surprise. The Taliban revival was a surprise. Given this poor record, say some officers, it's safer to pursue military capabilities with broad usefulness.

Given the pluses and minuses, it seems to us that neither a pure threat-based or pure capabilities-based planning concept is good enough. The correct course would feature some mixture of the two.

Certainly, it is dangerous to discard the capabilities approach. Paul K. Davis, a RAND expert on force planning, once observed that, whatever its faults, “capabilities-based planning has the virtue of encouraging prudent worrying about potential needs that go well beyond currently obvious threats.”

Lacking a sufficient amount of prudent worrying, we probably run a greater risk of suffering a nasty military surprise in the future. By then, though, today's officials will be gone from the Pentagon, and someone else will have to deal with the problem. ■



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Arrogance From the Secretary

Kudos to Robert Dudley for his editorial in the August 2009 issue titled, "The No-Brainers of Robert S. McNamara," [p. 2].

In the early days of Robert McNamara's tenure as Defense Secretary, I was one of the information officers serving under Arthur Sylvester, assistant secretary of defense for public affairs. Because of our daily contact with reporters, we were asked to forward to Mr. Sylvester any questions that Mr. McNamara might be asked at his next news conference. We were also to provide suggested answers, which meant we had to spend much time checking with our various service contacts for information.

It wasn't long before the word was passed down to us from Mr. McNamara which summarized his arrogance in dealing with the press. He reportedly told Mr. Sylvester, "Just give me the questions. I know the answers!"

C. V. Glines
Dallas

Please send a gold-embossed copy of the editorial, "The No-Brainers of Robert S. McNamara," to the present Secretary of Defense, with the document stamped, "Must Read."

John W. Payne
Ennis, Tex.

I found your editorial about Robert McNamara appalling. I am well aware that there are some who refer to Vietnam as "McNamara's War." Of course, you never hear about his involvement in the Cuban Missile Crisis, which most people would say turned out well.

Our 43rd President pointed out that "he was the decider." My 30-plus years in the Air Force and study of history have found that statement to be completely true. There will always be some, like yourself, who feel this is false, and perhaps in the future, we will refer to Iraq as "Rumsfeld's War" and Afghanistan as "Gates' War."

The reason that President Kennedy became involved in Vietnam was based on strong advice from President Eisenhower and the country's acceptance of the importance of the "domino theory" with regard to the spread of communism. No President wanted to be found guilty of ignoring this theory. Your editorial tries to simplify the "Vietnam Adventure"

by using John Correll's statement that "McNamara was Secretary of Defense from 1961 to 1968 ... which widened the involvement to a war in which 58,000 American troops died."

You conveniently fail to point out other facts and events such as Kennedy directing the withdrawal of US forces on Oct. 2, 1963, or that there was a coup (in which the US government was implicated) in November of that year to overthrow the government of Vietnam, which resulted in the assassination of its President. Then we have the assassination of President Kennedy on Nov. 22, 1963, and a transition of government which took over six months.

Despite insinuating that US Presidents are not the ultimate decision-makers in war, you lay Vietnam at McNamara's feet, and only offer Gen. Curtis LeMay and his biography as additional proof. You totally ignore other powerful people (many as powerful as LeMay, in their field), such as Dean Acheson, George Ball, Bobby Kennedy, McGeorge Bundy, Ellsworth Bunker, Clark Clifford (became Secretary of Defense in March 1968), William Colby (CIA station chief in Saigon and later CIA director under Nixon), Henry Kissinger, Gen. John McConnell (Air Force Chief of Staff after LeMay), Walt Rostow, Dean Rusk (Secretary of State), Gen. Maxwell Taylor (Chairman of the Joint Chiefs of Staff, ambassador to Vietnam), Gen. William Westmoreland, and Gen. Earle Wheeler (Chairman of the Joint Chiefs), all of whom made powerful and continuing inputs to one or more of the US Presidents involved. You also seem to ignore the comments of history books such as *Vietnam: A History*, by Stanley Karnow, and the biographies of some of the famous people mentioned above, which tell

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

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of their inputs which they felt led to Presidential decisions.

I hope that your future editorials are more balanced and consider that perhaps many people could be blamed for a disastrous conflict that lasted over 10 years. We could easily have the same problem with Afghanistan.

Col. William R. Phillips,
USAF (Ret.)
Houston

Two things pre-Vietnam are worthy of note. US High Command in its infinite unwisdom decided not to provide air support for the Bay of Pigs invasion in early 1962. We young Naval Reserve intelligence officers had been taught in amphibious intelligence courses I-1 in 1957, I-2 in 1958, and I-3 in 1960 at Little Creek (Va.) that three-to-one air superiority was necessary to the success of an amphibious assault. Pity that information never penetrated the skulls of President Kennedy, Secretary of Defense Robert McNamara, and anybody else involved in that unfortunate decision.

During the October 1962 Cuban Missile Crisis, Chief of Naval Operations Adm. George Anderson stated in a high-level meeting that the Navy had been running blockades for more than 100 years. Secretary of Defense McNamara rebuked Admiral Anderson in the presence of the group, with words to the effect that they'd never done one right.

McNamara was an allegedly brilliant Pythagorean who understood neither human nature nor how to appreciate or lead people. My father, who only went through the 10th grade, told me that I would never meet a person who couldn't tell me something that I didn't know. Legendary UCLA basketball coach John Wooden, the most successful in NCAA history, wrote, "It's what you learn after you know it all that counts." Secretary of Defense McNamara, with all his education, was not as wise as my father or Coach Wooden.

Cmdr. Walter Dunn Tucker,
USNR (Ret.)
Henrico, Va.

I was appalled by your Dudney-Correll editorial, "The No-Brainers of Robert S. McNamara," in your August issue. It was a vicious, hate-filled page unworthy of a serious journal. Worse, it was full of poorly argued and, in one case, dangerous points: (1) McNamara never said that he opposed the Vietnam War "all along"; the record bears out his claim that he became opposed only after the war was well under way. Therefore, your accusations of "duplicitous" and lack of "honor" collapse. You also imply that he was duplicitous in claiming that his mistakes were "hon-

est," and in claiming that he was not alone to blame for them. In fact, every Administration from Truman through Nixon made the same basic mistakes, giving McNamara a lot of company. Were they all "dishonest"?

(2) You condemn McNamara for mentioning the "rank and file" of our armed forces only four times. Well, obviously his book was about the highest level diplomatic, political, economic, social, and, yes, moral issues; there was no reason for him to mention the troops, whose courage and self-sacrifice were never in question. Similarly, your condemnation of McNamara's arguments as "philosophical mush" betrays your basic misunderstanding of history. High-level policy concepts (concerning diplomacy, etc.) cannot be as crisp and clear as a military standard operating procedure. And the record shows that McNamara was right: "We" did indeed "misjudge" our enemy's "intentions"; moreover, there are problems without immediate solutions.

(3) Which leads me to my most important point: You condemn McNamara for failing to take the advice of military professionals. In fact, McNamara (and President Johnson and Cabinet) were far better placed to make basic policy judgments than were the Joint Chiefs of Staff and other uniformed leaders—

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judgments involving those diplomatic and other nonmilitary factors which must set the context for military decisions, not the other way around. To argue that our country's civilian leaders must let the armed forces decide basic policy is to attack the Constitution-based concept of civilian control of the military—one of the cornerstones of our democracy. If Presidents and Secretaries of Defense must let narrow military proposals dominate higher policy, then Presidents and Secretaries become mere rubber stamps. On the contrary, we should thank our lucky stars that Johnson and McNamara had the wisdom and courage to reject military advice which would almost certainly (albeit unintentionally) have led to all-out war with China and perhaps with Russia as well.

Karl G. Larew
New Park, Pa.

I flew for MATS from 1965 to 1971, and was told that when the name was changed to Military Airlift Command, that the MAC was to be McNamara's legacy. I wasn't going to buy a copy [of McNamara's book] because I couldn't stand the man, but was waiting for someone to donate one to the Castle Air Museum, where I am the librarian, to read it. But now I don't think I will read it. You are right on documenting his arrogance, as both my wife and I saw it in his speeches

and interviews at the time. Thank you for your truthfulness.

Capt. Jim Preston,
USAF (Ret.)
Twain Harte, Calif.

The Legend of Frank Luke

The article "The Legacy of Frank Luke," in the August issue [p. 48], mentions that Luke Air Force Base was named for Frank Luke.

Of note, the PBS series "History Detectives" mentioned that Amelia Earhart ground looped or blew a tire while taking off from Luke Field, Territory of Hawaii, while taking off on the second leg of her first attempt to fly around the world.

A search on the Internet shows that Luke Field was located on Ford Island in the middle of Pearl Harbor on what was later the USN air facility. At least one source says that the name was given up so that what is now Luke AFB could be given that name. The Ford Island facility was apparently a joint use facility before Hickam Field was completed and the entire facility turned over to the Navy.

Patric Baumgartner
Mt. Airy, Md.

Predator's Predecessor

Combat drones go back 45 years. Many of your readers are probably not aware that the first combat drone mission, to my knowledge, was launched

over North Vietnam in August 1964 ["How the Predator Grew Teeth," July, p. 42].

This was accomplished by a handful (probably less than 50) of Air Force officers, enlisted men, and Ryan Aircraft civilians using drones manufactured by Ryan Aircraft Co. in San Diego, Calif.

I was a member of that group. We dropped the drones from a C-130 aircraft just south of the North Vietnam border. The drones were programmed to fly their mission over North Vietnam doing vital reconnaissance to gather surface-to-air missile information. This was to be used in developing countermeasures to protect our manned aircraft on their combat missions.

We recovered the drones after they returned to the vicinity of Da Nang Air Base. The recovery was accomplished by us sending a message to the drones to shut down its jet engine, deploy a parachute, which was then snagged in midair by a helicopter and returned to Da Nang Air Base.

The mission was carried out in much the same way as our current drones, except we didn't have the benefit of satellite communications. Therefore, we had to operate from South Vietnam using land-based radar. We also did not drop ordnance [from the drones].

Lt. Col. Milford E. Seabaugh,
USAF (Ret.)
San Diego

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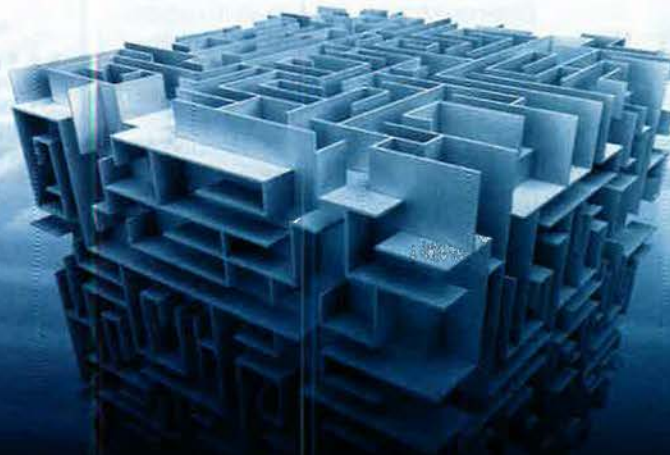
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Not so fast on the C-17; Can USAF trade platforms?; Carve two "tracks," says Gansler

Senators Say, "Save the C-17"

In mid-September, the Senate Appropriations Committee added \$2.5 billion to its version of the Fiscal 2010 defense budget to buy 10 additional C-17s, despite Defense Secretary Robert M. Gates' insistence that enough of the aircraft have already been bought.

The SAC added the airplanes after a bipartisan group of Senators wrote to the committee chairman and ranking member, asking to keep the airlifter in production, at least until new major strategy and requirements studies report out. The fleet is being eaten up by heavy usage, and ending production now would shortchange the airlift fleet and hurt the industrial base, the group argued.

The 20 Senators, in an Aug. 19 letter to Sen. Daniel K. Inouye (D-Hawaii) and Thad Cochran (R-Miss.), said they "respectfully request that the committee include funding to procure 12 additional C-17 aircraft in the Fiscal 2010 budget."

The program of record for the C-17 is 205 airplanes, plus eight more that were funded in the 2009 war supplemental bill. The House Appropriations Committee included money for just three more C-17s, but neither the Senate nor House authorizers added any new C-17s in their bills. If the SAC provision survives the full Senate and House-Senate defense budget conference, the 12 aircraft would bring the C-17 fleet to 225 aircraft.

In a statement accompanying its markup of the defense bill, Inouye said he's confident that the Defense Department will "eventually conclude" that buying more C-17s is "the right solution" to a myriad of airlift questions.

The Senators said the C-17 has been "critical" in supporting the war efforts in Iraq and Afghanistan, as the only airlifter "capable of performing every airlift mission." With the wars ongoing, "we do not see airlift needs abating anytime soon," they said, and terminating the C-17 would leave the US with meager options if it needs more strategic airlifters in the near- to midterm.

"In our view, it would be extremely risky to discontinue C-17 production before the Quadrennial Defense Review and the upcoming Mobility Capability and Requirements Study have reassessed our requirements."

In an apparent note of skepticism and concern that the QDR and MCRS will simply rubber-stamp an already-made decision to stop production of the C-17, the Senators made conditional their remark about the two assessments by adding, "provided that these studies are based on sound, requirements-driven analysis." Such analysis was lacking in the decision to stop F-22 fighter production, and the C-17 cap was included among those programs Gates chose to terminate in April—long before the QDR really got going. Several members of Congress have commented that making major, irreversible procurement decisions before the analysis is done is putting the cart before the horse.

Barring any new adds from Congress, the last C-17 will be delivered in 2010. In previous years, Boeing has extended its own funds to keep the airplane in production in the belief that Congress would order additional aircraft.

Citing a Congressional Research Service report, the Senate group noted that C-17s were designed to fly about 1,000 hours a year for 30 years, but "as our overseas commitments have

grown since 2001, the fleet has averaged 1,250 hours per aircraft over the last 10 years. Some aircraft have even reached 2,400 flying hours in a single year." That "heavy usage," the group said, coupled with a planned increase of tens of thousands of soldiers



No premature burial, please.

and marines to be transported and supplied, "has only increased the demand for this critical airlift capability."

It is critical, the Senators said, that "we provide our growing force with the equipment it needs to fight and win our nation's wars."

In their letter, the Senators asserted that "there is no time to spare in making this decision," given that the line will otherwise shut down in 2010 and the fact that restarting production after a break "could cost up to \$1 billion," a figure reported by the Government Accountability Office. In that November 2008 study, the GAO urged "careful planning" to ensure that the C-17 line is not ended "prematurely and later restarted at substantial cost."

In its study, the GAO reported that "both the manufacturer [Boeing] and [the] Air Force agree that shutting down and restarting production would not be feasible or cost-effective."

The Senators further argued that terminating C-17 production would be especially harmful to the defense industrial base, given "a waning demand for commercial aircraft and a lull in military fighter jet production." The C-17 could keep alive the design, engineering, and manufacturing talent needed to continue building large military airplanes into the future, they said. Otherwise, "our aerospace engineering, design, and manufacturing base will atrophy, putting at risk our competitiveness on the global market [and] our ability to address future airlift requirements."

The C-17 accounts for "30,000 American jobs stretched across 43 states," which would be lost if it were terminated, the Senators said.

The Fighter-Bomber-UAV Stew

A Washington, D.C., think tank suggests that the cash-strapped Pentagon cut production of F-35 fighters and divert the savings to acquisition of long-range bombers instead. Another efficiency move, it said, would be to shift more of today's fighter missions to unmanned aircraft.

The recommendations came from the Center for Strategic and Budgetary Assessments, which in August released its full analysis of the Obama Administration's Fiscal 2010 budget re-

quest. The report was prepared by Todd Harrison, CSBA's top Pentagon budget analyst.

The CSBA ideas may get a hearing in the Administration, which tapped Harrison's CSBA predecessor, Steven M. Kosiak, to be the defense budget guru at the White House's Office of Management and Budget. Andrew F. Krepinevich, CSBA president, was also recently appointed to the Defense Policy Board, an advisory group that helps the Pentagon devise new strategies.

The Pentagon "might consider" whether new bombers, given their longer range and payload, "could represent a cost-effective substitute for some number of these new fighters," according to the CSBA, "rather than buying both new long-range bombers and thousands of new short-range F-35 fighters."

Kosiak had said much the same thing in a 2007 report, co-authored with CSBA's Barry D. Watts. Their study pressed for an early decision on how to proceed with the F-35.

Harrison wrote that the Pentagon's existing plan for modernization is "problematic," and that programs already in the pipeline will likely be more expensive than the Pentagon now projects. The F-35 program is expected to cost about \$300 billion and continue into the early 2030s.

In April, Gates terminated the Air Force's lone bomber program, claiming that he thought USAF had not adequately defined what the aircraft should be able to do. It isn't clear whether the bomber will be included in the Fiscal 2011 budget.

The CSBA report went on to say that unmanned aircraft, with "much greater range and loiter times, and a much lower price tag, could enable a radically different force structure that achieves the same level of effectiveness at a much lower cost."

What's Causing the Traffic Jam?

CSBA produced its recommendations for an explicit purpose: to help DOD live within what are expected to be tight defense budgets in years to come. The problem has been compounded by the lagging pace of modernization in recent years.

The matter is urgent, because, as CSBA said in August, "the funding for weapon systems is projected to remain flat over the next five years while a bow wave of equipment recapitalization is building."

Harrison noted that there are several reasons for the "lagging pace of recapitalization" in US military equipment, exemplified by the fact that "the average age of aircraft in the Air Force inventory is 24 years and is projected to climb to 27 years by 2020." The development of new systems is devouring a large amount of the money set aside for recapitalization, he said, and while the resulting systems deliver more capability than those they replace, they usually end up being too few in number to do the job properly.

"Trading many legacy systems for fewer next generation systems is not always the best strategy," he asserted.

Two other approaches—buying the latest versions of legacy systems, or upgrading the legacy systems to extend their service lives and with greater capability—are cheaper than developing and buying new systems, according to the report, which notes that the Obama Administration is pursuing all three approaches in its modernization efforts.

The Administration "elected not to provide a detailed future years defense program" because of ongoing deliberations in the Quadrennial Defense Review, the CSBA report observed. As a result, the Fiscal 2011 budget has lots of room for "significant changes to weapon systems programs" and new emphasis could be given to the bomber and UAV efforts.

Economic constraints in the coming years will ensure that whatever small growth there is in defense spending will go toward manpower, while research, development, test, and evaluation—RDT&E—and procurement will suffer, the CSBA said.

"Pressure will likely continue to grow for DOD to scale back its plans, including both major modernization efforts and force

structure plans," Harrison wrote. This will compel "making some hard decisions. And the sooner those decisions are made, the less painful they will be to carry out."

Fast-Tracking New Weapons

The Pentagon needs a dual-track acquisition system—one to rapidly answer demands for new kinds of equipment needed in the field right away, and a "deliberate" path for systems that fill out the traditional force structure and which must be carefully specified and developed with long-term use in mind.

Those are the findings of a Defense Science Board task force on "Fulfillment of Urgent Operational Needs," released in late summer. The task force was chaired by Jacques S. Gansler, former Pentagon technology czar during the Clinton Administration and now a professor at the University of Maryland and director of the Center for Public Policy and Private Enterprise.

The experience of the last five years shows that the Pentagon "lacks the ability to rapidly field new capabilities for the warfighter in a systematic and effective way," Gansler wrote in the task force report's cover letter. The existing acquisition system is simply too ponderous—weighed down by laws, oversight, and the need for coordination—to move quickly enough to answer pressing demands from troops in the field.

All of the Pentagon's needs "cannot be met by the same acquisition processes, and ... the degree of urgency and technology readiness can be used to differentiate 'rapid' and 'deliberate' acquisitions."

The task force suggested creating a joint-service Rapid Acquisition and Fielding Agency—organized similarly to the Defense Logistics Agency or National Security Agency—which would be required to get urgently needed gear to fielded forces in "as quickly as two months, and no longer than 24 months after the need is identified."

Defense Secretary Gates has complained that it takes too long to translate a commander's urgent materiel request into a fielded capability, so he may be persuaded by the task force's suggestions.

The RAFA would employ "a streamlined, integrated approach for rapid acquisition," and would be focused on "acquiring new solutions to joint urgent operational needs and should work with the combatant commands to anticipate future needs." It would also oversee and track any urgent need requests sent up by the services and components. The task force envisioned a three-star officer heading the organization, reporting directly to the undersecretary of defense for acquisition, technology, and logistics, but with a "dotted line" connection to the vice chairman of the Joint Chiefs of Staff. This level of leadership is needed "for high-level support and visibility," the task force recommended.

The new agency would have a "separate and flexible fund" with which to buy equipment needed for requirements in wartime or "when threats are imminent." The agency would coordinate with the services' "acquisition, doctrine, training, and sustainment elements."

The executive and legislative branches should move "today" to establish the new agency's funding stream, the task force urged. The new agency should also absorb and integrate all of the "ad hoc" organizations that have sprung up to perform this function during the wars in Iraq and Afghanistan, Gansler wrote. The initial cadre of staff would be drawn from these previous organizations.

"It is imperative that the Secretary of Defense, the Joint Chiefs of Staff, and the service leaders start now to implement" the task force's recommendations, the group said. "Existing urgent needs remain waiting to be fulfilled with ever more limited resources, and the potential for new and even more devastating capabilities from adversaries looms large." ■

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B-52 Squadron Activated

The Air Force on Sept. 3 activated the 69th Bomb Squadron at Minot AFB, N.D., its newest operational B-52H unit that will be part of Minot's 5th Bomb Wing that already has the 23rd BS.

Initially, the new squadron will have four B-52s, with more aircraft arriving incrementally until the unit is at full strength in October 2010 with 11 primary aircraft and two backups, said spokeswoman Laurie Arellano.

The 69th BS is the Air Force's fourth combat-coded B-52 squadron. (The 2nd BW at Barksdale AFB, La., has the 20th BS and 96th BS.) The Air Force announced in 2008 the plan to create the new unit in order to have enough B-52s to support combatant commanders with conventional capability while simultaneously dedicating aircraft to the nuclear mission.

COIN Aircraft Sought

The Aeronautical Systems Center at Wright-Patterson AFB, Ohio, issued requests for information to industry in late July seeking input on a fixed-wing Light Attack/Armed Reconnaissance (LAAR) aircraft and a separate fixed-wing Light Mobility Aircraft (LiMA). The aircraft are sought for fielding early next decade in irregular warfare roles such as counterinsurgency.

The Air Force would like 100 LAAR platforms, with fielding beginning in Fiscal 2012 and approximately 60 LiMA airframes starting in Fiscal 2011. It wants LAAR to be able to operate from dirt fields at forward operating locations where the pilots will find jet fuel and not much else, and "capable of employing a variety of air-to-ground weapons and munitions."

LiMA would have to accommodate at least six passengers plus aircrew and be able to operate on unimproved austere landing sites when carrying a minimum of 1,800 pounds of passengers and cargo. Its cargo door should allow for loading and unloading of patients' litters.

Buzzing, Not Bombing?

Lt. Gen. Gilmory M. Hostage III, the new Air Forces Central commander, said Aug. 13 that the new military approach being adopted in Afghanistan may mean that coalition strike aircraft

end up buzzing enemy forces more often than bombing them.

Speaking to reporters at Shaw AFB, S.C., before heading out to Southwest Asia to take over the air campaigns in Afghanistan and Iraq, Hostage said, in some cases, it may be better to fly over enemy forces with noisy aircraft to scare them into dispersing. But if that doesn't work, the aircraft could then come back and attack.

Flying ABL Fires HE Laser

Boeing's industry team and the Missile Defense Agency successfully fired the Airborne Laser's megawatt-class laser aboard the ABL aircraft in flight for the first time during an Aug. 18 test over the southern California desert.

For this test of the ABL, a modified Boeing 747-400F aircraft designed to zap boosting missiles out of the sky, the laser's beam was fired into an onboard calorimeter and not through the aircraft's beam control system and nose turret.

Still, the company said the test was an important incremental step in moving the ABL closer to its shutdown demonstration against an actual ballistic missile before the end of the year. On Aug. 10, the ABL completed its first in-flight test against an instrumented ballistic missile target, using a surrogate high-energy (HE) kill laser aboard the aircraft to strike the missile.

F-22 Crash Laid to Human Error

Lockheed Martin test pilot David P. Cooley's inability to recover his test F-22 Raptor from a high-G maneuver due to his near loss of consciousness and lack of situational awareness ultimately led to the aircraft crashing and his death during a flight test on March 25 at Edwards AFB, Calif., the Air Force announced this summer.

According to Air Force Materiel Command's accident investigation report, Cooley, 49, ejected from the aircraft, after his recovery attempt failed, but sustained fatal, blunt force trauma due to the speed of the aircraft and windblast. The F-22 was destroyed upon impact, resulting in \$155 million in total property and equipment damage, including \$140 million for the aircraft.

The F-22, which was assigned to the Air Force Flight Test Center at Edwards, was

Photo by Jim Haehtline



functioning normally and “there were no design or airworthiness issues that would impact the safe operation of the F-22 fleet,” AFMC stated.

SBIRS Payload Gets Ops OK

US Strategic Command has certified the second on-orbit Space Based Infrared System sensor payload, Highly Elliptical Orbit II (HEO-2), and its associated ground systems for operations, thereby adding significant new capability to

the US missile-warning network, prime contractor Lockheed Martin announced Aug. 26.

“The HEO system is delivering revolutionary new surveillance capabilities to combatant commanders,” said Col. Roger W. Teague, commander of the Air Force’s SBIRS Wing at Space and Missile Systems Center in Los Angeles, in Lockheed’s release.

STRATCOM’s formal certification means that HEO-2 has been demonstrated to pro-

vide “timely, accurate, and unambiguous warning data,” the company said. HEO-2 joins HEO-1, the first on-orbit SBIRS payload, which STRATCOM cleared for operations last December.

New GPS Satellite Now Operational

The Air Force on Aug. 17 successfully placed the last of its eight modernized Global Positioning System IIR satellites into orbit. A United Launch Alliance Delta II rocket fired from Cape Canav-



09.15.2009

Two newly minted C models of the A-10 attack aircraft—both assigned to the Idaho Air National Guard’s 124th Wing in Boise—maneuver over the rugged Sawtooth Mountains. For a year, the wing’s 190th Fighter Squadron has been upgrading from A-10A Warhogs to the A-10C model. The C has new “glass cockpit” displays, radio equipment, data link, and precision engagement mods. The latter allow pilots to identify and strike targets from higher altitudes and greater distances, using highly accurate weapons.

Petraeus' Air Force "Joke" Bombs With Airmen

Speaking at the Marine Corps Association Foundation dinner July 30 in Arlington, Va., Army Gen. David H. Petraeus, commander of US Central Command, made joking comments about the Air Force that, on the surface, belittled the daily contributions of airmen to the joint fight.

In his remarks praising the tough nature of marines, Petraeus recalled "an illustrative story" describing a marine trudging happily along in a downpour, laden with gear, while "30,000 feet above ... an Air Force pilot flips aside his ponytail" as he flies over.

Petraeus continued the narrative, "'Boy,' he radios his wingman, 'It must be tough down there.'"

Regardless of the intent, many Air Force members, past and present, perceived Petraeus' comments as disparaging.

Petraeus' handlers at CENTCOM—realizing the effect—excised that part of his remarks from the version of his speech posted on the CENTCOM Web site.

In all fairness, Petraeus did offer joint praise early in his remarks, saying, "The best examples of true importance are to be found in our soldiers, sailors, airmen, marines, and coastguardsmen deployed in harm's way."

And he later said, when queried, that he had apologized to Air Force Chief of Staff Gen. Norton A. Schwartz for the "joke."

"I did apologize to the CSAF," Petraeus said, "right after it was clear that what was intended in jest was seen by some, understandably, as disparaging."

"I've spent more than six of the last eight years in joint operations with all services, and I think most folks who have worked around me will regard me as a serious team builder," he explained.

eral AFS, Fla., carried this satellite, designated GPS IIR-21(M), into space.

The Lockheed Martin-built satellite features increased signal power, two new military signals, a second civil signal, and enhanced encryption and anti-jamming capabilities. It was declared ready for operations on Aug. 27.

Regional Contract Centers Nixed

In a joint memo issued in July, Air Force Secretary Michael B. Donley and Chief of Staff Gen. Norton A. Schwartz announced that the Air Force will not proceed with the 2007 plan to create five regional installation contracting centers.

Instead, they said the service will stand up a new strategic sourcing organization under Air Force Materiel Command to focus on servicewide contracting needs. The new organization could begin operations by the end of the year. Meanwhile, major commands and their base contracting units will handle their unique requirements.

Donley and Schwartz said the new approach is "the most expeditious" for the Air Force "to mitigate the risks of operating within the constraints of reduced installation budgets." They said "lessons learned from recent Air Force transformations" and key stakeholder concerns drove the decision to scrap the plan for the regional centers.

T-37 Tweet Retired

The Air Force formally retired the T-37 Tweet twin-engine trainer aircraft from service during a ceremony on July 31

at Sheppard AFB, Tex. As part of the ceremony, four of Sheppard's remaining T-37s took off from the base one last time on a flight to the Aerospace Maintenance and Regeneration Group at Davis-Monthan AFB, Ariz., for placement in storage.

The Tweet had served for more than 50 years in undergraduate pilot training roles, providing initial jet aircraft training for more than 78,000 Air Force and allied pilots.

Sheppard's 80th Flying Training Wing, the last unit to operate the T-37, con-

ducted its final T-37 training flight in June. The T-6 Texan II replaces the Tweet. The Air Force last year began using the T-6 in place of the Tweet for specialized undergraduate pilot training.

C-5 Upgrade Enters Production

Lockheed Martin announced Aug. 19 that the first of the Air Force's C-5 transports slated to receive new engines and reliability improvements had been inducted into the company's modification line in Marietta, Ga. This aircraft is a C-5B model from Dover AFB, Del.

All told, the Air Force plans to upgrade 52 of its 111 C-5s (one C-5A, 49 C-5Bs, and two C-5Cs) by 2016 under the Reliability Enhancement and Re-engining Program. Already the one C-5A and two C-5Bs were fitted with these improvements for use in testing.

The RERP changes, coupled with new digital cockpits installed under the separate Avionics Modernization Program, will improve the reliability of these 52 aircraft and allow them to climb higher and faster and carry more cargo over greater distances. Lockheed Martin said Aug. 25 that it had already finished installing the new avionics on all of the C-5Bs.

F-15 Certified for Synfuel

The Air Force's F-15 fleet (F-15C/D and F-15E) has been cleared to run on the synthetic fuel blend that the service wants all of its aircraft able to operate on unconstrained in 2011. The certification came on June 16, but did not come to public light until August when *Air Force Magazine* queried the service.

The F-15 joins the B-1B, B-52H, and C-17 as the platforms now approved to use the fuel blend, which comprises 50 percent JP-8 jet fuel and 50 percent

Supplemental Eglin F-35 Basing Study Discussed

The Air Force announced Aug. 24 that it is now working on the supplemental environmental impact statement that will address the unexpectedly controversial beddown of 59 F-35 fighters by 2014 at Eglin AFB, Fla.

As part of this process, the service has expanded the potential beddown locations from Eglin proper to Duke Field and Choctaw Field, area airfields within the broader Eglin reservation. Each of these alternatives has a bevy of suboptions, including constructing new runways, moving runways, and using Eglin's main runway in combination with Duke and Choctaw.

Although the Air Force said it will consider "the consequences and potential mitigations" arising from increasing that number by up to another 48 aircraft to 107, it said the SEIS will not be used as a decision tool for placing those additional aircraft at Eglin.

That will come later, if at all, since USAF said it believes that establishing 59 F-35s at Eglin will satisfy requirements levied by BRAC 2005 to use Eglin as the F-35 initial joint training schoolhouse.

Even with only 59 aircraft, the Eglin basing plan still faces some stiff local resistance from the city of Valparaiso, Fla., whose elected officials fear the noise impact of the stealth fighters on the health of their citizens and the economic vitality of their town.

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Air Force Activates Global Strike Command

The Air Force leadership on Aug. 7 activated the service's new nuclear-centric major command, Air Force Global Strike Command, during a ceremony at Barksdale AFB, La.

Lt. Gen. Frank G. Klotz, who had been Air Force assistant vice chief of staff since August 2007, took command of the new organization. The work of the provisional Global Strike Command, which began operations in January at Bolling AFB, D.C., prepared for the standup.

"We expect Global Strike Command to carry forward a renewed commitment to the highest standards of professionalism, excellence, and nuclear expertise to guide the new generation of airmen overseeing our nation's most critical military mission," said Air Force Secretary Michael B. Donley at the activation ceremony.

Global Strike Command will bring the Air Force's Minuteman III ICBMs and nuclear-capable B-2A and B-52H bomber forces under a single umbrella and provide a single commander to oversee the organize, equip, and train functions associated with these assets. Klotz, as commander, will also be a leading advocate for nuclear matters across the service.

AFGSC will also oversee conventional global strike missions when called upon.

The standup of Global Strike Command is just one of the many Air Force activities to reinvigorate its nuclear enterprise and re-establish exemplary day-to-day stewardship.

"In the business of nuclear weapons, there is no room for error. And simply stated, this is a fundamentally true conviction. Warriors of the storied Strategic Air Command lived by it. ... And now, the Air Force is reclaiming it," said Chief of Staff Gen. Norton A. Schwartz at the ceremony.

Klotz did not immediately assume authority over the ICBMs and bombers. The Minuteman missiles are scheduled to transfer over from Air Force Space Command to AFGSC oversight in December, followed by the bomber force from Air Combat Command next February.

F-15 synfuel flight testing began in August 2008. The Air Force says it remains on track to certify all of its aircraft types by early 2011. Already the C-5, C-130, F-22, KC-135, and T-38 have flown with SPK in tests.

Tennessee ANG Helps Nigeria

Seventeenth Air Force (Air Forces Africa), the air component of US Africa Command, staged its biggest military-to-military exchange of 2009 to date in mid-August when it sent 12 Tennessee Air National Guard aircraft maintainers to Nigeria for two weeks to show Nigerian Air Force mechanics how to repair one of their C-130 Hercules transports.

The Air Guardsmen from the 118th Airlift Wing at Nashville all volunteered for this mission.

The Nigerian airmen learned how to make engine and propeller changes that would make their C-130s airworthy for a trip to a European aircraft repair depot for more extensive repairs. Nigeria has eight C-130s, but only one was in service.

USAF Wants To Speed MOP

The Air Force asked Congress for permission in mid-July to reprogram some \$70 million in Fiscal 2009 funds toward acceleration of the Massive Ordnance Penetrator program so that the first of these

synthetic paraffinic kerosene. SPK is currently derived from natural gas, but it can also be made from the abundant supply of domestic coal. This fuel blend is seen as one means to bolster US energy independence.

Enter the Dragon: Maj. Patrick Hudson brings a U-2 Dragon Lady to a stop on the ramp at an air base in Southwest Asia. Hudson, a pilot with the 99th Expeditionary Reconnaissance Squadron, has logged more than 1,000 hours in the U-2.

USAF photo by TSgt. Charles Larkin Sr.



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30,000-pound bunker busters would be available for use next year, several years ahead of the previous schedule.

Pentagon spokesman Bryan Whitman told reporters Aug. 3 that the goal is to have the MOP available for use, if called upon, by July 2010. Air Force officials cited as justification for the acceleration the "urgent operational need" expressed by combatant commanders for the capability to strike hard and deeply buried targets in "high-threat environments."

Boeing has been developing the munition under Defense Threat Reduction Agency-USAF sponsorship. MOP has already been tested on the B-52H bomber and the Air Force intends to integrate it on the B-2A stealth bomber. On Aug. 18, the Air Force awarded Boeing a \$12.5 million contract for three MOPs to be used in additional flight tests on the B-52.

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Senior Staff Changes

RETIREMENTS: Lt. Gen. John L. **Hudson**, Lt. Gen. James G. **Roudebush**, Lt. Gen. Norman R. **Seip**, Maj. Gen. Chris T. **Anzalone**, Maj. Gen. Robertus C. N. **Remkes**, Maj. Gen. Winfield W. **Scott III**, Brig. Gen. Michael A. **Longoria**.

NOMINATIONS: To be Lieutenant General: Ralph J. **Jodice II**, Christopher D. **Miller**, William J. **Rew**.

CHANGES: Brig. Gen. (sel.) Steven J. **Arquette**, from Chief, Distribution Div., Log. Directorate, Jt. Staff, Pentagon, to Dep. Dir., Ops., Natl. Mil. Command Ctr., Ops. Team Two, Jt. Staff, Pentagon ... Brig. Gen. Scott D. **Chambers**, from Assoc. Dir., Resource Integration, DCS, Instl., Log., & Mission Spt., USAF, Pentagon, to Cmdr., Defense Supply Ctr., Philadelphia, Defense Log. Agency, Philadelphia, Pa. ... Brig. Gen. Dwyer L. **Dennis**, from Cmdr., 551st Electronic Sys. Wg., ESC, AFMC, Hanscom AFB, Mass., to Spec. Asst. to the Cmdr., AFMC, Wright-Patterson AFB, Ohio ... Maj. Gen. (sel.) Richard T. **Devereaux**, from Dir., Intel., Ops., & Nuclear Integration, AETC, Randolph AFB, Tex., to Cmdr., USAF Expeditionary Ctr., AMC, Ft. Dix, N.J. ... Brig. Gen. Sharon K. **Dunbar**, from Dir., Manpower, Orgn., & Resources, DCS, Manpower, Personnel, & Svcs., USAF, Pentagon, to Dir., Force Mgmt. Policy, DCS, Manpower, Personnel, & Svcs., USAF, Pentagon ... Maj. Gen. Maurice H. **Forsyth**, from Cmdr., Spaatz Ctr. for Officer Education, AETC, Maxwell AFB, Ala., to Cmdr., Curtis E. LeMay Ctr. for Doctrine Development & Education, AETC, Maxwell AFB, Ala. ... Lt. Gen. Frank **Gorenc**, from Dir., Air & Space Ops., ACC, Langley AFB, Va., to Cmdr., 3rd AF, USAF, Ramstein AB, Germany ... Maj. Gen. Blair E. **Hansen**, from Dir., ISR Capabilities, DCS, ISR, USAF, Pentagon, to Dep. Cmdr., Jt. Functional Component Command for ISR, STRATCOM, Bolling AFB, D.C. ... Brig. Gen. Scott M. **Hanson**, from Dep. Dir., LL, OSAF, Pentagon, to Commanding General, Coalition AF Transition Team, Multinational Security Transition Command-Iraq, Baghdad, Iraq ... Brig. Gen. Veralinn **Jamieson**, from Dir.,

Strategy, Integration, & Doctrine, DCS, ISR, USAF, Pentagon, to Dir., Intel, SOUTHCOM, Miami, Fla. ... Maj. Gen. Darrell D. **Jones**, from Dir., Force Mgmt. Policy, DCS, Manpower, Personnel, & Svcs., USAF, Pentagon, to Cmdr., AF District of Washington, Andrews AFB, Md. ... Maj. Gen. Robert C. **Kane**, from Commanding General, Coalition AF Transition Team, Multinational Security Transition Command-Iraq, Baghdad, Iraq, to Cmdr., Spaatz Ctr. for Officer Education, AETC, Maxwell AFB, Ala. ... Brig. Gen. (sel.) Eden J. **Murrie**, from Cmdr., 100th Air Refueling Wg., USAF, RAF Mildenhall, UK, to Spec. Asst. to the Vice C/S, USAF, Pentagon ... Gen. Gary L. **North**, from Cmdr., 9th AF, ACC, Shaw AFB, S.C., to Cmdr., PACAF, Hickam AFB, Hawaii ... Brig. Gen. John R. **Ranck Jr.**, from Dep. Dir., Operational Planning, Policy, & Strategy, DCS, Ops., P&R, USAF, Pentagon, to Dep. Dir., Strat. Effects, Multinational Force-Iraq, CENTCOM, Baghdad, Iraq ... Brig. Gen. Darryl L. **Roberson**, from Cmdr., 325th FW, AETC, Tyndall AFB, Fla., to Dep. Dir., LL, OSAF, Pentagon ... Maj. Gen. Kip L. **Self**, from Cmdr., USAF Expeditionary Ctr., AMC, Ft. Dix, N.J., to Dir., Operational Planning, Policy, & Strategy, DCS, Ops., P&R, USAF, Pentagon ... Brig. Gen. Charles K. **Shugg**, from Vice Cmdr., AF Cyber Command (Provisional), Lackland AFB, Tex., to Vice Cmdr., 24th AF, AFSPC, Lackland AFB, Tex. ... Brig. Gen. Martin **Whelan**, from Dep. Dir., Current Ops., STRATCOM, Offutt AFB, Neb., to Dir., Combat Spt. Directorate, DTRA, Ft. Belvoir, Va. ... Maj. Gen. James A. **Whitmore**, from Dep. Cmdr., Jt. Functional Component Command for ISR, STRATCOM, Bolling AFB, D.C., to Dir., Intel., Ops., & Nuclear Integration, AETC, Randolph AFB, Tex.

COMMAND CHIEF MASTER SERGEANT CHANGE: Martin S. **Klukas**, to Command Chief Master Sergeant, ACC, Langley AFB, Va.

SENIOR EXECUTIVE SERVICE RETIREMENTS: Michael A. **Aimone**, Martha J. **Evans**, Rose **Gault**. ■

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Operation Enduring Freedom—Afghanistan

Casualties

By Sept. 16, a total of 827 Americans had died in Operation Enduring Freedom. The total includes 826 troops and one Department of Defense civilian. Of these deaths, 584 were killed in action with the enemy while 243 died in noncombat incidents.

There have been 3,896 troops wounded in action during Operation Enduring Freedom. This number includes 1,506 who were wounded and returned to duty within 72 hours and 2,390 who were unable to return to duty quickly.

Another Air-drop Record

The Air Force airdropped a record 3.3 million pounds of supplies into Afghanistan in July, eclipsing June's total of 3.2 million pounds as the highest monthly total since US military operations began in Afghanistan in late 2001.

Airmen Drop Artillery to Remote Afghan Base

A team of active duty, Air National Guard, and Reserve airmen operating at Bagram Air Base helped deliver a much-needed M198 howitzer to a remote Army post in eastern Afghanistan Aug. 8. It was the first air-drop mission of its kind since the US troop surge began in the landlocked Asian nation back in February.

This Total Force team loaded the 10-ton pallet assembly with five parachutes containing the 36-foot howitzer onto a Missouri ANG C-130 transport at Bagram for delivery to the Army unit in the volatile Paktika province so that it may fire high-explosive shells at insurgent elements there.

Due to the mountainous terrain of the country, such airlift is critical, said Lt. Col. Dave Koltermann, commander of Bagram's 774th Expeditionary Airlift Squadron.

Operation Iraqi Freedom—Iraq

Casualties

By Sept. 16, a total of 4,347 Americans had died in Operation Iraqi Freedom. The total includes 4,334 troops and 13 Department of Defense civilians. Of these deaths, 3,473 were killed in action with the enemy while 874 died in noncombat incidents.

There have been 31,494 troops wounded in action during Operation Iraqi Freedom. This number includes 17,633 who were wounded and returned to duty within 72 hours and 13,861 who were unable to return to duty quickly.

Airmen Help Certify Iraqi Weapons Loaders

Working with US Air Force advisors and trainers, three Iraqi airmen from Kirkuk Regional Air Base's Squadron 3 in August became the first certified lead weapons crew for the country's reconstituted air arm.

The three Iraqis are not only qualified to load weapons but can now train and evaluate their fellow service members, said TSgt. Shawn Mullins, weapons advisor with the 521st Air Expeditionary Advisory Squadron. The 521st is a USAF unit helping Iraq prepare its fleet of AC-208B Caravans for close air support and counterinsurgency missions supporting the Iraqi military.

The USAF trainers spent several months instructing the Iraqis and helping them understand the procedures involved in loading and properly caring for the Caravan's weapons, including the Hellfire ground-attack missile, its primary munition.

Kaiserslautern Phase II Ready

US Air Forces in Europe officials at Ramstein AB, Germany, opened Phase II of the new Kaiserslautern Military Community Center on Aug. 15. Phase II includes the complex's food court, four-plex movie theater, credit unions, and dozens of permanent and roving concessionaires.

In July, Phase I opened with the Ramstein Inn's Visitor's Quarters, a 350-room hotel; Romano's Macaroni Grill; Sports Lounge; and other concessions.

The third and final phase of the 844,000-square-foot complex, whose

opening was pending as of early September, will include the Army and Air Force Exchange Service base exchange, which will be "the largest AAFES facility in the world," according to Stephanie Burns, KMCC AAFES manager.

Tinker Depot Annex Opens

Air Force officials on Aug. 17 celebrated the opening of Bldg. 9001 at Tinker AFB, Okla. The building is one of six industrial facilities on the new Tinker Aerospace Complex (TAC), a 407-acre former General Motors plant

that the Air Force is leasing to support the depot work done at the Oklahoma City Air Logistics Center.

"This will be a magnificent addition to the Oklahoma City Air Logistics Center," said Gen. Donald J. Hoffman, Air Force Materiel Command boss, at the opening ceremony.

Bldg. 9001 alone has 2.5 million square feet of industrial floor space, about one-quarter of which is expected to be occupied by year's end. Already the ALC's TF33 engine maintenance work has relocated there.

C-27J Transition Under Way

The Air Force and Army are still working through the Office of the Secretary of Defense-directed mandate of transitioning the C-27J Joint Cargo Aircraft program from a combined effort to an Air Force-only initiative, Lt. Gen. Harry M. Wyatt III, Air National Guard director, told defense reporters July 29 in Washington, D.C.

Despite the standing JCA requirement for 78 airframes, the Pentagon's current plans call for procuring only 38, but keeping 16 airplanes in theater at all times. This will require at least doubling the number of aircrews per aircraft from two to four, or perhaps five, and increasing the maintenance requirements since each aircraft will fly more hours, he said.

Each of the six original ANG bed-down locations is scheduled to get four C-27Js, said Wyatt. ANG is still determining the sites for the remaining 14 aircraft in concert with the Army and state adjutants general, he said.

Vietnam War MIA Buried

The remains of CMSgt. John Quincy Adam of Bethel, Kan., whose C-130 went down May 22, 1968 on a mission over the Ho Chi Minh Trail in Vietnam, were buried in his hometown of Kansas City, Kan., on July 27.

Adam's remains were positively identified in March, according to the Pentagon's Defense Prisoner of War/Missing Personnel Office.

He was an airman first class at the time of the crash. The entire aircrew of the C-130, which had call sign Blind Bat 01, had been listed as missing in action since 1968.

Academy Graduates UAV/ISR Class

Members of the first class of the Air Force Academy's unmanned aircraft system and intelligence-surveillance-reconnaissance education program received their UAS wings Aug. 11 during a ceremony at the institution in Colorado Springs, Colo.

The class included 25 cadets overall. The instruction included classroom time and flight training on two Viking

New Cyber Organization Begins Operations

The Air Force on Aug. 18 activated 24th Air Force, the new numbered air force at Lackland AFB, Tex., that will oversee the service's cyber operations.

The new organization, led by Maj. Gen. Richard E. Webber, is part of Air Force Space Command. It will provide combat-ready forces trained and equipped to conduct sustained cyber operations, fully integrated within air and space operations.

Also on Aug. 18 at Lackland, Webber presided over the redesignation of the Air Force Information Operations Center as the 688th Information Operations Wing and the realignment of the 67th Network Warfare Wing under 24th Air Force.

Lackland was chosen in May as the preferred location of 24th Air Force headquarters. This decision became final on Aug. 12 with completion of the environmental impact analysis required by law.

With the activation, Gen. C. Robert Kehler, AFSPC commander, said "a great deal of work" remained to integrate cyberspace operations with those in air and space. Toward that end, he said AFSPC had "an extensive blueprint" in place outlining the first 100 days for 24th Air Force.

Subsequent to the activation, Air Force Secretary Michael B. Donley and Chief of Staff Gen. Norton A. Schwartz penned a joint Letter to Airmen stating, "Significant progress" would only come through changing "the way we think about the cyberspace domain" with an accompanying "change [in] our culture."

"Every airman must become a cyber defender," they said.

force installations at Apiay, Malambo, and Palanquero.

With the loss earlier this year of the use of Eloy Alfaro Air Base in Manta, Ecuador, the US had been looking for access rights to facilities in a Latin America partner nation from which to mount counternarcotics and counterterrorist surveillance activities in the region. The US military had launched unarmed counternarcotics surveillance flights of the eastern Pacific from Eloy Alfaro since 1999, but Ecuador decided not to renew the 10-year US lease to the base.

Clinton said the agreement with Colombia does not signal or authorize an increase in the US military presence in Colombia. The seven facilities will remain under Colombian control. ■

Strapped In Tight: SrA. Bryce Kester of the 817th Expeditionary Airlift Squadron is securely attached to the cargo hold of this C-17 as he checks on pallets of cargo due to be air-dropped to a forward operating base in Afghanistan. Kester is deployed from McChord AFB, Wash.

300 unmanned aerial vehicles at Camp Red Devil at Ft. Carson, Colo.

The program, expected to grow to include about 300 cadets, was integrated into the school's curriculum because UAVs are "a priority" for the Air Force and their value is "evidenced on a daily basis in Iraq and Afghanistan," said Lt. Gen. Michael C. Gould, academy superintendent. "So it is only fitting that our cadets have a keen understanding" of them, he said.

US and Colombia Sign Accord

US Secretary of State Hillary Rodham Clinton and Colombian Foreign Minister Jaime Bermudez announced Aug. 18 in Washington, D.C., that the two nations had reached a provisional agreement that would allow the US access to seven Colombian military bases, including air

USAF photo by SSGT. Michael B. Keller



News Notes

■ The 62nd Airlift Wing at McChord AFB, Wash., a C-17 unit that is the nation's primary nuclear airlift force, received a "satisfactory" rating, the highest possible grade, in a no-notice limited nuclear surety inspection carried out by Air Mobility Command Aug. 17-24.

■ *US News & World Report* in August named the US Air Force Academy the best baccalaureate college in the western region of the US for the third year in a row in its "America's Best Colleges" 2010 rankings.

■ The 798th Munitions Maintenance Group stood up Aug. 18 at Minot AFB, N.D. It will oversee four new munitions units at F. E. Warren AFB, Wyo., Malmstrom AFB, Mont., Vandenberg AFB,

Calif., and Minot that will maintain the service's nuclear weapons.

■ The Air Force and Missile Defense Agency in July successfully completed the trial period of the Upgraded Early Warning Radar at Thule AB, Greenland, thereby clearing the system for ballistic missile defense operations after a two-year upgrade.

■ Air Force Special Operations Command on July 31 activated the 33rd Special Operations Squadron at Cannon AFB, N.M. The new unit will operate the MQ-9 Reaper unmanned aerial vehicle.

■ The Air Force's 31st Munitions Squadron at Camp Darby, Italy, and the 6th/927th Aircraft Maintenance Squadron at MacDill AFB, Fla., were

among the winners of Secretary of Defense Maintenance Awards for 2009 announced Aug. 17.

■ The Air Force plans to erect a three-megawatt solar farm on the grounds of the Air Force Academy in Colorado Springs, Colo., and a one-megawatt solar power plant at Buckley Air Force Base in the state, according to press reports in August.

■ Canadian government divers think they may have found the wreckage of a US Army Air Forces PB5A Catalina seaplane that went down in rough weather on Nov. 2, 1942 in the St. Lawrence River, the Associated Press reported Aug. 7. A joint salvage effort was planned. ■

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New Nukes, Old Nukes

When it comes to the political debate in Washington, nuclear weapon programs now fall into two broad categories—those that would “modernize” existing capabilities, and those that would create new ones. Modernization programs are generally acceptable. Those deemed to be producing new or stronger nuclear capabilities most definitely are not.

Caught in the middle of this tug-of-war is a plan to extend the life of the B61, but that is getting ahead of the story.

Anti-nuclear activists, in their zeal to stamp out all such weapons, routinely apply the “new capabilities” tag to any type of program. Often, this requires a stretch of the imagination. What, exactly, is a new weapon, or a new capability?

Washington has no agreed-upon definition of what constitutes a “new” weapon and what constitutes a “modernized” weapon. Application of the distinction, as you might imagine, gets pretty mushy. “Neither word really means anything,” said Jeffrey G. Lewis of the New America Foundation. “It’s all about salesmanship.”

This dynamic has played itself out several times in recent years. A life extension program (LEP) for W76 warheads used by the Navy’s Trident submarines is under way, and the Air Force has consistently found support for extensive Minuteman III ICBM sustainment programs.

However, lawmakers have in recent years killed Pentagon plans for a Robust Nuclear Earth Penetrator and canceled the Reliable Replacement Warhead. Those programs were deemed to be of the “new capabilities” type, and therefore verboten.

Which brings us to the B61. B61 variants are used by USAF heavy bombers and NATO dual-role fighters. Defense Secretary Robert M. Gates told NATO allies in June that “the United States is committed to a full life extension program for the B61 gravity bomb deployed in support of the alliance.”

This comes with a deadline: The LEP needs to be done by 2017 to give the F-35 nuclear delivery capability. As Air Force Brig. Gen. Garrett Harencaak, who oversees defense programs for the Energy Department’s semiautonomous National Nuclear Security Administration, noted, “Our allies are spending a lot of money on the F-35” —and they expect certain capabilities from it.

Long-standing NATO arrangements make US B61s available, under certain conditions, to allies flying F-16s and Tornados. Several will replace their dual-role fighters with F-35s, and planners want to make the extended deterrent available on “the premier weapon system,” Harencaak said.

Delaying the LEP, and therefore keeping the B61 off the F-35, “doesn’t make any damn sense,” for the US or NATO, said Harencaak, a career bomber pilot who commanded the 509th Bomb Wing at Whiteman AFB, Mo.

The Administration therefore requested \$65 million in Fiscal 2010 to begin design studies for a B61 extension, but the House Appropriations energy and water subcommittee, which oversees DOE nuclear programs, zeroed out the funding.

Administration officials insist a modernized B61 would offer no new military capabilities.

What makes the B61 LEP fundamentally different from previous RNEP or RRRW proposals is the lack of new nuclear capability, said Daryl G. Kimball, executive director of the Arms Control Association. “That’s why you see [three of four] committees supporting it.”

In Kimball’s view, the B61 proposal is a standard life extension, “not a new design effort.”

The weapon’s yield, for example, would not change, although it would have improved reliability and better safety, for example, through improved resistance to fire.

Few US nuclear weapons currently have “internal disablement features” to prevent unauthorized use if the weapons are stolen, but military planners would like to add this capability, too. Logistics would also be simplified.

Some allege a definition of a “new” nuclear weapon came in the 2003 National Defense Authorization Act, Lewis noted. The legislation, however, only sets rules for budget requests and is frequently misconstrued.

The act stated that a weapon is considered new if its plutonium pit (the primary) or its canned subassembly (which houses the nuclear secondary) was not in the stockpile or production in 2002.

The House Appropriations energy and water subcommittee is looking for a nuclear strategy. In the report language passed by the House, HEW lawmakers wrote that they “will not support a major warhead redesign in the absence of clearly defined nuclear weapons strategy, stockpile, and complex plans. In light of the evolving strategic climate, the B61 is particularly in need of a clearly articulated strategy.”

A subcommittee release added that it “does not support the effort to develop what is essentially a new nuclear weapon.”

Harencaak added that the goals for the B61 LEP are safety, security, and reliability. The B61s are old—they were designed in the 1960s and delivered beginning in the 1970s. “Its radar has vacuum tubes,” noted Harencaak. “It’s crazy to think that a weapon that’s so important to our extended deterrence and our strategic air deliveries ... would ever have features that are that old.”

Whether the program goes forward, however, will likely depend on which side prevails in its attempt to “brand” the LEP—as modernization or a new weapon. ■



B61 life extension: caught up in a debate.

USAF photo

More information: <http://www.armscontrolwonk.com/2171>



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The expeditionary air war is drawing in more airmen and aircraft for the long haul.

Spooling Up in Afghanistan

By Adam J. Hebert, Executive Editor

Air Forces Central, the command that oversees US airpower operations in Southwest Asia, reports US aircraft flew some 19,000 close air support sorties over Afghanistan in 2008. This year, AFCENT forces are on pace to nearly double that number.

In other areas of airpower application—tactical transport, intelligence-surveillance-reconnaissance, and so forth—the story is much the same: Expeditionary airpower is in growing demand.

For US military leaders, the war in Afghanistan now has moved to cen-

ter stage. US goals are clear: Defend Afghan citizens from depredations of insurgents, support civil development, and, in the process, crush a resurgent Taliban and al Qaeda threat.

For this, USAF airmen are cast in starring roles. The Air Force's ability to quickly and efficiently deploy and



An F-15E from the 391st Expeditionary Fighter Squadron banks over a craggy mountain range in Afghanistan.

USAF photo by SSgt. Aaron Almon

In Afghanistan, things are heating up and will become deadlier as more US troops pour into the nation. In July, the US upgraded to wing status the 451st Air Expeditionary Group at Kandahar Airfield. It is now commanded by a brigadier general, reflecting the new scope and importance of the operation in southern Afghanistan.

In August, USAF also carried out a major realignment. AFCENT, the theater air component of US Central Command, was separated from 9th Air Force, an Air Force-only service command. Until August, both commands had been led by Lt. Gen. (now Gen.) Gary L. North. When North was tapped to lead Pacific Air Forces, the account was broken into two pieces. The AFCENT commander now is Lt. Gen. Gilmary M. Hostage III. The 9th Air Force commander is Holland.

A Complicated Environment

"The operations tempo is as high as it's ever been, and as our commitments accelerate in Afghanistan, we need 100 percent focus," said Gen. Norton A. Schwartz, Chief of Staff, explaining the plan earlier this year.

Hostage's forward headquarters is at al Udeid Air Base in Southwest Asia. AFCENT will take forward a command staff of 40 to 50 persons to oversee 27,000 deployed airmen, a large network of expeditionary bases, and the air campaign. Al Udeid is also home to a combined air and space operations center (CAOC), which directs air operations.

For the moment, anyway, Afghan insurgents are willing to fight head-on battles with US and NATO forces. Col. Kenneth C. Sersun, AFCENT's manpower director, said officials have noticed an increase in casualties from small-arms fire and rocket-propelled grenades. "This suggests an increase in sophistication" in the enemy's tactics, he said.

Terrorists will mass "relative to the small units" patrolling Afghanistan, explained Col. Kenneth Craib, AFCENT chief of plans. Friendly forces have repeatedly found themselves outnumbered and ambushed, making on-call airpower a key to success and even survival.

"It's a complicated environment," Holland summarized. "It's a fight."

Consider the events during five typical days this summer:

Last July 29, Navy F/A-18 fighters were on armed overwatch in Afghanistan, supporting a convoy that had come under rocket-propelled grenade and

redeploy its combat power makes it especially valuable. Whereas lightened-up ground forces are still relatively slow and ponderous, airpower can shift from one combat zone to another in a matter of hours.

The reduced violence in Iraq in recent months has allowed USAF to shift its

attention eastward, said Maj. Gen. William L. Holland, the new commander of 9th Air Force and, until recently, the deputy commander of AFCENT.

Airpower is a deterrent, Holland said. The air presence prevents enemies from massing and forces them into hiding.

small-arms fire near Tarin Kowt. The F/A-18s carried out several “show of force” passes to keep the enemy’s head down. Then, USAFA-10 attack aircraft rolled in, using precision weapons and 30 mm cannon fire to wipe out several enemy positions.

On the next day, an Air Force MQ-9 Reaper unmanned aerial vehicle took similar action near the Afghan village of Sangin. The heavyweight UAV “responded to an enemy threat by firing a precision guided munition” at the enemy’s position, and that position was eliminated, according to an official summary of the action.

Shortly afterward, on Aug. 2, Air Force A-10s once again went into action, this time near the town of Gereshk. Enemy forces had dug in



naissance aircraft. It has also led to greatly expanded Predator and Reaper forces. This summer, the UAV force had grown to provide 35 simultaneous orbits.

In Afghanistan, the ISR mission is “still growing,” said Maj. Ed Horner, an ISR planner at the CAOC. The aircraft are invaluable for tracking enemies over rough terrain and in villages.

USA photos by Sgt. Matthew Moeller



Top: TSgt. Joel McPherson scans the steep hills of the Korengal Valley, searching for enemy combatants. **Above:** A US soldier watches as F-15Es bombard insurgent positions in the Afghan valley.

along a tree line, firing from cover at friendly forces. The A-10s used precision weapons and halted the attack, and then kept the enemy from escaping the scene.

On Aug. 3, B-1 bombers came to the rescue of friendly forces under attack near the Afghan town of Mushan. “The enemy position was located along a wall,” said an official summary, which added that the B-1Bs engaged the enemy with precision weaponry, “terminating enemy action.”

On Aug. 4, F-15E fighters went into action near Asmar. According to a summary, “numerous enemy sniper positions were identified, confirmed, and destroyed” by PGMs, eliminating the threats. Also on Aug. 4, USAF F-16CJ fighters swept in when “enemy

forces were confirmed massing in an open field.” The enemy position was “destroyed by precision guided munitions and cannon fire.”

If precision airpower has been vital, USAF’s ISR systems have been even more critical to success in Afghanistan.

Sophisticated ISR gives US forces the ability to track the enemy’s forces for extended periods, spot threats before small units stumble into them, precisely target enemy positions, and develop “pattern of life” analyses that indicate when something is amiss and when it is safe to attack enemies.

Every ground commander wants full-motion video provided by airborne sensors. The demand for FMV spurred USAF to swiftly field (within eight months) the MC-12 manned recon-



Horner said “one of the hardest tasks” is positively identifying Taliban and al Qaeda figures, so planners try to “layer” the ISR collection whenever possible, for example by using UAVs, Rivet Joints, and U-2s to collect information on the same target.

The ISR community typically works “in the shadows,” Horner said, but it protects bases and outposts, counters improvised explosive devices, identifies sources of indirect fire, supports troops in contact and expands the situational awareness of small ground units.

Limited Conditions

The primary mission for the Predators and Reapers is ISR, but the UAVs can immediately switch to an attack role if necessary. Manned aircraft perform most strike missions.

Army Gen. Stanley A. McChrystal, the top military commander in Afghanistan, recently issued a tactical directive ordering troops to “scrutinize and limit the use of force such as close air support (CAS) against residential compounds and other locations likely to produce civilian casualties.” The

Winding Down in Once-Violent Iraq

The reduced violence in Iraq has allowed USAF to shift its attention eastward without damaging the war effort there. Close air support missions were once the norm over Iraq, but they have declined. The total has dropped from 18,422 sorties in 2008 to fewer than 9,000 projected for 2009.

In January 2008, AFCENT-controlled air forces expended 400 munitions, but the “kinetic” portion of the operation has sharply tailed off. In June, zero munitions were fired from the air.

“That’s pretty significant—that’s telling,” said Maj. Gen. William L. Holland, commander of 9th Air Force, who served as deputy commander of AFCENT until August. “It means we’ve been pretty darn successful” in Iraq.

Today, roughly half of the 150 sorties flown daily over Iraq are counter-IED missions. Improvised explosive devices are still a deadly threat, but USAF’s armed overwatch missions greatly improve situational awareness and reduce the danger.

directive came on the heels of a series of attacks that killed Afghan civilians in addition to the intended terrorists.

Of particular interest to coalition air forces is McChrystal’s guidance that “use of air-to-ground munitions and indirect fires against residential compounds is only authorized under very limited and prescribed conditions.”

This matters greatly because US and allied forces are battling an enemy that courts civilian casualties for propaganda purposes, deliberately hides

among civilians, and frequently fights from residences and towns.

“Basic US self-defense policy has not changed,” said Col. James G. Bitzes, CAOC legal advisor—friendly forces will defend themselves. Bitzes and others said the directive makes clear that the top priority is protecting

A storm rolls in at Bagram Air Base. With so many infrastructure improvement projects going on, Bagram keeps a dedicated cement plant just outside the base fence.



USAF photo by S/A Erik Cardenas



Capt. Eric Fleming, in the cockpit of an A-10, readies for takeoff at Bagram. The Thunderbolt II sports nose art symbolic of the famous "Flying Tigers" squadron.

civilians, without unduly restricting the Air Force.

"I really don't think it's different today," said Holland. "We pretty much hit what we're aiming for—and it's vetted."

The Air Force is constantly refining its targeting processes. In addition to having controllers in the field calling in and verifying air strikes, USAF has relentlessly pushed new technology. All combat aircraft in theater are now equipped with targeting pods, and data are shared both horizontally and vertically—between aircraft and airmen on the ground.

Air support operations centers are collocated with Army tactical headquarters at Kabul, Afghanistan, and Camp Victory, Iraq. Battlefield airman ASOC teams coordinate the air strikes supporting ground forces—urgent work when there's a firefight.

When a call for air support comes in, five operators on the ASOC "floor" will in seconds have identified the location and the threats in the area, picked the proper response aircraft, contacted the pilot and appropriate joint terminal attack controller, and passed the aircraft off to the JTAC. Capt. Josh Robertson, a fighter duty officer with the 682nd Air Support Operations Squadron at Shaw AFB, S.C., said the goal is to have an aircraft responding within a minute-and-a-half after notification of a TIC situation.

This response depends on communications systems which have undergone continuous improvement.

TSgt. Josh Littlefield, a JTAC now assigned to the 682nd, has deployed to Iraq or Afghanistan six times since

2002. The primary method of communication has changed almost every year, he said. Strikes were first coordinated by radio, then secure Internet "chat," then moving digital maps, and now the "Gateway" Humvee-mounted communications system.

Deployments Trending Downward

Capt. Chad Richardson, squadron logistics director, said these changes have sped up targeting and notification and helped eliminate mistakes. Each new system has its own quirks and idiosyncrasies that must be mastered, however. The Gateway system, for example, had growing pains and was originally "finicky," Richardson said.

Redundancy is key, so there are multiple options if a system fails. "If it all went down today, we've got our radios and batteries," said Littlefield.

Air and Space Expeditionary Force (AEF) rotations are reaching deep into the Air Force to identify the proper airmen for deployments to Afghanistan.

Case in point: The 169th Fighter Wing at McEntire JNGB, S.C., is an F-16CJ unit specializing in destroying enemy air defenses. The base, home to an active associate unit that includes nearly 150 active duty airmen, is preparing now for a 120-day deployment to Southwest Asia. A dozen F-16s are expected to deploy next May. The training begins well in advance.

Though traditionally a suppression of enemy air defenses unit, the 169th has "all the bells and whistles to do CAS," said Col. Scott Williams, the wing commander, who added that "exercises are key."

Thanks to the infusion of "regular Air Force" personnel through the active association, the 2010 deployment will be the first time a single Air National Guard unit has deployed for a full 120-day AEF without having to bring in personnel and equipment from other units.

The arrangement also allows the wing to continue to fly at the normal rate in the days leading up to its deployment, said Lt. Col. Scott Bridgers, commander of the 169th Maintenance Squadron. Most Guard units, with their small full-time staffs, have difficulty maintaining flying hours during the run-up to a deployment. The active association's extra personnel allow the wing to keep its skills fully honed before heading overseas.

The 120-day AEF is becoming something of a rarity in Southwest Asia, however. Sersun, the personnel director, reported that 56 percent of deployments to the area of responsi-

Building an Afghan Air Force, From Scratch

The Afghan government's need to control vast areas of rugged terrain underscores the importance of USAF's mission to develop the Afghan Air Corps.

The group of 170 airmen supporting the Combined Airpower Transition Force (CAPTF) is expected to expand to more than 300. The airmen are training an air corps that began from scratch, said Wes Long, chief of AF-CENT's Air Advisory and Training Division.

Airpower can increase the Afghan government's visibility and its ability to reach its population, Long noted. These factors could prove vital to Afghanistan's long-term security because the central government faces the same problems US and NATO forces do—long distances, crumbling infrastructure, and harsh terrain.

The unit is not trying to duplicate the US Air Force, said Lt. Col. John Edwards, AF-CENT's deputy planning director. CAPTF, he said, is focused on training an air corps with "the right capabilities to serve Afghanistan."

This means lift, ISR capability, and direct support to the Afghan national army. The air corps is already flying a variety of Russian-designed helicopters and transports, and will soon begin to take delivery of 18 refurbished C-27A light airlifters.

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USAF photo by TSgt. Erik Gudmundson

bility are now of the 179-day variety, with only 39 percent being traditional four-month AEFs.

The trend toward half-year deployments “keeps growing,” he said, but most personnel seem to favor this. The spin up, transportation, and training time associated with most of the jobs in Southwest Asia take a lot of time, and four months is often seen as too soon to turn back around.

Once in theater, units run hard. The deployed air refueling fleet, for example, is flying about 45 refueling sorties per day—more than double the normal “peacetime” rate.

Other aircraft types are similarly busy, and the wear and tear adds up. Lt. Col. Simon A. Izaguirre Jr., chief of maintenance and munitions in AFCENT’s logistics directorate, noted that some parts simply weren’t designed with heat and sand in mind.

Maintainers keep readiness rates high by working 12-hour days, seven days a week in theater—but it is a constant struggle to meet the forward requirements without unduly raiding stateside units. Home bases are “also feeling the burn,” Sersun said.

One of the priorities for planners is to “balance capability and minimum footprint,” said Lt. Col. John Edwards, deputy chief of AFCENT plans.

Because of Washington’s new emphasis on Afghanistan, many military construction programs are humming around the country.

There are “tons of concrete being poured,” said Col. Brian D. Yolitz, AFCENT installations director. Civil engineers are “trying to stay ahead of what the operator needs”—and the operator needs a lot.

New barracks and parking areas for airlifters top a long list of projects. Infrastructure has steadily improved in Afghanistan. At Bagram in 2002, “there were literally holes that we taxied around for takeoff,” Craib said. “The construction of the runways was of such poor quality, they were falling apart constantly.” Existing facilities often have to be destroyed and rebuilt from scratch.

Even this January, Edwards added, airmen were de-mining Soviet-seeded areas around Kandahar. This sort of work is vital to build Bagram, Kandahar, and other locations into secure, “enduring” facilities.

Vital Airlift

The current programs at three locations help illustrate what is needed.

Kandahar Airfield is receiving a strategic airlift apron, CAS aircraft apron expansion, refueler apron, ISR aircraft apron, expeditionary fighter shelter, and a cargo helicopter apron, among other enhancements.

Forward Operating Base Bastion, in south-central Afghanistan, is seeing construction of a runway, munitions storage area, fuel storage, new strategic airlift apron, cargo handling area, and an aviation operations and maintenance facility, and CAS and ISR aircraft apron work.

Southern Afghanistan is currently Operation Enduring Freedom’s hot-spot, so building up Kandahar and Bastion allows airmen to work closer with the marines and gives aircraft more time on station.

The original Afghanistan hub, Bagram, is receiving passenger and cargo terminals, an expeditionary fighter

An MQ-9 Reaper touches down at Joint Base Balad, Iraq. The primary mission for these UAVs is ISR, but they can switch to attack mode at a moment’s notice.

shelter, a C-130 maintenance hangar, a refueler ramp, and an aviation operations and maintenance facility. So much concrete is being poured at Bagram, in fact, that the base has its own cement plant just outside the fence. Concrete, Yolitz said, is pumped through chutes over the fence into waiting cement trucks. The trucks stay on base for security.

Airlift is vital in Afghanistan because so much activity is far from the major hubs. An airdrop is often the only way to resupply troops at forward locations. Still, airdrops are not a cure-all. Lt. Col. Jon M. Olekszyk, an air mobility planner at the CAOC, said if water has to be airdropped to outposts, it is only half as effective as a conventional delivery. A drop requires bulky protective packaging, some goods will be damaged in the fall, and some materiel will simply not be recovered.

“You’ve got some folks really out there in the hinterlands,” said Holland. “You can’t get a mule to them, much less a Humvee.”

Overall, airdrops (which were never really an issue in Iraq, thanks to an abundance of 13,000-foot runways) are on the rise. Olekszyk said air-drop capacity has increased 800 percent just since 2005, and July 2009 was the busiest month for drops since 2001.

The Air Force has continuously adjusted to meet the needs in Afghanistan and will continue to do so as long as the fighting continues. ■

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Airpower for Hybrid War

**This new type of warfare aligns closely with
US Air Force strengths.**

By Michael W. Isherwood



Two F-22 Raptors and a B-2 Spirit deployed to Andersen AFB, Guam, power over the Pacific Ocean on a mission.



USAF photo by MSgt. Kevin J. Grisenwald

In the early years of the new century, huge force-on-force clashes and low-level irregular warfare aren't the only threats faced by US military forces. Relatively small hostile groups either have or could acquire in the next few years access to sophisticated and lethal weaponry.

With modest training, modern communications, and strong command and control, these forces can employ such advanced weapons in concert with established guerrilla tactics and gain lethal effects once unavailable to such fighters.

Analysts are calling this type of conflict "hybrid warfare"—blending elements of different forms of combat. Participants in hybrid contests will comprise both nation-states and

nonstate actors—sometimes with both on the same side, sometimes opposing one another. This distinctly new type of military challenge requires national security strategists and force planners to understand new realities and prepare America's armed forces.

Hybrid warfare blurs the distinction between pure conventional and pure irregular warfare. At present, it is also a term with at least three applications. Hybrid can refer, first, to the battlespace environment and conditions; second, to enemy strategy choices; and third, to the type of force the US should build and maintain. Early examinations of this phenomenon have often used the term to apply to all these possibilities. In February, Marine Corps Gen. James N. Mattis, head of US Joint Forces

Command and NATO Supreme Allied Commander Transformation, referred to both hybrid enemies and a hybrid force the US might build.

In hybrid contests of the future, US forces could confront state and nonstate adversaries who employ a range of what could be considered "conventional" weapons—from guided mortars to cruise missiles to cyber weapons—in a manner merging lethal and nonlethal effects. The adversaries may employ ambush tactics one day while engaging in fixed conventional attacks the next.

What is clear is that US air and space forces (in simple terms, "airpower") can provide the foundation for the nation's response. Airpower offers the war-fighting components military resources that can cover great distances, survive,



USAF photo by SRA Emily S. Moore

Security forces from Moody AFB, Ga., demonstrate the capabilities of a Scan Eagle unmanned aircraft system at Hurlburt Field, Fla.

persist, and gain desired lethal and nonlethal effects.

The key tasks in high demand are four: persistent awareness, rapid air mobility, precision strike, and integrated networks that pull together all force elements and coordinate execution. Clearly, airpower is the key.

Persistent Awareness

The complex nature of hybrid warfare demands of military commanders and civilian leaders an exquisite awareness of their operating environment or, as the Marine Corps puts it, a “sense of the battlespace.” They seek to understand the planning, force disposition, operations, and lethality of potential threats that endanger their operating environment.

Gaining this information requires a disciplined and extensive collection network. No single sensor or approach can provide all the necessary information. Commanders value and need a “layered” intelligence-surveillance-reconnaissance (ISR) architecture to meet varied requirements.

Floods of imagery. Unmanned aerial vehicles and associated full-motion video (FMV) have dominated the ISR arena in the last decade. Predator video, with its precise reconnaissance ability and persistence to stare at one location for extended periods of time, has become the high-demand asset. But Predator is not the only UAV providing electro-optical (EO) and infrared (IR) imagery. A number of UAVs have been deployed to support US forces in the Mideast, where many hundreds of systems are in operation today.

These UAVs include more than 10 types of small, man-portable handheld systems that meet only a tactical commander’s needs in the fight. At the next level, battalion and brigade commanders have seven additional UAVs. Collectively, these assets have allowed ISR imagery and FMV capabilities to be widely available with positive effects.

Predators and other UAVs are not the sole source of imagery information. USAF operates five EO-IR sensor-suite-equipped U-2 aircraft and six with optical cameras. The Global Hawk has provided imagery support as well, despite still being in development. The Navy’s P-3 has been adapted to support ground forces with EO and IR sensors, while the Air Force is also deploying the MC-12 Liberty Project Aircraft to supplement the Predator and Reaper force with EO, IR, and signals intelligence (Sigint) sensor suites.

FMV and spot imagery alone will not meet all ISR needs in the US campaign in a hybrid conflict. In fact, FMV and imagery support normally is at the end of the ISR functional chain—but is the first product many request. Fortunately, commanders have more assets available than spot reconnaissance aircraft that focus narrowly at one location. The ISR architecture layers assets to build commanders’ situational awareness.

Surveillance, broad and deep. Gaining and maximizing situational awareness starts with being alerted or tipped off on an activity somewhere. Wide area surveillance (WAS), preferably with multiple sensors, is required to gain the persistent search capability to find

and fix activities or persons of interest. Multiple sensors allow a blanketing of the largest area possible.

The two dominant WAS techniques are signals intelligence and moving target indicator (MTI). Both techniques scan a wide area and discriminate the target or person, based on exploiting the communications, signal, or movement against the background. Both have the ability to pinpoint an activity for further exploitation or to cross-cue another ISR sensor.

Ground forces do have organic surveillance systems. The Prophet ground system, for example, provides signals collection for brigade commanders. The sensor sits on a tall pole, extending the sensor’s range. Normally, it detects signals out to seven miles, depending on the terrain. If located on higher terrain, such as a 500-foot ridge, the sensor could range to 27 miles.

While these systems maintain their surveillance as long as they are protected and have power, a ground system’s range is limited compared to airborne assets. In the Sigint collection, USAF’s RC-135 operating at 30,000 feet can detect communications out to 244 miles. A Global Hawk or U-2 with a signals collection suite can find signals out to 300 miles. From its high perch, these aircraft can monitor more than 284,000 square miles—an area larger than Iraq.

In a similar manner, the E-8C Joint STARS monitors a wide area for movement of units, vehicles, and associated traffic in the battlespace. Just as the E-3 AWACS provides air superiority fighters an in-depth awareness of all air traffic and guides the fight for air dominance, Joint STARS provides similar knowledge and direction for ground activities.

The MC-12 will have a Sigint suite to provide direct support to brigade and similar units with a tailored WAS capability to cue the onboard MX-15 EO/IR FMV sensor or another EO/IR sensor. The MC-12 data will go directly to brigade operations centers and any joint terminal attack controller with the laptop-based ROVER (Remotely Operated Video Enhanced Receiver). This digital C2 tool allows the ground party to see the video feed from an attacking aircraft and confirm the target.

Cuing from human intelligence. Other traditional intelligence disciplines play a vital role in the hybrid campaign. Perhaps the oldest method is human intelligence (Humint). While the public may think of Humint as information from spies, it involves details

obtained from debriefs of captured enemy combatants or casual conversations with civilians in the battlespace. Humint can provide answers to the “five questions”—but is normally narrow in scope in terms of the speed, range, and flexibility of gaining data.

As with any ISR discipline, Humint can provide a vital cuing for other systems. One of the better known examples of Humint as part of a layered architecture was the strike against Abu Musab al-Zarqawi. Initially tipped by a Humint source, reinforced by a Sigint intercept, and then tracked through more than 600 hours of airborne ISR, the collage of ISR data allowed an F-16 with a Litening pod to zero in for the attack. This multidiscipline and integrated effort demonstrates that no single entity

USAF photo by SSGT Aaron Allmon II



USAF photo by A1C Chad Warren

Left, an E-3 AWACS conducts a mission over South Korea in June. Above, TSgt. Bo Sullivan, flight engineer, prepares for takeoff aboard an E-8C Joint STARS aircraft.



can operate successfully in isolation. Layering of ISR assets works.

Rapid Air Mobility

Airpower’s speed, range, flexibility, and survivability are valued for their ability to deploy and sustain US forces. Foremost is the assured and rapid response to reach any part of the globe on short notice—in under a day. While surface transportation remains the efficient means to deploy large-size forces globally, air mobility aircraft are the most effective when personnel or equipment are needed immediately, such as when the US moved relief supplies and personnel to Pakistan following the 2005 earthquake. Rapid air mobility is also vital when bringing injured personnel to the United States for treatment.

Aeromedical evacuation often starts with rotary-wing assets and ends with a C-17 or similar airframe landing half the world away with the injured person arriving at a world-class trauma center in the US. One case involved a Marine Corps lance corporal, injured in Iraq by an improvised explosive device in September 2006. He suffered burns and a significant injury to his right eye. Brooke Army Medical Center in Texas was the only hospital with the combined resources to maximize his recovery chances. Leapfrogging from helicopter to C-17, the marine arrived in Texas 30 hours after the explosion. More importantly, the effort saved his eye.

Flights such as these also reinforce the other partner in the air mobility mission—airial refueling aircraft. The C-17 crew relied upon a number of air-to-air

refueling efforts to prevent having to stop for fuel en route, saving time and the marine’s eyesight. The Air Force’s tanker inventory gives the force the speed to close global distances within a day.

Air mobility provides more than a bridge to and from the United States and the contingency operations area. Inside the theater, air mobility is critical. For example, given the size of Afghanistan, US forces are dispersed around the country, and theater air mobility provides the speedy response inside the theater of operations.

One manifestation of air mobility’s value is its ability to reduce risk to the force. As a part of the counter-IED strategy to negate the more than 900 IEDs planted in Iraq and Afghanistan each month, C-130s and other tactical airlift reduce vehicle traffic and, hence, reduce personnel exposure to that threat. In 2008, airlift aircraft moved more than 1,174,000 people into, out of, and around US Central Command—a 50 percent increase from a few years earlier. Airlift is one tool in the counter-IED strategy that includes aggressive intelligence gathering and preventive operations plus electronic warfare techniques from the air and on vehicles.

Tactical airlift can sustain the force in the way that surface convoys have in the past. The development of the Joint Precision Air-Drop System (JPADS) has given airlifters the same precision that fighters and bombers have with



USAF photo by SSgt. Lee A. Osberry Jr.

A TACP with the 4th Air Support Operations Group Det. 1 uses night vision goggles during a close air support exercise at Kirkuk AB, Iraq.

their GPS guided munitions. In 2008, C-17s and C-130s air-dropped more than 16.5 million pounds of supplies to tactical fighting positions in Afghanistan, allowing forces to maintain their presence and readiness. This is a fourfold increase in two years. More importantly, precision airdrops, according to a US Army statement in 2008, “saved soldiers’ lives [by] offsetting ground convoy requirements.”

In addition, air-drop operations can play a vital role in support of the overall strategy in the hybrid campaign. During the winter of 2008-09 in Afghanistan, nearly 40 percent of all airdrops were humanitarian missions—delivering rice, water, firewood, and blankets to isolated villagers. More than just lifesaving materials, the airdrops reinforced the positive image of the government support to the people.

Rapid, assured air mobility is vital to any US campaign in a hybrid warfare contingency. It places the force into the region where needed and when needed while also sustaining a critical lifeline into and out of the theater. Within the theater or country, it reduces the risk to the force while enabling logistical operations in general. Without air mobility, it is difficult to imagine a successful global US campaign.

Precision Strike

Hybrid warfare seems tailor-made for close air support—or CAS—operations. As a hybrid campaign often will involve warfare “among the people,” it requires soldiers and marines to operate in, live with, and move fluidly

through the populace. This fact often dictates foot patrols to provide presence and to build relationships with businessmen, village leaders, and the people on the street.

For ground forces, conducting these presence missions while operating in armored vehicles or tanks would create an adverse effect—isolating the security force from the people it must protect and reinforcing the outside nature of US forces. While improving the safety of ground forces, operating from inside armored vehicles does not build trust nor fortify the legitimacy of the government. To avoid this perception, US forces are lightly armed as they operate in cities and villages.

Operating in this manner yields the initiative to hybrid adversaries—permitting the belligerents to mass and attack at the time and place of their choosing. Placed quickly on the defensive, US ground forces turn to CAS to neutralize the hostile force. In 2008, the air component in US Central Command flew more than 37,000 CAS missions and expended more than 5,900 munitions.

Airpower’s value for striking enemies, however, cannot be measured by the quantity or tonnage of weapons employed. The presence of aircraft over friendly forces deters hostile action. Army SSgt. Chris Summers in the 101st Airborne Division captured the importance of airpower’s presence when he said: “Airpower plays a vital role in dismounted or mounted maneuvers through hostile areas. When CAS is on station, it greatly reduces the threat. If

we do get hit, only a handful [of enemy troops] will be brave enough to fire, knowing [aircraft are overhead].”

From its vertical perch, airpower has a maneuver advantage not available to ground forces. During operations in southern Lebanon, Israeli armor often faced constricted roads and lanes inside the villages. As a result, infantry forces operated without the benefit of reinforcing armor; but CAS aircraft made up the gap—and with often improved effects.

Armed with 20 mm or 30 mm weapons, CAS aircraft can have pinpoint accuracy with low collateral damage. Likewise, the advent of the Small Diameter Bomb, the GBU-39, allows US forces to strike within four feet of a target. If needed, it can hit a room where the hostile forces are, from a vertical or horizontal approach, and with less risk to other occupants in the house. Airpower’s ability to locate and destroy the belligerent’s forces alters the options available to opponents.

On many occasions in Afghanistan, the hostile forces have transitioned from guerrilla, hit-and-run style attacks to engage in a more conventional fight. In the summer of 2006, Taliban forces attempted to hold ground in an area known as the Pashmul Pocket, 30 miles west of Kandahar. With an extensive trench system and well-developed network of supporting fires, Taliban fighters tried to coordinate fires and counterattack as they lost ground. The coalition force, with superior ISR, command and control networks, mobility, and precision attacks, defeated the Taliban.

Operation Medusa, as the fight in the Pashmul Pocket was called, was not an isolated event. The years 2007 and 2008 would see similar fights stemming from both planned and ad hoc encounters. In 2008, US forces operating in Kunar province stumbled into a pitched battle following an insurgent ambush. The fighting lasted three days and resulted in another defeat for those opposing US and coalition forces in Afghanistan.

In addition to lethal effects, airpower’s precision engagement creates a variety of nonlethal yet beneficial outcomes. One example is how CAS aircraft provide column cover or escort for ground forces as they move. As Summers mentioned, the presence of overhead attack aircraft has a powerful deterrent effect. The aircraft persistence, speed, and survivability enables that effect.

Fifth generation fighters such as the F-22 and F-35 can provide additional, unique capabilities to the hybrid cam-

paign with their nonlethal attributes. These aircraft are more than “stealth” fighters—they can potentially serve as C2, ISR, and electronic attack platforms. US airpower in the early part of the 21st century will be netted—with the F-35 and F-22 serving as key nodes. When not needed for lethal firepower, the F-35’s and F-22’s sensor suites can search and track a variety of surface targets while being controlled from ground locations. Information will flow via the Multifunction Advanced Data Link (MADL), which will connect all stealth assets.

Network Integration

ISR forces teamed with rapid air mobility and precision strike capabilities are only effective if orchestrated and focused in a coherent manner. Such unity of effort is not unique to air operations but necessary for all components for all operations.

The extensive collection of organizations—military and nonmilitary—involved in the hybrid campaign demands their plans and operations be integrated. Given their disparate efforts, this synchronization and collaboration can be daunting; but its demanding nature makes it vital to focus the collective effort.

Airpower can fill this distinct need with extensive experience linking and commanding organizations over great distances. During Operation Enduring Freedom in October 2001, the combined force air component commander (CFACC) provided planning guidance and directed execution for B-2 bombers in the middle of the United States, C-17s and their fighter escorts based in Europe, and carrier-based attack aircraft. This was truly a global effort.

Space-based communications and state-of-the-art information technology and planning tools enable the unity of effort. While all warfighting components rely on these resources, airpower is unique in its daily use of such extended and integrated networks.

The second challenging element of integrating networks is the requirement to unify the diverse partners—air, land, naval, and civic components.

While airpower provides a premier network to unify the joint campaign at the theater level, its resources also provide a means to extend the planning, coordination, and execution for units in the field. Ever since Lt. Gen. Elwood R. Quesada placed pilots with Army tanks to facilitate the breakout

USAF Photo by SRA Brian J. Ellis



Brig. Gen. H. D. Polumbo Jr., then commander of the 380th Air Expeditionary Wing, brings a U-2 Dragon Lady in for a landing in Southwest Asia.

from Normandy, air commanders have excelled at working with front-line units in austere conditions.

Today, the tactical air control party continues this legacy. These airmen are now equipped with advanced communication tools: In Iraq and Afghanistan, TACPs have the ROVER, and can send target coordinates and other relevant attack information to aircrews using a situation awareness data link or Link 16 data link.

At the same time, TACPs located in the brigade operations centers have access to additional information via a variety of ground control stations. For example, the Joint STARS common ground station allows those responsible for executing the ongoing operations to see units and forces moving in their area. This information sharing is in addition to the E-8’s ability to send data directly to a number of ground elements such as attack helicopters and command vehicles via Force XXI Battle Command Brigade and Below and the Single Channel Ground and Airborne Radio System.

Given the unpredictable and uncertain nature of the hybrid battlespace, additional tools are needed to gain greater effectiveness and efficiency of US forces. Airpower’s attributes allow it to enhance the campaign with its ability to cover distances and provide airborne communications nodes to unite distributed units and capabilities. One example is Objective Gateway, outfit-

ted on an RQ-4 high-altitude UAV, that will extend the ground communications networks hundreds of miles and over ground obstructions such as high terrain or urban buildings. From its vertical position, Objective Gateway will connect ground forces on opposite sides of a mountain ridge or opposite sides of the country.

Airpower will soon also provide ground units with access to an extensive database of tactical information.

Ground entities can gain access to real-time information via the Heterogeneous Airborne Reconnaissance Team (HART). Also available on a Toughbook portable computer, ground personnel can access instant information from airborne ISR platforms, such as Scan Eagle, Predator, Reaper, MC-12, Hunter, and so forth. Just as important, if a commander prioritizes subordinate units, the higher priority unit can task or request information from the airborne ISR asset to meet its ongoing operations. HART gives ground personnel real-time and seamless situational awareness.

Hybrid operations mark an evolution in warfare. While the environment has changed, and the style of warfare has changed, airpower’s enduring attributes are critical to the hybrid fight. Airpower’s speed, range, flexibility, precision, and persistence enable it to rapidly adjust and adapt to the dynamic environment in which the hybrid beligerent operates. ■

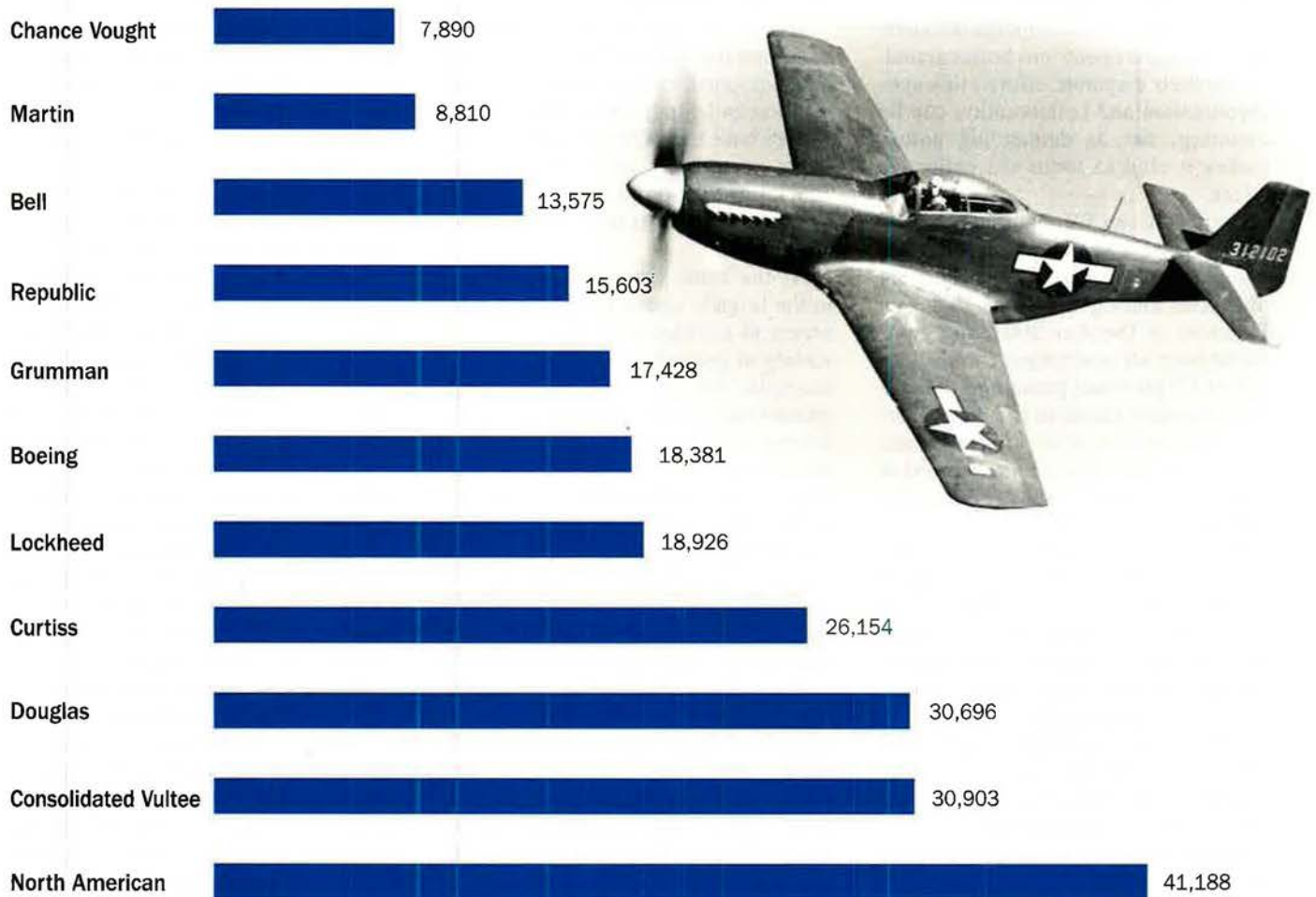
Michael W. Isherwood, a retired USAF colonel and fighter pilot, is a senior analyst at the Northrop Grumman Analysis Center in Washington, D.C. This is his first article for Air Force Magazine.

Who Built the Airplanes?

In World War II, US plants churned out nearly 300,000 military airplanes, at a cost of \$45 billion. More than half—158,880—went to the Army Air Forces. The rest went to the Navy, Marine Corps, and Allies. Who built all of these aircraft? In popular imaginings, US automakers and other civilian industries converted to war

production and led the way. In reality, the burden was carried by aircraft houses established in the prewar period. The top 11 such airframers (see chart) built a huge 77 percent of all airplanes. The existence of this large aircraft base was the reason US air forces could expand rapidly.

Eleven Prodigious World War II Aircraft Companies



Source: *A History of the United States Air Force 1907-1957*, by Alfred Goldberg, ed., p. 91.



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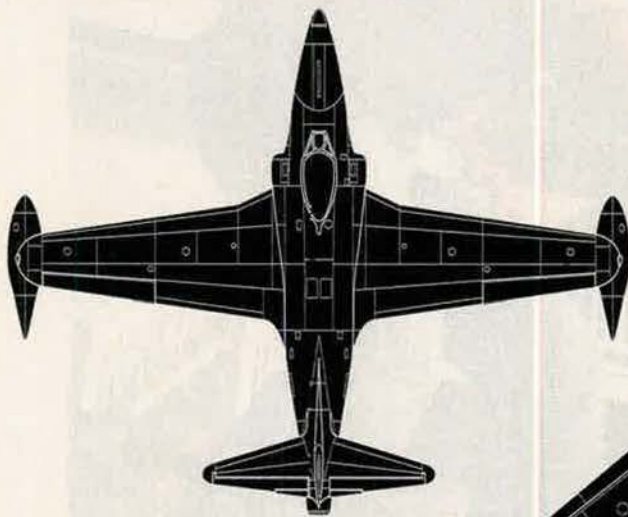
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The Sixth Generation Fighter

By John A. Tirpak, Executive Editor



F-80



F-86D



F-4

Illustrations not to scale

“Within the next few years, we will begin work on the sixth generation [fighter] capabilities necessary for future air dominance.” The Secretary of the Air Force, Michael B. Donley, and the USAF Chief of Staff, Gen. Norton A. Schwartz, issued that statement in an April 13 *Washington Post* article.

The Air Force may have to move a little faster to develop that next generation fighter. While anticipated F-22 and F-35 inventories seem settled, there won't be enough to fix shortfalls in the fighter fleet over the next 20 years, as

legacy fighters retire faster than fifth generation replacements appear.

The Air Force will have to answer a host of tough questions about the nature of the next fighter.

Should it provide a true “quantum leap” in capability, from fifth to sixth generation, or will some interim level of technology suffice? When will it have to appear? What kinds of fighters will potential adversaries be fielding in the next 20 years? And, if the program is delayed, will a defense industry with nothing to work on in the meantime lose its know-how to deliver the needed system?

What seems certain is that more is riding on the Air Force's answers than just replacing worn-out combat aircraft.

Initial concept studies for what would become the F-22 began in the early 1980s, when production of the F-15 was just hitting its stride. It took 20 years to go from those concepts to initial operational capability. Industry leaders believe that it will probably take another 20 years to field a next generation fighter.

That may be late to need. By 2030, according to internal USAF analyses, the service could be as many as 971 aircraft short of its minimum required inventory of 2,250 fighters. That as-

sumes that all planned F-35s are built and delivered on time and at a rate of at least 48 per year. The shortfall is due to the mandatory retirement of F-15s and F-16s that will have exceeded their service lives and may no longer be safe to fly.

Defense Secretary Robert M. Gates has set the tone for the tactical aviation debate. He opposed the F-22 as being an expensive, “exquisite” solution to air combat requirements, and has put emphasis on the less costly F-35 Lightning II instead. He considers it exemplary of the kind of multirole platforms, applicable to a wide variety of uses, that he

or outclassed by “generation four-plus-plus” fighters, if Russia and China build their fifth generation fighters in large numbers, the US would be at a clear airpower disadvantage in the middle of the 2020s. That’s a distinct possibility, as both countries have openly stated their intentions to build world-class air fleets. If they do, the 75 percent solution fails.

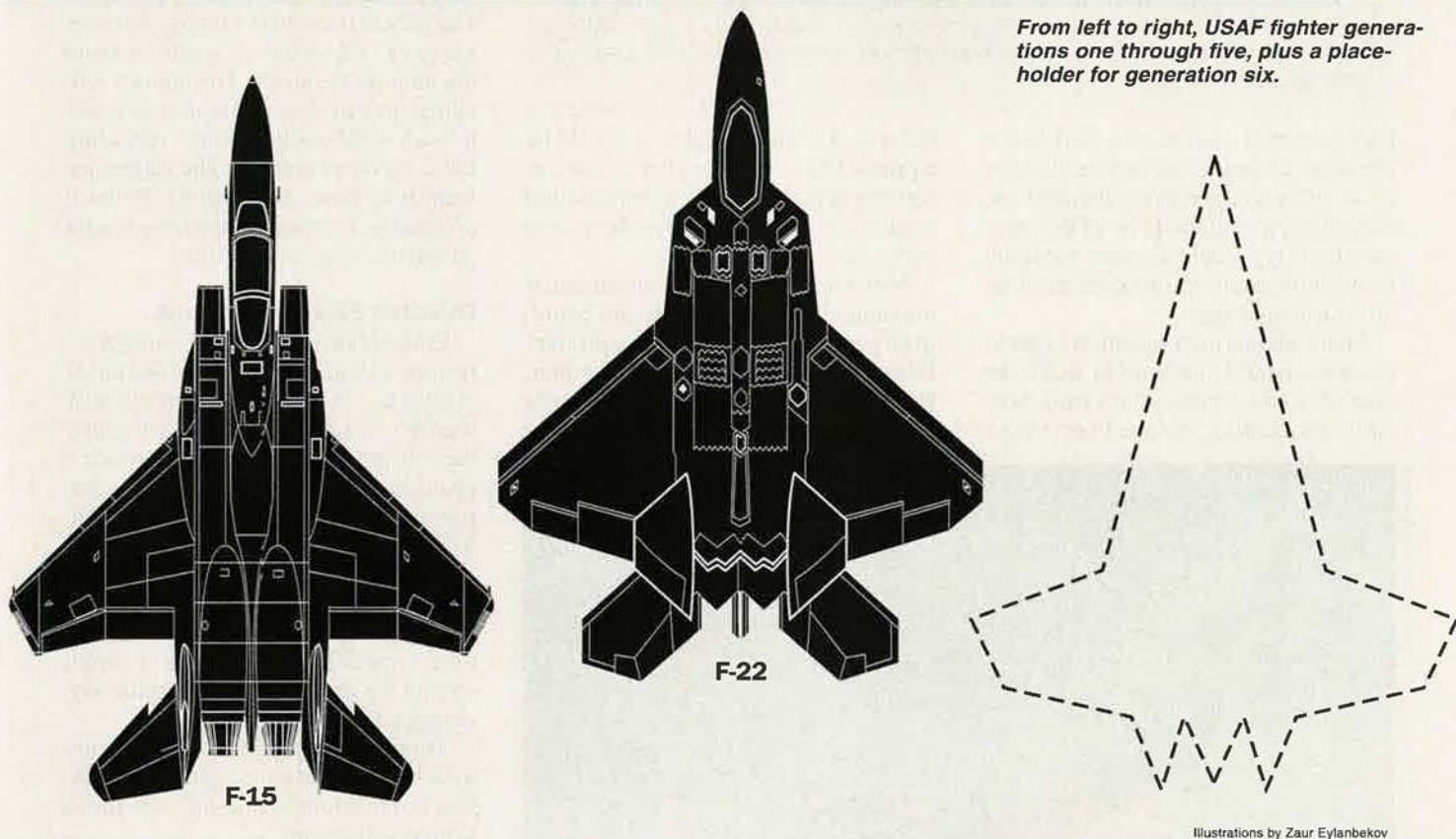
What You See Is What You Get

The Air Force declined to offer official comment on the status of its sixth generation fighter efforts. Privately, senior leaders have said they have been waiting to see how the F-22 and F-35

cret, better fighter is nearly ready to be deployed. He said, “What you see is what you get.”

That opinion was borne out in interviews with the top aeronautic technologists of Boeing, Lockheed Martin, and Northrop Grumman, the three largest remaining US airframers. They said they were unaware of an official, dedicated Air Force sixth generation fighter program and are anxiously waiting to see what capabilities the service wants in such a fighter.

The possibilities for a sixth generation fighter seem almost the stuff of science fiction.



From left to right, USAF fighter generations one through five, plus a placeholder for generation six.

Illustrations by Zaur Eylanbekov

The technologies are emerging, but what’s needed is a program to pull them together.

believes the US military should be buying in coming years. He and his technology managers have described this approach as the “75 percent” solution.

Gates has also forecast that a Russian fifth generation fighter will be operational in 2016—Russia says it will fly the fighter this year—and a Chinese version just four years later. Given that US legacy fighters are already matched

issues sorted out before establishing a structured program for a next generation fighter.

The Air Force has a large classified budget, but it seems there is no “black” sixth generation fighter program waiting in the wings. A senior industry official, with long-term, intimate knowledge of classified efforts, said the F-22 wasn’t stopped at 187 aircraft because a se-

It would likely be far stealthier than even the fifth generation aircraft. It may be able to change its shape in flight, “morphing” to optimize for either speed or persistence, and its engines will likely be retunable in-flight for efficient supersonic cruise or subsonic loitering.

The sixth generation fighter will likely have directed energy weapons—

Fighter Generations

The definition of fighter generations has long been subject to debate. However, most agree that the generations break down along these broad lines:

Generation 1: Jet propulsion (F-80, German Me 262).

Generation 2: Swept wings; range-only radar; infrared missiles (F-86, MiG-15).

Generation 3: Supersonic speed; pulse radar; able to shoot at targets beyond visual range ("Century Series" fighters such as F-105; F-4; MiG-17; MiG-21).

Generation 4: Pulse-doppler radar; high maneuverability; look-down, shoot-down missiles (F-15, F-16, Mirage 2000, MiG-29).

Generation 4+: High agility; sensor fusion; reduced signatures (Eurofighter Typhoon, Su-30, advanced versions of F-16 and F/A-18, Rafale).

Generation 4++: Active electronically scanned arrays; continued reduced signatures or some "active" (waveform canceling) stealth; some supercruise (Su-35, F-15SE).

Generation 5: All-aspect stealth with internal weapons, extreme agility, full-sensor fusion, integrated avionics, some or full supercruise (F-22, F-35).

Potential Generation 6: extreme stealth; efficient in all flight regimes (subsonic to multi-Mach); possible "morphing" capability; smart skins; highly networked; extremely sensitive sensors; optionally manned; directed energy weapons.

high-powered microwaves and lasers for defense against incoming missiles or as offensive weapons themselves. Munitions would likely be of the "dial an effect" type, able to cause anything from impairment to destruction of an air or ground target.

Materials and microelectronics technologies would combine to make the aircraft a large integrated sensor, possibly eliminating the need for a nose

radar as it is known today. It would be equipped for making cyber attacks as well as achieving kinetic effects, but would still have to be cost-effective to make, service, and modify.

Moreover, the rapid advancement of unmanned aircraft technologies could, in 20 years or so, make feasible production of an autonomous robotic fighter. However, that is considered less likely than the emergence of an uninhabited

but remotely piloted aircraft with an off-board "crew," possibly comprising many operators.

Not clear, yet, is whether the mission should be fulfilled by a single, multirole platform or a series of smaller, specialized aircraft, working in concert.

"I think this next round [of fighter development] is probably going to be dominated by ever-increasing amounts of command and control information," said Paul K. Meyer, vice president and general manager of Northrop Grumman's Advanced Programs and Technology Division.

Meyer forecast that vast amounts of data will be available to the pilot, who may or may not be on board the aircraft. The pilot will see wide-ranging, intuitive views of "the extended world" around the aircraft, he noted. The aircraft will collect its own data and seamlessly fuse it with off-board sensors, including those on other aircraft. The difference from fifth generation will be the level of detail and certainty—the long-sought automatic target recognition.

Directed Energy Weapons

Embedded sensors and microelectronics will also make possible sensor arrays in "locations that previously weren't available because of either heat or the curvature of the surface," providing more powerful and comprehensive views of the battlefield, Meyer noted. Although the aircraft probably won't be autonomous, he said, it will be able to "learn" and advise the pilot as to what actions to take—specifically, whether a target should be incapacitated temporarily, damaged, or destroyed.

Traditional electronics will probably give way to photonics, said Darryl W. Davis, president of Boeing's advanced systems division.

"You could have fewer wires," said Davis. "You're on a multiplexed, fiber-optic bus ... that connects all the systems, and because you can do things at different wavelengths of light, you can move lots of data around airplanes much faster, with much less weight in terms of ... wire bundles."

Fiber optics would also be resistant to jamming or spoofing of data and less prone to cyber attack.

A "digital wingman" could accompany the main fighter as an extra sensor-shooter smart enough to take verbal instructions, Meyer forecasted.

Directed energy weapons could play a big role in deciding how agile



A Northrop Grumman artist's conception of a sixth generation fighter employing directed energy weapons and stealthy data networking.

Technology Readiness Levels

Pentagon leaders now seek to reduce weapon risks and costs by deferring production until technologies are mature. Pentagon technology readiness levels—TRLs—are defined as follows:

TRL 1: Basic principles observed and reported. Earliest transition from basic scientific research to applied research and development. Paper studies of a technology's basic properties.

TRL 2: Invention begins; practical applications developed. No proof or detailed analysis yet.

TRL 3: Active R&D begins. Analytical and lab studies to validate predictions. Components not yet integrated.

TRL 4: Basic elements are shown to work together in a "breadboard," or lab setting.

TRL 5: Fidelity of demonstrations rises. Basic pieces are integrated in a somewhat realistic way. Can be tested in a simulated environment.

TRL 6: Representative model or prototype. A major step up in readiness for use. Possible field tests.

TRL 7: Prototype of system in operational environment is demonstrated—test bed aircraft, for example.

TRL 8: Final form of the technology is proved to work. Usually the end of system development. Weapon is tested in its final form.

TRL 9: Field use of the technology in its final form, under realistic conditions.

a sixth generation fighter would have to be, Meyer noted. "Speed of light" weapons, he added, could "negate" the importance of "the maneuverability we see in today's fashionable fighters." There won't be time to maneuver away from a directed energy attack.

Pulse weapons could also fry an enemy aircraft's systems—or those of a ground target. Based on what "we have seen and we make at Northrop Grumman," Meyer said, "in the next 20 years ... that type of technology is going to be available."

With an appropriate engine—possibly an auxiliary engine—on board to provide power for directed energy weapons, there could be an "unlimited magazine" of shots, Meyer said.

Hypersonics—that is, the ability of an air vehicle to travel at five times the speed of sound, or faster—has routinely been suggested as an attribute of sixth generation fighters, but the industry leaders are skeptical the capability will be ready in time.

While there have been some successes with experimental hypersonic propulsion, the total amount of true hypersonic flying time is less than 15 minutes, and the leap to an operational fighter in 20 years might be a leap too far.

"It entails a whole new range of materials development, due to ... sensors, fuzes, apertures, etc.," Meyer noted, "all of which must operate in that intense heat environment at ... Mach 5-plus."

Still, "it is indeed an option that we would consider" because targets will be fleeting and require quick, surgical strikes at great distances. However,

such an approach would probably be incompatible with a loitering capability.

Davis said he thinks hypersonics "will start to show up in sixth generation," but not initially as the platform's power plant, but rather in the aircraft's kinetic munitions.

"I think it will start with applications to weapons," Davis said. And they may not necessarily be just weapons but "high-speed reconnaissance platforms for short missions on the way to the target."

Because of the extreme speed of hypersonic platforms and especially directed energy weapons, Davis thinks it

will be critical to have "persistent eyes on target" because speed-of-light weapons can't be recalled "once you've pulled the trigger," and even at hypersonic speed, a target may move before the weapon arrives. That would suggest a flotilla of stealthy drones or sensors positioned around the battlefield.

Not only will hypersonics require years more work, Davis said it must be combined with other, variable-cycle engines that will allow an aircraft to take off from sea level, climb to high altitude, and then engage a hypersonic engine. Those enabling propulsion elements are not necessarily near at hand in a single package.

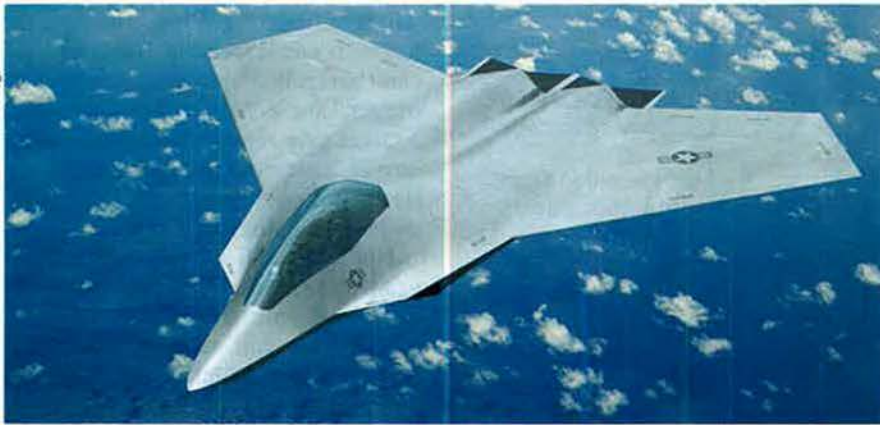
The sixth generation fighter, whatever it turns out to be, will still be a machine and will need to be serviced, repaired, and modified, according to Neil Kacena, deputy director of Lockheed Martin's Skunk Works advanced projects division. He is less confident that major systems such as radar will be embedded in the aircraft skin.

"If the radar doesn't work, and now you have to take the wing off, ... then that may not be the technology that will find its way onto a sixth gen aircraft," he said. In designing the next fighter, life cycle costs will be crucial, and so practical considerations will have to be accommodated.

Toward that end, he said, Lockheed Martin is working on new composite manufacturing techniques that use far fewer fasteners, less costly tooling, and therefore lower start-up and sustainment



F-22 Raptors on a training mission soar over the mountains near Elmendorf AFB, Alaska. The fifth generation fighter features all-aspect stealth and full-sensor fusion.



In Boeing's conception, traditional electronics give way to photonics, reducing weight and increasing processing speed.

costs. It demonstrated those technologies recently on the Advanced Composite Cargo Aircraft program.

Given the anticipated capabilities of the Russian and Chinese fifth generation fighters, when will a sixth generation aircraft have to be available?

Davis said the Air Force and Navy, not industry, will have to decide how soon they need a new generation of fighters. However, "if the services are thinking they need something in 2020" when foreign fifth generation fighters could be proliferating in large numbers, "we're going to have to do some things to our existing generation of platforms," such as add the directed energy weapons or other enhancements.

Kacena agreed, saying that Lockheed Martin has "engaged with both services and supplied them data and our perspectives" about the next round of fighter development. If the need exists to make a true quantum leap, then sixth generation is the way to go, but, "if it's driven by the reduction in force structure [and] ... the equipment is just getting old and worn out in that time frame, then [we] may very well be on a path of continuous improvement of fifth generation capabilities." Lockheed Martin makes both the F-22 and F-35.

He said the company's goal is to find the knee in the curve where "you get them the most bang for the buck without an 80 to 90 percent solution. Something that doesn't take them beyond the nonlinear increase in cost."

Lt. Gen. David A. Deptula, the Air Force deputy chief of staff for intelligence-surveillance-reconnaissance and a fighter pilot, said the next fighter generation may well have characteristics fundamentally different from any seen today, but he urged defense decision-makers to keep an open mind and not ignore hard-learned lessons from history.

Although great strides have been made in unmanned aircraft, said Deptula, "we have a long way to go to achieve the degree of 360-degree spherical situation awareness, rapid assimilation of information, and translation of that information into action that the human brain, linked with its on-site sensors, can accomplish."

Numbers Count, Too

Despite rapid increases in computer processing power, it will be difficult for a machine to cope with "an infinite number of potential situations that are occurring in split seconds," Deptula added, noting that, until such a capability is proved, "we will still require manned aircraft."

It's important to note that America's potential adversaries will have access to nearly all the technologies now only resident with US forces, Deptula said. Thinking 20 to 30 years out, it will be necessary to invest properly to retain things US forces depend on, such as air superiority.

However, he warned not to put too much emphasis on technology, per se. "Just as precision air weapons and, to a certain degree, cyberspace are redefining our definition of mass in today's fight, we have to be very wary of how quickly 'mass' in its classic sense can return in an era of mass-precision and mass-cyber capabilities for all."

In other words, numbers count, and too few fighters, even if they are extremely advanced, are still too few.

Hanging over the sixth generation fighter debate is this stark fact: The relevant program should now be well under way, but it has not even been defined. If the Pentagon wants a sixth generation capability, it will have to demonstrate that intent, and soon. Industry needs that clear signal if it is to invest its own money in developing the technologies

needed to make the sixth generation fighter come about.

Moreover, the sixth generation program is necessary to keep the US aerospace industry on the cutting edge. Unless it is challenged, if the "90 percent" solution is needed in the future, industry may not be able to answer the call.

Under Gates, Pentagon technology leaders have said they want to avoid cost and schedule problems by deferring development until technologies are more mature. Unfortunately, this safe and steady approach does not stimulate leap-ahead technologies.

Meyer said, "We need to have challenges to our innovative thoughts, our engineering talents, our technology integration and development that would ... push us ... to the point where industry has to perform beyond expectations."

He noted that today's F-35 is predicated on largely proven technologies and "affordability," but it was the B-2 and F-22 programs that really paved the way for the systems that underpin modern air combat.

The B-2 bomber, he noted, "was a program of significant discovery," because it involved a great deal of invention to meet required performance. The B-2 demanded "taking ... basic research and developing it in the early ... phases" of the program, which yielded nonfaceted stealth, enhanced range and payload, nuclear hardening, new antennas, radars, and flight controls.

Today, Meyer said, most programs are entering full-scale development only when they've reached a technology readiness level of six or higher (see chart).

"We probably had elements on the B-2 ... that were at four, and a lot at five," Meyer said.

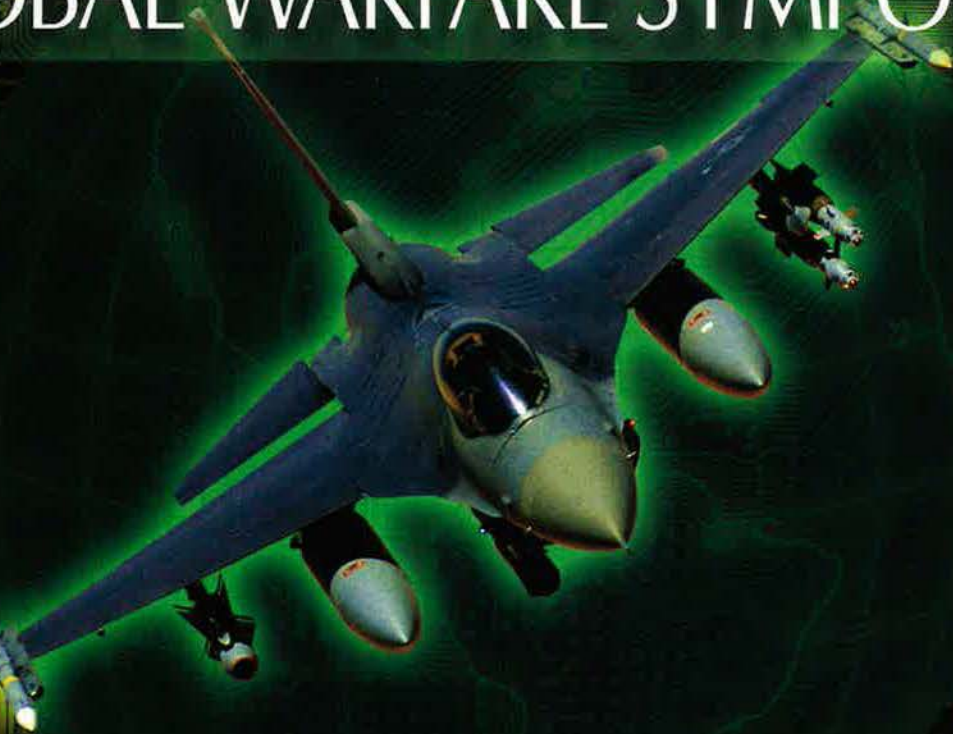
Programs such as the sixth generation fighter "are the ones we relish because they make us think, they make us take risks that we wouldn't normally take, and in taking on those risks we've discovered the new technologies that have made our industry great," he asserted.

Davis said that other countries are going to school on the US fighter industry and taking its lessons to heart.

"We still think you have to build things—fly them and test them—in order to know what works and what doesn't," said Davis. "And, at some point, if you don't do that, just do it theoretically, it doesn't get you where you need to be."

He added, "If we don't continue to move forward, they will catch us." ■

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Enduring Airlift

Afghanistan is a logistician's nightmare, and air mobility is the solution.

By Marc V. Schanz, Associate Editor

USA photo by Spc. Micah E. Clare

With a new 20,000-strong contingent of US troops streaming into Afghanistan, the task of generating required logistics support has jumped near the top of the Pentagon "to do" list. The new increment of ground forces will need tons of materiel and lots of transport, and all signs are that USAF's airlift will be the key.

The Air Force's mobility fleet has been vital throughout eight years of war in Afghanistan and Iraq, swiftly and reliably moving thousands of service members, contractors, bullets, guns, supplies, water—you name it.

While airlift proved important in the Iraq war, it may well become decisive for the renewed US war effort in Afghanistan.

USAF Col. Gregory Schwartz, chief of contingency operations at US Transportation Command, reported, "I could make the argument that airlift is more important to sustain what we have going on in Afghanistan," if for no other reason that Afghanistan, unlike Iraq, has no established national distribution system.



USAF photo by TSgt. John Jung

Top: A C-17 drops combat delivery system bundles to ground forces in Afghanistan. **Above:** Army Spc. Joshua Vazquez (left) and SMSgt. Timothy Gaines move a pallet into a C-130 cargo bay before an air-drop mission.

In fact, Afghanistan amounts to a logistician's nightmare.

To begin with, the country lacks modern infrastructure, possesses no access to sea or river ports, and is ringed by some of the highest and most rugged mountains on Earth.

Generally, cargo and supplies move into Afghanistan over land arteries from the north and south. However, the land routes leading into Afghanistan are fraught with difficulty and danger. They are under constant threat of insurgent attack. What's more, surrounding na-

tions impose political constraints on the type of cargo that can be moved to the Afghan border.

Certain sensitive items (such as ammunition and armaments) can't be shipped between certain areas, Schwartz said, and have to go in by air. These supplies are often air-dropped or delivered at austere landing fields.

In July, US and coalition forces of Operation Enduring Freedom generated a record: Some 3.3 million pounds of supplies were air-dropped around the country. Deliveries ranged from combat support supplies to humanitarian goods.

The impact of the mobility surge is evident not only in Afghanistan

the buildup to Operation Desert Storm, Horton added.

"It's definitely increased our workload," said Maj. Michael Riley, acting commander and operations officer for the 436th Aerial Port Squadron. "There are days where we're pushing over 400 tons a day outbound." Supplies run the gamut from spare mine-resistant-vehicle axles and armor kits to rolling stock, trailers, and building materials.

The traffic has also increased due to the addition of new "channel missions" from other units for Dover's airlifters, Riley said. These regularly scheduled runs, which began in March, are mostly used for basic resupply. The channel

Afghanistan and assisted with moving sea-lifted supplies from Kuwaiti seaports into the Afghan theater.

Reich recalled flying sorties into Forward Operating Base Bastion, a remote coalition outpost in rugged Helmand province. Bastion possessed a tiny, 90-foot-wide airstrip. And that was the high end of the landing experience. In his squadron's deployment, he noted, C-17 aircrews performed 11 dirt strip landings.

Given Afghanistan's difficult geographic circumstances and delicate regional politics, sustainment of American operations in Afghanistan has long been a concern of US officials.



USAF photo by SrA. Felicia Jueneke

but also on flight lines at US bases, where units now are feeling a strain. "We have a finite number of resources, and those are in continuous use," said Col. David B. Horton, the commander of the 436th Operations Group, Dover AFB, Del., which operates both C-5 and C-17 airlifters for the Afghanistan operation.

"The mission in Southwest Asia has shifted," said Horton. Iraq no longer has top priority.

Dover is one of the Defense Department's busiest US logistical hubs, providing some 25 percent of USAF's global airlift capability and home to the 436th Aerial Port Squadron. The 436th is currently DOD's largest air freight operation, and serves as the aerial port for much of the materiel headed east to Southwest Asia.

For three consecutive months this spring—from April through June—Dover's cargo throughput exceeded the monthly record set in early 1991 in

missions require Dover aircraft to fly into Kabul and Bagram several times per week.

"We may fly two or three or four of those a week," Horton said, "whereas contingencies are more irregular. ... There is a time sensitivity to it, which is why we are flying it."

A Very Different Mission

Capt. Jeremy Reich, a C-17 weapons officer and chief of tactics with the 3rd Airlift Squadron at Dover, experienced the increased operations tempo this past summer when he carried out a 60-day deployment downrange.

"I was deployed [in] 2006, and back then it was mostly OIF. ... I'd say about a 60/40 split," recalled Reich, a six-year veteran of C-17 operations. "This time it was significantly different, and it was a lot more of the OEF missions."

In addition to flying normal inter-theater routes, C-17 aircrews moved a good deal of equipment from Iraq into

Three C-17s occupy a flight line at Bagram AB, Afghanistan.

In March, Gen. Duncan J. McNabb—commander of US Transportation Command—testified on the state of supply lines, cautioning that sustainment in Afghanistan would be a challenge. "You probably couldn't ask [for] or find a tougher place, from a logistics challenge [perspective], of getting the stuff in," McNabb told the Senate Armed Services Committee.

In March, just as the US troop buildup was picking up speed, TRANSCOM was sending into Afghanistan each day an average of some 130 to 140 supply containers.

Sealift plays an important, but only partial, role. Cargo comes by ship to the Pakistani port city of Karachi on the Indian Ocean, and then can be trucked overland through mountain passes to Afghanistan. These routes are exposed



Airmen unload a mine-resistant, ambush-protected vehicle (MRAP) from the belly of a C-17 at Bagram on Aug. 4, 2009.

and dangerous, however. To the west lies Iran, which permits no US transport.

Routes through Central Asia remain critical to the effort. This is particularly true of the air route through Kyrgyzstan's Manas Air Base, located just outside of the capital, Bishkek. The Pentagon reports that about 15,000 US personnel and some 500 tons of cargo move through the base each month.

In March, the Air Force assigned three C-17s from Pacific Air Forces units to fly round-the-clock missions from Manas into Afghanistan and deliver critical cargo on an urgent basis. The C-17s flew in critical supplies without slowing down or otherwise interfering with other operations at the base. Supplies included materials for aircraft parking ramps for new Marine Corps airfields used to support the summer offensive against the Taliban in Helmand province.

Earlier this year, Kyrgyzstan's government indicated it would end the US lease on the facility by August—sending US and coalition allies scrambling to find new basing rights in neighboring countries. In June, however, the Kyrgyz parliament ratified a new agreement which would allow the US to continue use of Manas as a transit and logistics hub under a one-year lease of the facility. The deal was wrapped up in July.

For all the threats, development of Manas never ended. A nine-member airfield resources team from Holloman AFB, N.M., erected two dome shelters for the 376th Air Expeditionary Wing. The new 4,000-square-foot shelters added needed bunk space and latrines, critical to the large number of US and

coalition personnel transiting the base to Afghanistan.

The commercial aviation sector provides a significant fraction of US airlift capability, offering the power to expand US airlift at low cost. Commercial transit is also why overflight issues are so important at the top levels of US Central Command and TRANSCOM, as commercial traffic delivers loads to key hubs where they are transferred to military lift.

Bursting at the Seams

With bare-bones infrastructure in place, building up facilities and airstrips is just as much a strategic effort as a tactical one, officials claim. "Improving the infrastructure is not only for our logistical issues ... but also for the Afghans," Schwartz said, noting air infrastructure's contribution to building an economy.

The US has brought steady improvements to some of Afghanistan's more important airfields, which now can accept more and larger aircraft, such as the C-5.

This is not a luxury, but a necessity. The Air Force's main in-country hub, Bagram Air Base north of Kabul, has experienced a rising wave of traffic since the beginning of the year. The base's 455th Expeditionary Aerial Port Squadron was processing around 14,000 tons of cargo a month in May—about double the volume being processed only a few months earlier, according to squadron officials. The passenger terminal at Bagram has also seen sharp growth in traffic; the daily rate has ex-

panded from some 1,200 passengers to 1,600 passengers.

In February, the Air Force began surging as much support capacity as possible to help build up facilities to handle the traffic. Even months later, new buildings, aerial port facilities, airstrips, and other permanent structures continue to sprout in Afghanistan.

"You go to Bagram and Kandahar [Airfield], they're absolutely full up with missions," said Air Force Civil Engineer Maj. Gen. Delwyn R. Eulberg in March.

The ramps at both facilities are "bursting at the seams," he added, noting that at Bagram alone, four concrete batch plants were operating 24 hours a day for the past 18 months to keep pace with demand for concrete, used everywhere on an air base.

On some ramps, aircraft are parked three deep, a sight Eulberg said he had not witnessed in 31 years of service. (Eulberg retired from active duty in August.) To alleviate the crowding, USAF has shifted as much of its civil engineering capacity as possible to meet demand, Eulberg said. RED HORSE units moved into the country to erect airstrips in many locations.

In the country's restive south, US and coalition officials enhanced existing infrastructure, stood up new squadrons, and established a second expeditionary wing at Kandahar Airfield.

To support the number of air-drop resupply and airlift taskings in country, the 772nd Expeditionary Airlift Squadron (a C-130J unit) was activated at the airfield on March 15. It came with eight Js and about 120 operations and maintenance personnel. On the day prior to the stand-up, the first four of the squadron's aircraft were already flying missions.

Coalition allies are throwing whatever they can into the airlift pot. In July, the Strategic Airlift Capability consortium stood up, comprising 10 NATO and two non-NATO countries that will jointly operate a wing of three C-17s from Papa AB, Hungary. The unit's first airlifter, which arrived at the base July 18, was immediately prepped to start flying support for alliance operations in Afghanistan.

From the start, aircrews and logisticians pushing materiel forward have had a clear perspective on their mission.

"If those Army guys were going to drink, it's because we brought them the water via airdrop," Reich said. Without airlift, "you would have to ... get it through the mountains." ■

No Long Slog

"After the Iraq experience, nobody is prepared to have a long slog where it is not apparent we are making headway. The troops are tired; the American people are pretty tired."—**Secretary of Defense Robert M. Gates**, *Los Angeles Times*, July 19.

That Would Be a Slog

"The Army's role [in Afghanistan] will evolve, but the whole process might take as long as 30 to 40 years."—**Gen. David Richards**, *new chief of the British Army, whose comment aroused immediate furor in Parliament*, *Times of London*, Aug. 8.

Tea With the Taliban

"Strangely, our military leaders rarely talk about the battles here [in Afghanistan]. They urge shooting less and drinking more cups of tea with village elders. This is the new face of war—counterinsurgency defined as nation building, an idealistic blend of development aid and John Locke philosophy. Our generals say that the war is '80 percent nonkinetic.' ... War is not complicated. You have to separate the guerrilla forces from the population and kill them until they no longer want to continue."—**Francis J. West**, *former assistant secretary of defense and combat marine*, *Wall Street Journal*, July 29.

Good for Paul and Silas

"In the F-18, we can also produce front-line fighters that are more than capable of addressing any threat that we'll face for the next five to 10 years."—**Marine Corps Gen. James E. Cartwright**, *vice chairman of the Joint Chiefs of Staff, Senate Armed Services Committee*, July 9.

The Gates Legacy

"Taken in totality, the decisions Secretary Gates has made—and those he is expected to make in the near future—will bequeath to his successors a military that will be older and more costly to operate, have fewer technological advantages over potential adversaries, and be less able to deal with high-end threats. Almost without exception, it has been the most advanced US weapons programs [that] have been targeted for termination, reduction, or delay.

The only solace we can take is in the Secretary's judgment that we can take risk in the medium term. However long that lasts."—**Daniel Gouré**, *Lexington Institute, National Journal Online*, July 27.

Fraud on the Moon

"In the United States, more than anywhere else, they are sure of the believability of the steps on the moon."—**Russian state TV channel Rossiya, giving some credence to conspiracy theories that the US landing on the moon 40 years ago was faked**, *Associated Press*, July 19.

Wright Flyer of UAVs

"You can't judge UAVs by what you see today. That would be like judging all aircraft by looking at the Wright Flyer."—**Col. Eric Mathewson**, *head of USAF's unmanned aerial vehicle task force*, *Arizona Daily Star*, July 26.

Bases Make Us Less Secure

"The Pentagon has been ringing the world with US bases, meant to make the US secure and able to strike down any threat to American interests, anywhere. There are currently more than 800 manned US foreign military bases. Taken all together, they make up a formidable global array of power. But practically every one of them could be picked off by a hostile military operation. Are they keeping America secure? I would argue that every one of them is an American vulnerability."—**William Pfaff**, *acclaimed columnist and international prognosticator*, *www.truthdig.com*, Aug. 4.

Where the Russians Are

"The reality is, the Russians are where they are. They have a shrinking population base, they have a withering economy, they have a banking sector and structure that is not likely to be able to withstand the next 15 years, they're in a situation where the world is changing before them and they're clinging to something in the past that is not sustainable."—**Vice President Joe Biden**, *Wall Street Journal*, July 25.

What the Veep Meant To Say

"We view Russia as a great power. Every country faces challenges. We have our challenges. Russia has their

challenges. There are certain issues that Russia has to deal with on its own."—**Secretary of State Hillary Rodham Clinton**, *responding to Russian concern about Biden's remarks and reassuring Russia that the US is committed to a "reset" of relations*, *NBC's "Meet the Press"*, July 26.

War Got in Rumsfeld's Way

"It's my belief that he had an expectation of what his job would be as Secretary of Defense and it probably centered around transformation. ... And then a war got in the way. Transformation had been a labor of love for him. The war became a labor of responsibility."—**Andrew H. Card Jr.**, *former White House chief of staff*, in *By His Own Rules: The Ambitions, Successes, and Ultimate Failures of Donald Rumsfeld*, by **Bradley Graham**.

Russian Force Modernization

"We expect 70 percent of the Air Force strength to be in new and modernized aircraft by 2020. The development of the Russian Air Force will be carried out through extensive acquisition of new advanced aircraft and continuing modernization of the existing fleet."—**Col. Gen. Alexander Zelin**, *commander of the Russian Air Force*, *RIA Novosti*, Aug. 5.

Too Focused on Terrorism

"We have been overly counterterrorism-focused and not counterinsurgency-focused. We might still be too focused on bin Laden. We should probably reassess our priorities."—**Unnamed "top military official"**, *Los Angeles Times*, July 30.

Generational Perspectives

"Today, Hiroshima has become a Rorschach test for Americans. We see the same pictures and we hear the same facts. But based on how we view our country, our government, and the world, we interpret these facts in very different ways. A former GI, now 90, who survived the war in Europe and was about to be sent to the Pacific understands quite clearly that the bomb saved his life. His grandchildren may see this event in a very different way."—**Author Warren Kozak**, *op-ed column*, *Wall Street Journal*, Aug. 6.

Space once was ours. Then came the space junk, collisions, and dangerous interlopers.



Illustration by Erik Simonson

Insecurity in Space

By Rebecca Grant

In the 1991 Gulf War, American airmen benefited from uncontested control of space. They came to view this vast region as airpower's ultimate high ground. Back then, it was a domain filled with war-winning advantages and all but devoid of adversaries.

Today, crowded orbits and the conflicting aims of multiple nations have changed the game.

The Obama Administration is finishing up a number of key space policy reviews. As they do, US officials and military leaders have come to face ques-

tions about how the nation will keep its edge in military space operations. Air Force Space Command, in particular, has taken a lead role in the effort to determine just what it will take to protect US access to the advantages of space.

The head of Space Command, Gen. C. Robert Kehler, is now only too aware of the developing threats. He noted, "We certainly have seen the Chinese demonstrate a kinetic kill anti-satellite weapon," referring to Beijing's early 2007 use of a direct-ascent weapon to kill a target satellite in space.

Yet, attack from a direct-ascent satellite-killer is not the only danger out there. Threats range from proliferating space junk and orbital vehicle collisions to ground-based jamming, which now can be used to neutralize or disrupt spacecraft in medium Earth orbits.

One way or another, the job of securing military space is about to change, and a top mission for Air Force Space Command is to preserve and expand the ability to deliver space effects to joint forces in combat.

A fresh technical review of space protection options began in the spring of 2008. Andrew W. Palowitch, a former Navy submariner with extensive CIA experience, took the helm of the new office of space protection policy. Air Force Space Command and the National Reconnaissance Office together created the office to assess the natural and man-made hazards to space systems. Its main job is to report on technical risks and deliver recommendations that flow into the Air Force and NRO acquisition systems.

The fact that a formal space protection office was deemed to be necessary underscores how risks in space have increased.

Space efforts, which began in the mid-20th century, grew tremendously through the 1960s and 1970s. By the 1980s, matters had reached a point where "the Soviet Union had adversarial capabilities and demonstrated a viable threat" to US and other space systems on orbit, said Palowitch.

However, everything seemed to change with the fall of the Berlin Wall in 1989 and subsequent collapse of the Soviet Union. After those events, said Palowitch, the perceived threat in space was "almost negligible."

From 1989 to 2007, the operational capabilities of space systems—and dependence on them—grew massively. The US invested with great results in capabilities such as communications, positioning, navigation, timing, and sensing without investing a lot in the defense of those assets, Palowitch added.

Meanwhile, the number of nations using space grew, as did their own capabilities.

According to Palowitch, several rogue states possess at least some ability to interfere with US space systems or their effects. North Korea's Taepo Dong II long-range ballistic missile, if armed with a nuclear warhead, could pose a potential threat to satellites in orbit. Iran's Safir missile could wreak



Left, space debris hits a solar panel on a satellite in an artist's conception. Above, Gen. C. Robert Kehler, head of Air Force Space Command, speaks at the 2009 Air Force Information Technology Conference.

the same type of damage, should the Islamic Republic finally succeed in going nuclear.

Much further up the scale of threat is China. Palowitch categorized China's 2007 destruction of its own defunct weather satellite as "the first-ever demonstration of direct-ascent launch" of a kill vehicle against a space target. (The US showed that it, too, has the capability with the February 2008 intercept of an inoperable NRO satellite.)

Beyond the danger of overt attack, on-orbit perils are increasing. Active satellites can collide with debris or even with each other.

Currently the most dangerous place is low Earth orbit—out to 300 miles—and just beyond. Imagery satellites dominate in this region. Satellites operating from about 300 to 700 miles above the planet's surface can be targeted by direct-ascent attack. As long as the geometry is correct, any nation with space launch and tracking capability could in theory take out a LEO satellite.

Space debris in the low Earth orbit bands also poses a significant hazard. Space Command leads an effort to track and deconflict objects in space. The Joint Space Operations Center (JSpOC) at Vandenberg AFB, Calif., regularly and continuously tracks 19,000 major items. However, NASA officials believe space may be littered with at least 10 times as many objects.

Of the objects tracked, as many as 700 per day approach "conjunction"—defined by Palowitch as "close proximity between two space objects." Crews at Vandenberg use software to anticipate conjunctions and make recommendations for emergency course corrections.

Worries about a collision are intensifying. On Feb. 10, a defunct Russian military communications satellite collided with an operational Iridium commercial satellite 480 miles above Siberia, destroying both spacecraft and creating a wide debris field orbiting in space.

A Pummeling

On May 12, French and US officials convened a conference to discuss what to do about a French SPOT Image satellite nearing a dangerous conjunction.

Space Command officials have shown reluctance to discuss methods for deconfliction or to speculate on increasing risks of collisions. Still, there's no question that the risk of debris or other spacecraft knocking out a satellite is a real hazard for those depending on the space-based effects.

It's not only satellites that are at risk. Manned spacecraft are in danger, too. The International Space Station keeps an eye out for debris in its low Earth orbit band.

The recent expedition of space shuttle *Atlantis* on a major Hubble repair mission illustrated the dangers also.

Traveling up to the Hubble telescope's altitude required transit through a major debris field. As Palowitch described it, the worst debris in LEO is right in the Hubble's band. The known debris put *Atlantis* "at a one-in-200 chance of being

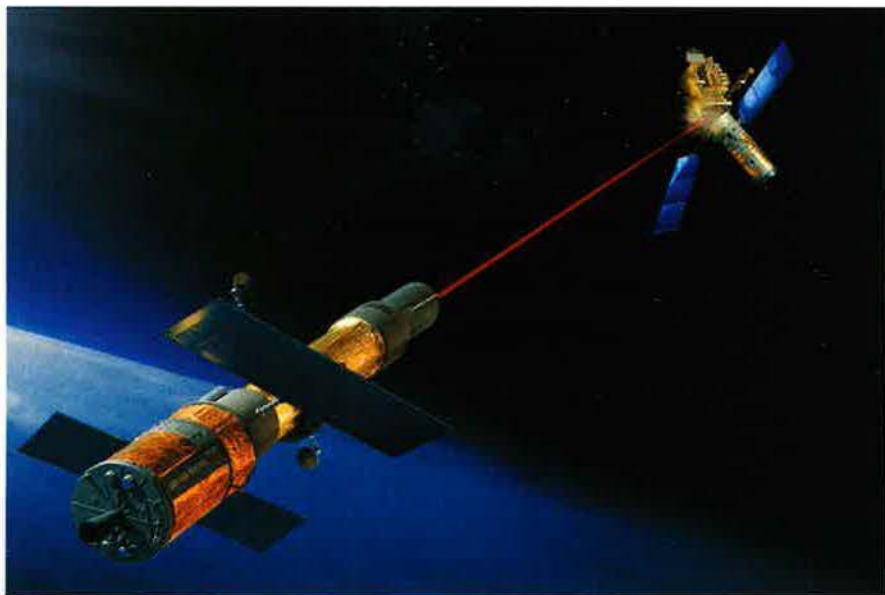
totally destroyed by impact in flight," he said. When it landed, *Atlantis* was pockmarked with more debris hits than any other shuttle in history.

Several factors contributed to the pummeling. First was the transit through debris fields. Then, once in position, the complex repairs required *Atlantis* to spend more time in the junk-strewn orbit.

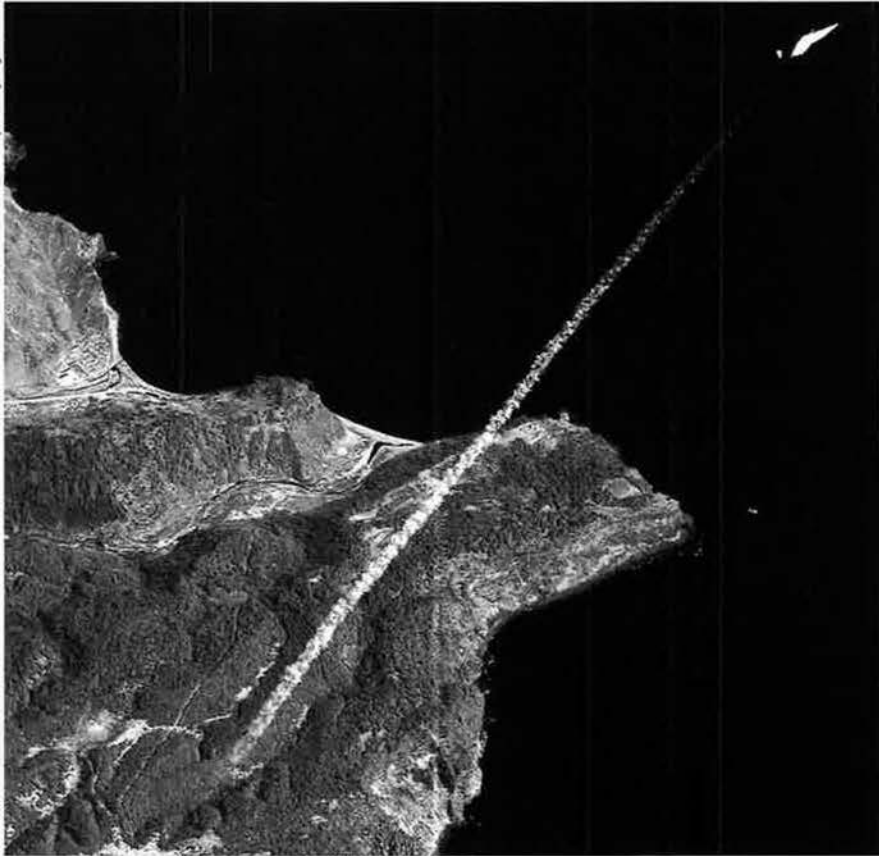
As is obvious, growing debris fields pose a problem for critical space operations. The Air Force in June awarded development contracts to three industry teams for the Space Fence, a next generation space tracking system with planned initial capability in 2015. The Space Fence should track both low and medium Earth orbit objects ranging from space junk to operating satellites and other spacecraft. Space Fence will allow tracking of up to about 100,000 objects. The new system should also reliably track objects as small as two inches in diameter.

The US isn't alone. China, with its own manned space program, soon will have to deal with the space junk it has done so much to spread.

Far above the debris fields of LEO wait other hazards. Many communications satellites operate in geosynchronous Earth orbit more than 22,000 miles above the equator. Interdicting satellites in GEO is a whole different proposition—at least for now. Many experts maintain that direct-ascent attack currently can't pose a threat to satellites in medium Earth orbit (MEO), highly elliptical orbit (HEO), or the far-distant geostationary or geosynchronous Earth orbit (GEO).



An artist's conception of a spacecraft taking down an enemy satellite.



A satellite photo taken by DigitalGlobe shows what is believed to be the exhaust trail and vehicle launched from Musudan-ri, North Korea, in April.

Collisions aren't necessarily head-on crashes—satellites extend long arrays for positioning. Often, these tentacles crash into each other. Still, even glancing blows can obliterate satellites closing on each other at thousands of miles per hour. In theory, any object on orbit is a potential satellite-killer, by accident or on purpose.

Why do satellites collide? Avoiding accidental collision is a matter of better tracking data. When Iridium and the Russian satellite hit each other, "we weren't looking at them," Gen. Kevin P. Chilton, head of US Strategic Command, explained.

About 1,300 satellites orbit above the Earth. Of those, approximately 800 can be maneuvered with short fuel burns. The JSpOC now performs conjunction analyses on all of them. Priorities begin with manned space vehicles, such as the space station and shuttle, and the vital national security satellites, and on down. Last February, before JSpOC increased its analyses from 140 to all 800 maneuverable satellites, Iridium wasn't on the list. Nor were Iridium's minders regularly feeding data on its position.

Currently, sensors may check the position of a satellite irregularly and

extrapolate its position according to Kepler's laws. Over time, the position data changes from an exact location to an ellipse containing the probable location. When two ellipses overlap, a conjunction is possible. The problem is that error margins grow as the ellipses grow. Officials would like to know whether a predicted conjunction will scrape solar arms or miss by miles.

Taking Stock of Threats

More and better sensors on orbit are part of the answer. "You want the ellipses to be as small as possible," Chilton said, and that takes more frequent position updates.

STRATCOM would like to upgrade sensors and software to track 300 satellites or more, with a precision measured in feet, not kilometers. Maneuvers cost fuel, so operators want a good reason to move. In the future, officials would "like to give them the opportunity to get out of the way. If you run into something, it hurts everyone," Chilton said.

When it comes to active, deliberate military action, adversaries are much more likely to try to disrupt the signals or the ground stations from the surface of the Earth. "We have seen evidence

from a number of places around the world that our potential adversaries or others are developing capabilities here that can challenge us in all three of those pieces of our space capability: the space segment, the link segment, and the ground segment," said Kehler.

High-flying communications satellites are susceptible to ground-based jamming. Palowitch estimated there are "multiple hundreds" of jammers, which are "a lot cheaper than any other means for localized effects" to disrupt communications.

Ground-based jamming is creeping upward to higher altitudes. DOD's official report this year on Chinese military capabilities noted the purchase of jammers from Ukraine several years ago, and the probability of Chinese-made jammers, as well.

"We've seen GPS jamming, and GPS is in MEO," noted Palowitch. Opinions vary on whether commercial communications capability leased by the US military is truly safe or not.

Laser dazzling is another form of ground-based disruption. "It's not hard to go buy sufficient laser capability—at the low end—that would allow you to potentially dazzle sensors that would either be in the air or in space or wherever," said Kehler.

Space Command has concluded that heavier defenses for space assets can help. For example, GPS is a low-power system, which is easier to jam. Kehler said Space Command is working on "increasing the power of the systems, and we're headed towards GPS III, which will give us a platform to be able to deal with this more robustly in the future."

Space Command is taking stock of threats and vulnerabilities. "We are looking ... across the board at how we protect these high-value assets. In some cases, these assets are very well-protected," explained Kehler, because they were "designed to operate through a nuclear exchange. Some of our communications at the high end are still intended to operate through nuclear activities, and, of course, our early warning satellites are designed at some length with some amount of inherent survivability."

Hardening satellites is part of the package. Kehler described on-orbit protection as primarily an engineering issue. Satellites have to be built tougher, with threats in mind. "This is not an overnight solution [where] we can engineer protection solutions in,

Is Heavy Lift the Chinese Game-Changer?

During America's reach for space in the 1960s, the hallmark of success was the heavy lift of the massive Saturn rocket. Saturn Vs like the one that boosted Apollo 11 generated 7.5 million pounds of thrust from its mix of kerosene and liquid oxygen fuel. Remarkably, all 32 of the Saturn rockets launched without a single failure.

This is the capability that space up-and-comers such as China lack today, but are trying to acquire.

China is taking steps toward putting rovers on the moon and, eventually, to landing a human astronaut there. China flew its first manned spaceflight in 2003, and plans the moon landing for 2024.

Getting the boost power needed to lift heavier vehicles toward the moon will also give China the technology to put heavy spacecraft in orbit.

China is nowhere near the Saturn V capability yet, but 50 years of steady progress has left the Chinese space program well-positioned to achieve its goals in another decade. In that time, China will pursue advanced reconnaissance and communications satellites and make a big decision about whether to create its own precision timing and navigation constellation to compete with the Global Positioning System.

Mastering heavy lift will create ancillary options for the Chinese military use of space. "Many of China's space programs, including the manned program and the planned space station, are run by the [People's Liberation Army]," confirmed this year's DOD annual report on Chinese military power.

and have them up there tomorrow," he cautioned. "It's going to take us some amount of time, here."

One example of a well-defended system is Milstar. Its original name of Military Strategic and Tactical Relay summed up its mission well. Five Milstar satellites in geosynchronous orbit provide jam-resistant communications for forces around the world. Milstar satellites process signals on-board and can talk to other Milstar satellites as well as to ground terminals. The three newest Milstar satellites have greatly improved data flow rates. The ability of Milstar to form a signals relay in space significantly improves the security of the information it handles because operators can choose to bypass ground links, in some cases.

Scheduled to replace Milstar is the Advanced Extremely High Frequency Satellite Communications System. With AEHF, defensive protection has been an engineering requirement from the start. AEHF is designed with extremely high frequency uplinks and superhigh frequency downlinks to potentially thousands of joint user terminals. Kehler said Advanced EHF includes "improved protection on it because of its jam resistance." Its bandwidth rate of eight million bits of data per second is a leap ahead of Milstar.

Bandwidth alone is not the measure of secure, space-based communications. Cross-links among the AEHF satellites remain critical, as do mobile ground links. Of course, all depends on injecting

enough cyber security into the system to ward off attack from that domain.

Protecting satellites is both a design issue and "a maneuver issue," to use Kehler's terminology. "Protection isn't just about the satellites. It's a balanced activity that we're going to be careful that we maintain," he said.

Part of the smart and balanced solution may lie with the international community. As with the law of the sea or nuclear arms treaties, agreements take time and political will, but hold the potential to reduce danger and reshape behavior. International initiatives could help ensure that US military forces can rely safely on space effects.

Looking at Alternatives, Backup

Many nations are heavily invested in capabilities such as the Air Force's Global Positioning System. China, for one, depends on GPS for precision navigation and targeting.

For now, sticking with an international community approach is preferred. "We decided that we wouldn't move into a NATO-ish system of alliance," Palowitch told *C4ISR Journal* last year. "You actually increase the perception of conflict by excluding people and driving them to the other side."

Not surprisingly, minimizing debris is of major international interest.

Palowitch likened it to the experience of protecting more of the oceans from pollution. For centuries, no one gave ocean dumping a second thought. Then, as more nations became aware of the effects of pollution, political momentum grew for keeping the oceans clean.

"We're at the exact same stage in space today," said Palowitch. In his view, there is a "huge international cooperation effort to ensure space-debris mitigation."

Remedies may include laser ablation of debris or nudging objects to a lower orbit so they can burn up in the atmosphere. So far, major cleanup operations are only in the conceptual stages.

With all the concern about debris, direct attack, and interference, airmen have also begun serious exploration of tactical and strategic alternatives to space systems. The idea is to create a backup plan. "We're not trying to save satellites," Palowitch told *C4ISR Journal*. "We're trying to preserve our national space effects."

Creating the ability to augment constellations on demand is one option. Space Command is "looking at operationally responsive space as a national strategic capability to give ourselves the ability on a relatively short time frame to either augment a constellation or replenish it if we have issues either from technical reasons or from some kind of attack," said Kehler.

Another alternative actively being explored is to create backup communications links via manned aircraft, unmanned systems, and high-altitude airships. Tactical, theater-specific communications relays could flow through airborne platforms.

Space Command experts see the approach not as a threat but as a way of delivering effects under emergency conditions. The Air Force's newly released unmanned air systems flight plan includes explicit reference to backup communications links.

There are many ways to preserve space effects.

"In some cases, the most effective way to counter a loss of a space capability may be with a non-space [capability]," Kehler said. "It might be an aircraft, it might be a ground system of some kind, it might be a UAV." ■

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 was "The Turning Point," which appeared in the August issue.

Power Players



at Kadena

The air base on Okinawa is a centerpiece of USAF power projection.

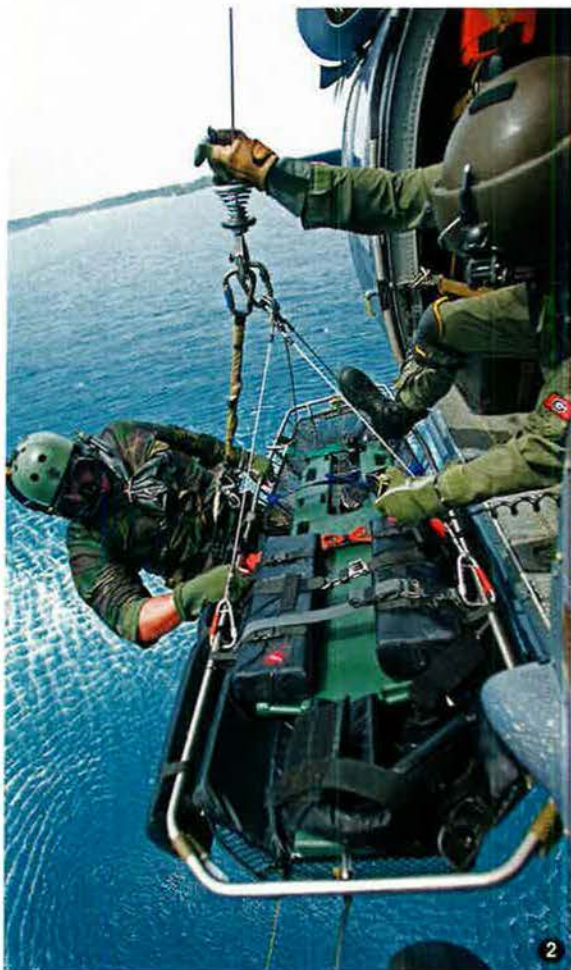
Photography by Jim Hasettine



A four-ship formation of F-15C Eagles of the 67th Fighter Squadron, Kadena AB, Japan, patrols off the island of Okinawa.

Kadena AB, Japan, is one of the key bases in the Pacific. A sprawling facility on the island of Okinawa, it hosts fighters, tankers, special operations, intelligence-surveillance-reconnaissance aircraft, and rescue units. Closer to Taiwan than Tokyo, Kadena plays an essential role in the defense of Japan as well as the US. US Army Patriot missile batteries help defend the base from missile attack.

111 An HH-60G Pave Hawk of the 33rd Rescue Squadron flies along the Okinawan coast en route to the base. 121 A pararescueman is hoisted aboard a Pave Hawk with a litter. 131 KC-135s are arrayed in one corner of the large apron and hangar area. These belong to the 909th Air Refueling Squadron.



141 RC-135s of the 82nd Reconnaissance Squadron provide signals intelligence and other ISR of the Pacific rim. Working on an RC-135 engine are SSgt. Mario Adinolfi, SSgt. David Heaps, SrA. Matthew Gouldsmith, and TSgt. John Henze.





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11 Flying the 67th Fighter Squadron's flagship, Capt. Thomas Hunt dumps flares on a training mission. The flares would distract an adversary's heat-seeking missiles in a real engagement. *12* Two F-22s from the 94th FS, Langley AFB, Va., visit Kadena skies. Kadena has hosted F-22s on several occasions in the

last few years; regular deployments of Raptors to the base are expected, given Kadena's proximity to North Korea and other Asia-Pacific hotspots. *13* The two Raptors perform an engagement. Although the F-22 is the world's "Top Gun" in air combat, Kadena's F-15s are USAF's best Eagles, with new radars and

helmet-aimed missiles. When the F-22s are not visiting, the F-15s can handle most regional threats. *14* An F-15C pilot gets an airman's salute, telling him he's good to go before a mission. *15* SrA. Shera Hendrickson and A1C Shawn Bailey hook up an F-15's launch rail to a test rig.

111 Pararescuemen from the 320th Special Tactics Squadron head out to a water training exercise south of Okinawa. 121 An F-15 pilot sports the Joint Helmet-Mounted Cueing System, or JHMCS. It allows the F-15 pilot to aim a heat-seeking missile by looking at the target, without the need to point his aircraft directly at it. 131 A Pave Hawk gets ready to dust off on a mission. 141 Idesuna Jima, an island on the gunnery range, where Pave Hawk crews can practice live-firing with their .50-caliber guns. 151 An F-15 and an F-22 adjacent to three of Kadena's hardened aircraft shelters. The shelters could protect some aircraft in a ballistic missile attack. 161 A1C Jimmie Tillman, an F-15 crew chief, services his aircraft.





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11 TSgt. Scott Lagerveld wields his .50-caliber machine gun from the door of a Pave Hawk. The firepower comes in handy if an airman must be rescued behind enemy lines. *12* A brace of F-15s, wearing Kadena's distinctive ZZ tail code, break for

a dogfight turn. *13* The extremely agile AIM-9X missile is the newest weapon in the F-15C's arsenal, making a potent combination with the Joint Helmet-Mounted Cueing System. Here, a training round is mounted on a rail by SSgt. Michael

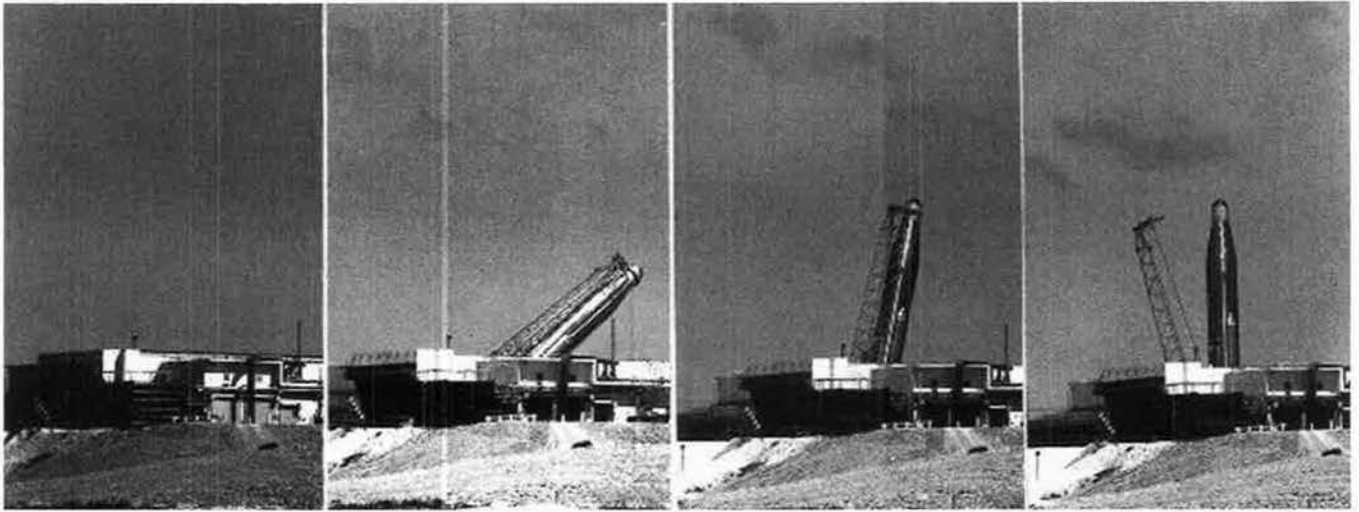
Clark, A1C Amanda Zahn, and A1C James Bozley. *14* An F-22 from the 1st Fighter Wing at Langley taxis out in the Kadena sunshine. Raptors have not experienced any problems operating in the base's salty, hot, and humid environment.

111 A1C Emily Miles performs a postflight systems check in the F-15's cockpit. 121 Two pararescuemen come aboard a Pave Hawk during a water exercise. They made multiple jumps from the chopper into the water. 131 F-15s in the military operating area near Okinawa. Kadena F-15s will frequently practice with Japan Air Self-Defense Force F-15s from a nearby base, or with US F/A-18s visiting from Iwakuni, Japan. 141 Two Langley Raptors flank a Kadena Eagle in a joint exercise. 151 An F-22 stops for an end-of-runway check. The all-moving horizontal stabilizer is evident in this photo.





111 Capt. Matt Evers of the 67th FS flies fingertip formation with another F-15. The JHMCS adds greater situational awareness to the F-15's already magnificent cockpit view. *121* An Atlas Air 747—part of the Civil Reserve Air Fleet—stops at Kadena during a resupply mission. CRAF augments Air Mobility Command's fleet of transports. *131* Two Eagles touch down at the end of a mission. *141* An E-3 Sentry AWACS of the 961st Airborne Air Control Squadron in a Kadena revetment. A crucial "lily pad" with room for literally hundreds of aircraft, Kadena promises to be a critical asset for years to come as a major USAF base in the western Pacific. ■



The Day of the Atlas

Above: Sequential images of an Atlas ICBM missile being raised, fueled, and launched.

By Stewart M. Powell

Fifty years ago this month, the United States stepped briskly into the ICBM era, and it has never stepped out. Three long-range, liquid-fueled Atlas D missiles armed with nuclear warheads went on full combat alert at Vandenberg AFB, Calif., on Oct. 31, 1959. That moment will be commemorated at low-key events around the nation.

The fearsome Atlas missile instantly became a key element of Cold War deterrence. Its activation came amid a US-Soviet arms and space race kicked off by the Soviets launching Sputnik into orbit just two years earlier.

The fielding of the Atlas D was a milestone. It marked the onset of an age that peaked in 1978, when Washington had on alert 1,237 strategic land-based, nuclear-tipped missiles. The era of the ICBM continued more or less unabated for another decade, as the Air Force fielded the 10-warhead Peacekeeper missile.

In the past two decades, arms agreements and budget-driven cuts have whittled the force to 450 Minuteman IIIs, stationed in silos across the Great Plains. Though it has declined in number, the ICBM has maintained its status as queen of the strategic chessboard.

It began with Atlas. By the time the last ICBM-based variant was launched from Cape Canaveral, Fla., on Aug. 31, 2004, the missile had been launched 576 times, 477 of the launches successful.

Historians deem the Atlas program to be the most expensive and comprehensive engineering feat in history up to that time. It overshadowed even the World War II-era Manhattan Project that developed the atomic bomb. Atlas development yielded lessons that were applied to subsequent US rocket systems, including the Titan, the Minuteman, and the Saturn, which was used to carry the Apollo spacecraft to the moon in 1969.

“What strikes me today as an engineer and operator is how quickly we turned concepts into deployed capabilities back

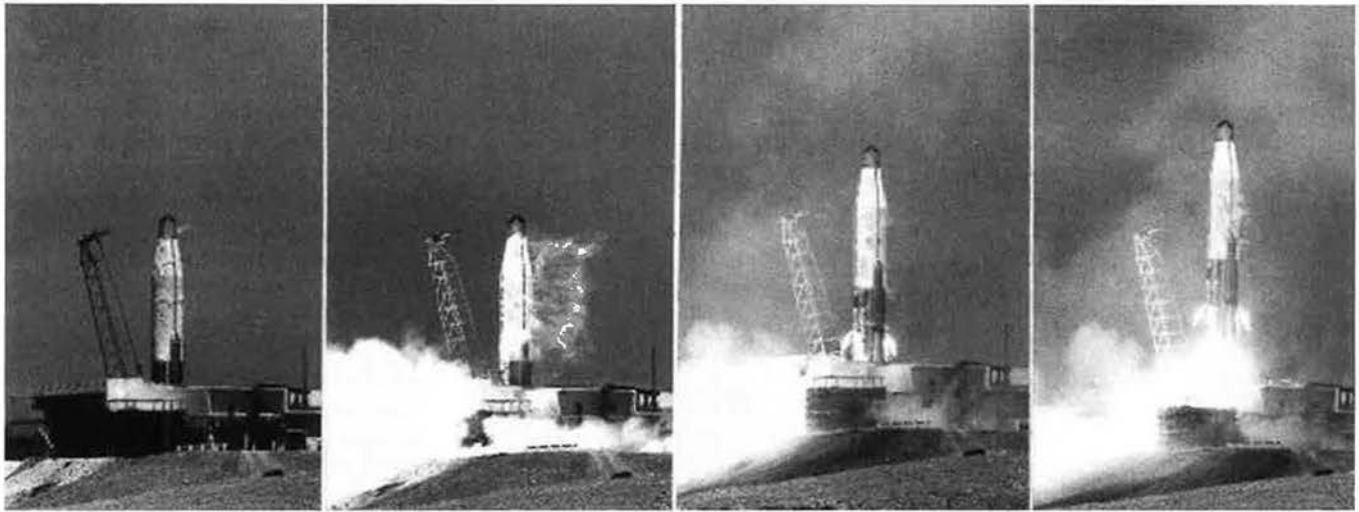
in the 1950s,” said Maj. Gen. Roger W. Burg, commander of 20th Air Force, which operates the nation’s ICBM force. “I am astounded at how rapidly they could take an idea, develop the technology to support it, and move it forward to a demonstrated capability and then deploy it as an operational system.”

Atlas deployment in 1959 capped a 14-year US effort to design, build, test, perfect, and deploy a long-range, land-based missile. In the mid-1950s, the push became urgent. The ICBM came to be viewed as a vital comple-



Pictured in the late 1950s is Vandenberg AFB, Calif., where the first three Atlas D missiles armed with nuclear warheads went on full combat alert in 1959.

Photo via Siteworld.com



On an October day a half-century ago, the ICBM era was born.

ment to Strategic Air Command's force of long-range nuclear bombers, which some warned had become vulnerable to a Soviet surprise attack.

Project Paperclip

The theory was that the existence of a separate and survivable ICBM force would tamp down any temptation on the part of the Kremlin to try a pre-emptive strike on US bombers.

The ICBM lineage goes back to the World War II V-2 rockets developed by a team of German scientists led by rocket scientist Wernher von Braun. US military leaders became keenly interested in prospects for ballistic missiles after seeing Nazi forces, in the last days of World War II, use the 46-foot, liquid-fueled rockets to deliver 2,200-pound warheads 200 miles on trajectories reaching altitudes of 55 miles. The German Wehrmacht fired more than 3,000 V-2 rockets against Allied targets during World War II, killing an estimated 7,250 military personnel and civilians.

After the war, President Harry S. Truman launched Project Paperclip, which transferred scientists from Germany's pioneering rocket program to the US. Barely a month after the first German scientists arrived in September 1945, the Army Air Forces sought design proposals for long-range missiles from US firms.

By January 1946, engineers at Consolidated Vultee Aircraft Corp., led by Belgian émigré Karel J. Bossart,

submitted innovative designs for two missiles.

One Bossart design was for a subsonic and winged cruise missile. The second was of a supersonic, rocket-powered ballistic missile that achieved extremely low structural weight by relying on single wall steel tanks held rigid by internal tank pressure. And in what became the keystone of the early US rocket program, Bossart created a so-called "stage-and-a-half" design that propelled payloads downrange by dropping the first stage on ascent.

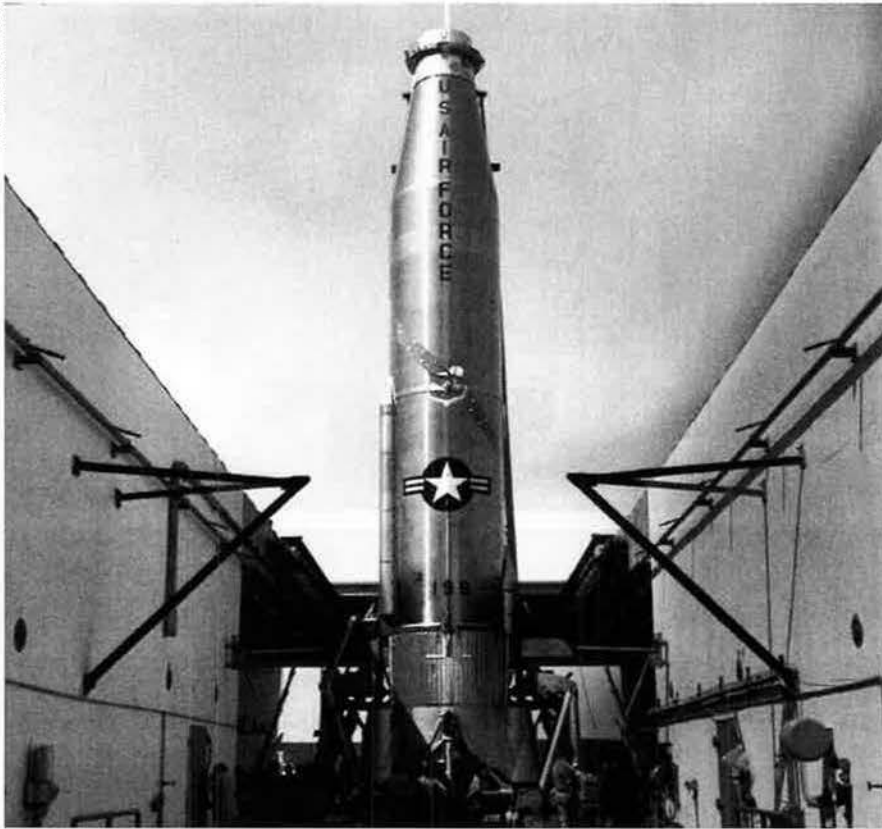
By April 1946, the Army Air Forces had contracted with Convair to build 10 MX-774 Hiroc missiles to test Bossart's concepts. Plans called for building a 32-foot-long missile with a fully fueled launch weight of 4,100 pounds that could reach an altitude of 40 miles. The contract called for three phases. Stage A, known as the "Teetotaler," was a subsonic, self-guided cruise missile. Stage B, the "Old Fashioned," used V-2 technology. Stage C, the "Manhattan," was to be an ICBM.

By mid-1947, Convair had lost the cruise missile contract to Northrop



The 1950 launch of the first rocket from Cape Canaveral, Fla., shown here, was a WAC Corporal rocket atop a V-2.

NASA photo



This Atlas D missile is shown at Vandenberg Air Force Base Complex B. It was later launched from Cape Canaveral in 1960.

Corp. and Martin Co. Defense cutbacks, coupled with Air Force skepticism at the time about the actual future of missiles, led to termination of the MX-774 contract three months before the scheduled first flight.

Using residual contract and corporate funds, Bossart eked out launches of three Stage B test vehicles at Point Loma, Calif., and from White Sands, N.M., between November 1947 and December 1948. Each test failed, but they generated crucial information that validated Bossart's concepts—making the propellant tanks part of the airframe, using gimbaled gyroscopic-controlled motors, and installing a warhead that could separate in flight.

In the late 1940s, the newly created United States Air Force took note of the progress. The Berlin crisis in 1948, the Soviet Union's first atomic test in 1949, and the start of the Korean War in 1950 quickly prompted the Pentagon to reinvigorate the drive for ICBMs.

DOD signed a new MX-1593 contract with Convair in 1951, calling on the firm to build upon proven concepts. USAF sealed a two-phase study that led to a contract in 1954 to build a ballistic missile that could lift and hurl a 7,900-pound warhead more than 5,700 miles and deliver it within 1,500 feet of a target.

It became known as Project Atlas, drawn from the mythic Greek giant bearing the weight of the Earth on his shoulders.

A Missile Gap

The Pentagon remained enamored with the cruise missile concept, nonetheless. It spent more than \$450 million over four years to develop, refine, and deploy the Snark and the Navaho, while providing only \$26.2 million for the ICBM program.

However, continued failures of the cruise missiles and successful efforts to reduce the size of a thermonuclear warhead gradually cleared the way for a return to strong ICBM work.

Industry, outside experts, and Congress collaborated to shift momentum to the ICBM, as did competitive missile efforts by the Soviet Union that raised fears of a "missile gap."

Convair, acquired by General Dynamics in 1954, presented a plan to the Air Force to accelerate ICBM development. The firm's initial design called for a 90-foot missile with five engines producing the 600,000 pounds of total thrust thought needed to carry a 65-ton thermonuclear warhead into intercontinental range.

The Air Force had created the Strategic Missiles Evaluation Committee in October 1953. It was better known

as the "Teapot Committee" or the "Von Neumann Committee" after its chairman John von Neumann, a Hungarian-born naturalized US citizen who was a key member of the Manhattan Project and a pioneer in the nuclear physics research that led to thermonuclear reactions and the hydrogen bomb.

The panel's report in February 1954 contended that the US could surmount stubborn technological problems besetting development of ICBMs. H-bomb tests in the Pacific in 1954 bolstered this view; the tests proved that warheads could be made smaller and lighter—as little as 1,500 pounds—enabling Atlas designers to revamp their blueprints to create a more reliable three-engine design.

The tilt in favor of ICBMs got another boost from a RAND report that concluded operational ICBMs could be deployed to protect the United States by the early 1960s.

In May 1954, Gen. Thomas D. White, Air Force vice chief of staff, gave Project Atlas the Air Force's highest priority. The Western Development Division of the Air Research and Development Command was established in Inglewood, Calif., to take over Project Atlas, a crash development program.

The effort was led by Gen. Bernard A. Schriever, a veteran of World War II B-17 combat missions who led WDD and its successor organizations from 1954 through 1966. Schriever harnessed the talents of some 18,000 scientists, more than 200 contractors, and 3,500 suppliers to develop and deploy the ICBM.

As Schriever later described it, "The Air Force's Ballistic Missile Program represents a concerted effort of unprecedented magnitude jointly pursued by the most competent and widespread government, science, and industry teams ever assembled on a single project."

The final push came from President Dwight D. Eisenhower, who created the Killian Committee in the fall of 1954, led by MIT President James R. Killian Jr. The panel reported in February 1955 that Atlas should be given the highest national priority in the face of Soviet progress on ICBMs.

Eisenhower in September 1955 officially assigned top priority to ICBM development and deployment. The Atlas got the full go-ahead as Weapon System WS107A-1—a project known at Convair as Model 7. Eisenhower in March 1957 approved the plan for 40 Atlas and 40 Titan missiles, the backup system ordered developed in case the Atlas concept floundered.



President Kennedy and observers watch a successful launch of an Atlas D on March 23, 1962 at Vandenberg.

The first Atlas A flight—a failure—took place June 11, 1957. It fell short of both target range (690 miles) and peak altitude (66 miles).

The first successful test flight came on the third attempt, Dec. 17, 1957. That success coupled with Moscow's disturbing launch of Sputnik pushed Eisenhower and Congress to broaden the US space effort in 1958 and award SAC responsibility for the nascent ICBM forces in that year. By 1959, the \$8 billion Atlas project boasted 33,000 workers. Roughly one-fourth of the funds were used to design and develop the missile. The remainder went to the construction of ICBM launch facilities such as Vandenberg.

After the first three missiles went on alert at Vandenberg that October 1959, the first operational Atlas D squadron became fully armed in 1960. It had soft launchpads known as "coffins," slightly hardened above-ground shelters with removable roofs.

Atlas D deployments were adjusted year by year from six in 1959 to 32 in 1962 before declining to 13 on station by 1964 when the Titan and Minuteman ICBMs began entering the force.

At the outset, some airmen were leery of putting too much emphasis on long-range missiles. Gen. Curtis E. LeMay,

though he was an ICBM supporter, emphasized that piloted bombers could always be recalled or redirected en route, while this was not so with ICBMs.

A Long History

In fact, the initial designation of the Atlas missile was that of a bomber—XB-65. It was not until 1955 that Atlas was redesignated SM-65, SM signifying "strategic missile." It then became CGM-16. The letter C stood for "container" and the GM for "guided missile." The rocket was stored in a semihardened container and prepared for launch by being raised and fueled in the open.

"The senior Air Force officer's dedication to the airplane is deeply ingrained, and rightly so," White said in 1957, "but we must never permit this to result in a battleship attitude"—a reference to the pre-World War II Navy's preference for the big-gunned battlewagons over the still-unproven aircraft carrier.

Gen. Jack J. Catton, commander of Military Airlift Command and a former SAC officer, readily conceded the doubts.

Stewart M. Powell, White House correspondent for Hearst Newspapers, has covered national and international affairs for 30 years in the United States and overseas. His most recent article for Air Force Magazine, "Engagement in Africa," appeared in the July issue.

"I think there was apprehension more than opposition," Catton recalled in an interview with Air Force historians. "We were not sure whether missiles were going to replace airplanes, or supplement them. More than opposition, I think we wanted to be shown the reliability and the performance capability of the new weapon."

Burg, a career missileer, says of the early ICBM force: "A lot of officers ... I learned from were in the original cadre. To me, the sacrifices and contributions they made [and] the discipline that became the watchword for the ICBM force—that's still here. What they put together is still here."

The Atlas was soon replaced by more advanced ICBMs, but it found work anyway, with variants carrying Mariner space probes that studied Mercury, Venus, and Mars, and with Agena target vehicles used during the Gemini program to develop and rehearse the orbital space rendezvous that were essential for lunar missions by the Apollo.

The Atlas also carried nine of the Mercury program missions from 1960 to 1963, including four manned missions beginning with John H. Glenn Jr. circling the Earth Feb. 20, 1962, 10 months after Soviet cosmonaut Yuri A. Gagarin.

The Atlas is remembered even as the Air Force prepares to transfer the ICBM force from Air Force Space Command to the newly established Global Strike Command. In a ceremony at Barksdale AFB, La., on Aug. 7, Burg's team mapped plans to mark the 50th anniversary of Atlas D deployment. There was the dedication of an ICBM static display at Peterson AFB, Colo., and the presenting of "pioneer" awards to veterans of the early effort.

The ceremonies will be ignored by many Americans, but that goes with the assignment, says Burg.

"It's amazing to me," he said. "If you're walking through the airport and people see your uniform and ask, 'What do you do, General?' and I tell them, they say, 'Oh, really? Do we still do that?'"

Burg sees this as a classic good news-bad news situation.

"The bad news is, I wish more people knew what we did," he said. "The good news is, they don't feel they have to know. ... That reinforces that we're doing our job." ■



USAF photo by David Ellis



USAF photo by SrA. Tiffany Trojes

Combat Air Forces Take a Hit

By Tom Philpott

The Air Force is in the grip of a major force-shaping campaign. Changes generated by the initiative will ripple across the entire service, but they will be felt most acutely by the airmen in the combat air forces.

Fighter—active, Guard, and Reserve—units will see the accelerated retirement of roughly 250 fighters in line with a detailed plan announced by Air Force leaders in May. The ramifications of this initiative on USAF's personnel are just now coming into focus.

USAF is retiring legacy fighters to achieve a smaller and more sustainable fighter force and to redistribute its people for higher priority missions. The greatest effect might be on people, as airmen at 21 bases will see assignments and career fields change, families move sooner than planned, and communities weigh the economic consequence of pilots, aircrews, and maintainers leaving or arriving.

Every career field at the bases involved "will be affected in some way," said Lt. Col. David T. DuHadway, chief of rated force policy on the Air Staff.

The combat air forces restructuring plan was announced days after President Obama released his defense budget request for Fiscal 2010. A total of 249 fighters—112 F-15s, 134 F-16s, three A-10s—will be flown to the boneyard at Davis-McCannan AFB, Ariz.

USAF leaders call it "rebalancing," but others warn the cuts have gone too far.

This group will be joined by another five F-16s previously scheduled for retirement next year. The average age of the targeted A-10s and F-15s is 30 years. The average of the F-16s is 24 years.

Secretary of the Air Force Michael B. Donley said that USAF seeks to exploit a "window of opportunity"—a brief period of a few years in which it can, with little short-term risk, jettison some older fighters and use the savings to upgrade remaining Generation 4 fighters to higher capability. That would have to take place

before the rise of other military powers slams that window shut.

Working with the service's new F-22 Raptors, the fourth generation CAF will have a "more flexible and lethal bridge to fifth generation fighters like the F-35," Donley argued.

Estimated savings, \$355 million in Fiscal 2010 and \$3.5 billion over the next five years, would be used to modernize today's fighter and bomber forces as well as buy upgraded munitions and more modern missiles. Some of the savings

A Calculated Risk

Air Force leaders recognize that their restructuring plan entails loss of some capability relative to potential adversaries.

"We feel that we are at about moderate risk" for executing the nation's two-war strategy, said Col. Jack Forsythe, a combat forces planner on the Air Staff. If the strategy is changed during the current Quadrennial Defense Review, "then we'll have to go back and look at how we're postured."

Although potential enemies have advanced missile systems today, Forsythe noted, the Air Force believes the deadliest SAMs won't be seen until much further into the "outyears." Potential threats will include better adversary aircraft and air-combat missiles, as well as a great proliferation of advanced "double digit" SAMs.

To reverse the erosion of air dominance, Forsythe said, the Air Force must invest in systems to "buy back" that capability. "We absolutely need fifth generation capability to buy back access to the modern battlespace," he said.

This means more fifth generation aircraft. With the F-22 program halted, the F-35 will shoulder a heavy responsibility.

Far left, an F-15 from RAF Lakenheath, Britain, takes on fuel. Left, Lt. Col. Philip Stewart inspects a new MC-12 ISR aircraft at Joint Base Balad, Iraq. USAF restructuring will shift airmen out of fighter missions and into emerging growth areas.

also would be spent on critical intelligence capabilities such as the advanced targeting pod and enabling technologies for tactical air controllers and special operations forces.

In sum, Air Force leaders say they seek to rebalance the components of the CAF. They are seeking resources to bolster the nuclear enterprise (USAF's current top priority), plus special operations and intelligence-surveillance-reconnaissance assets.

Though the CAF plan is reflected in the Fiscal 2010 budget request, it immediately ran into some resistance from lawmakers representing districts losing aircraft and personnel.

More Questions

"I think this community feels more threatened than at any time in the last 15 to 20 years," said Rep. F. Allen Boyd Jr. (D-Fla.) in a public forum he hosted with Donley and Air Force Chief of Staff Gen. Norton A. Schwartz at Tyndall AFB, Fla. Plans call for stripping Tyndall of two F-15 squadrons, comprising a total of 48 aircraft.

Boyd is on the House Appropriations Committee and was able to add to the Fiscal 2010 defense appropriations bill, passed by the House, language that could delay the Tyndall aircraft retirements until the Air Force provides a full report on long-term effects.

Boyd also seeks an independent review by a federally funded research and development center of the restructuring plan, and of USAF's cost-benefit analysis on moving F-15 training to Oregon.

The Iron Is Moving

USAF's combat air forces restructuring cuts across active, Air National Guard, and Air Force Reserve forces.

Fighters in active duty squadrons will drop by 199 aircraft or 16 percent. The cut is six percent for the Air National Guard (which will lose 33 aircraft) and the Air Force Reserve, which will lose six. (Another 16 fighters will come from backup-attrition reserve to reach the 249 destined for the boneyard.)

Fifty-one aircraft being retired are based overseas (from England, South Korea, and Germany), and 187 are on bases located in 12 states.

Among active duty F-15 bases, Tyndall AFB, Fla., will lose 48 aircraft, and Elmendorf AFB, Alaska, will lose 24. From the active duty F-16 bases, Luke AFB, Ariz., will lose 28 aircraft and Hill AFB, Utah, will lose 24.

Klamath Falls Arpt., Ore., is—and will remain—a Guard and Reserve F-15 training base but will be receiving aircraft. Tyndall currently is the only active duty training base for F-15s and will lose the mission, becoming an F-22 training base instead. Other areas of the force are also booming. Cannon AFB, N.M., and Hurlburt Field, Fla., are getting more special operations aircraft.

"We are adding aircraft, adding aircrew, and we're growing the support personnel footprint there as well," said Col. David T. DuHadway, rated-force policy chief at the Pentagon.

The remaining legacy fleet, however, will be more potent than ever. "It's very important to state we are not buying fifth generation aircraft with the money saved," said Col. Jack Forsythe, combat forces planner. "What we are buying is critical enabling capabilities [for the remaining aircraft, to] help bridge us to a fifth generation force."

This will include radar upgrades, improved air-launched missiles, including the AIM-9X and AIM-120D, and preferred munitions such as the 250-pound Small Diameter Bomb to reduce collateral damage in attacks against enemy targets.

A follow-on effort called the Small Diameter Bomb II will give pilots even more capability against moving targets.

Boyd told the Panama City (Fla.) *News Herald* that Air Force officials had previously said F-15s at Tyndall were to retire in 2013 and would leave a fighter gap until F-35s arrived.

Air Force officials have made themselves available to lawmakers to explain the CAF plan in detail for impacted areas and have handled many Congressional and private inquiries to date. Still, the plan faces considerable skepticism.

"I'm sure we're not done answering questions," said one senior officer.

Even so, the Air Force plans to support its new, high-priority mission areas

with personnel. Some 13,400 active duty slots, which had been written off the books, became available when Defense Secretary Robert M. Gates halted the Air Force's drawdown and raised end strength to nearly 333,000 active duty personnel.

Roughly another 4,000 personnel will become available with the fighter force rollback.

"Those two actions," said Col. Bill Snodgrass, chief of the manpower programming division at USAF headquarters, "allowed us to do a complete scrub of missions and corporately vet through the Air Force how we want to utilize those available manpower authorizations."

To bolster the nuclear enterprise mission, a fourth active duty B-52 Stratofortress squadron stood up at Minot AFB, N.D., Sept. 3. Creating this new bomb squadron will allow one B-52 unit to be focused solely on nuclear weapons delivery at all times.

The service inventory of 76 B-52s will not change, but airplanes in attrition reserve status will become primary mission aircraft and be manned and funded for the new squadron. Minot's population of aircrew and maintenance teams will rise.

Approximately 1,600 more airmen will be reassigned to unmanned aerial



A B-52 bomber is inspected for cracks at Minot AFB, N.D., where a new B-52 combat squadron was recently established. Strategic nuclear forces will see increases in assigned personnel.



SSgt. Kary Bearden, a crew chief with the 169th Fighter Wing at McEntire JNGB, S.C., checks the status of an Air National Guard F-16. Many units will quickly retire old fighters under the CAF restructure, but McEntire will keep its Vipers until they are replaced by F-35s.

vehicle units. These systems include the MQ-1 Predator, MQ-9 Reaper, and RQ-4 Global Hawk, as well as priority ISR programs like the MC-12 Liberty Project Aircraft. The personnel infusion will help build Air Force capacity to field the equivalent of 50 UAV orbits by 2011 in support of operations in US Central Command's area of operations.

Another 2,500 personnel will expand distributed common ground systems and information processing, exploitation, and dissemination capabilities to support combatant commanders' need for actionable ISR.

"The programs rely on well-trained manpower to handle, analyze, and put into context imagery and signals intelligence for the warfighter," Snodgrass said.

The Air Force Chief of Staff has warned that his service's advantage over potential adversaries is eroding and that this trend "endangers both air and ground forces alike." What is needed, Schwartz said, is "a very significant investment in bridge capabilities and fifth generation aircraft." CAF restructuring "gets us there," he said.

Faster retirement of fighter aircraft was one of the results from force guidance that Gates issued last fall. The Air Force was to look out five years and find areas of fighting force overmatch against potential enemies.

These years are an "opportunity where we don't see the threat increasing at such a rate that we can't afford to divest ourselves of some fighter forces and reprioritize money and manpower savings

toward higher-priority missions," said Col. Jack Forsythe, chief of the combat forces division on the Air Staff.

Almost 260 pilot billets will be affected by CAF restructure, said DuHadway. Follow-on assignments "will be worked individually, based on needs of the Air Force, manning levels at other CAF bases, and the individuals' desires," he added.

Person by Person

Though cockpit numbers are declining, DuHadway said, the Air Force knows the investment it has in these pilots.

"We'll use existing personnel policy to make sure we put them where we need them," said DuHadway. "We will see many pilots go to staff positions, if their grade and time in service permit. Others will fill other operational pilot billets, to include fighters, trainers, RPVs [remotely piloted vehicles], and air operations center jobs."

Adding personnel to unmanned aircraft missions, said DuHadway, will continue on pace. This highly publicized effort at Creech AFB, Nev., the hub of UAV training and operations, isn't being accelerated by the CAF restructuring.

"We're not going to take the 4,000 people, move them all from fighter bases, and put them all at Creech," DuHadway noted. "We will continue to draw aircrew to operate and train intel experts and to

process, exploit, and disseminate the information from across the service, like we do today."

The Air Force Personnel Center will continue to work person by person to figure out what missions are a good fit. "If there's a need in the A-10 community, for example, for an instructor to stay in the A-10, we'll do that," DuHadway said. "These fighters are not going away entirely. We may just have to move them through a PCS [permanent change of station]."

The same is true for the maintainers. The personnel center will look at overall personnel manning for specialties involved, both on the maintenance side and office support personnel, in order to figure out best use of the personnel. No bases will close, so the effect on support personnel will be moderate.

"Some may move, because the size of a force support squadron might not need to be as big if a lot of the operators and maintainers do move away," said DuHadway. "By no means does CAF restructuring mean instantaneous PCS for everybody."

The Air Force isn't changing the way it manages the movement of personnel, DuHadway said.

He explained, "We're still trying to balance the requirements we have as a service with our inventory of human capital, and making sure that we manage that carefully. It will always depend on how much time individuals have in service, the individual's desires and expertise, and most importantly the needs of the Air Force."

Snodgrass noted that the service will be "in-sourcing"—that is, taking back operations run by contractors and converting those positions to government jobs—thus reversing an outsourcing trend which occurred in the era of Secretary of Defense Donald H. Rumsfeld. The Air Force alone has identified 13,800 contractor jobs for conversion to federal civilian positions by Fiscal 2014. About 4,500 of those would be converted in Fiscal 2010.

"Those are pretty significant numbers," said Snodgrass. Where the conversions will take place, by base, hasn't been set.

"Until we go through our contract-by-contract review, we just don't know," he said. The review might not conclude until the first months of calendar 2010. ■

Tom Philpott, the editor of "Military Update," lives in the Washington, D.C., area. His most recent article for Air Force Magazine, "Sustain and Retain," appeared in the June issue.

Flashback

Wee Bee and Its Friend



Photo by Consolidated Vultee. Text by Andrea K. Dudney

After World War II, experimenters competed to produce ever smaller aircraft. The first to be called *World's Smallest Flyable Airplane* was Wee Bee, shown here circa 1948 (with a pilot) on the ramp near the Consolidated Vultee facility at Lindbergh Field, San Diego. This Bee Aviation airplane had a length of 14 feet, span of 18 feet, and a 30-horse power piston engine. The pilot flew the 'Wee Bee while lying flat

atop its fuselage, reaching a top speed of 82 mph. Looming over this little fella is Convair's XC-99 transport, the largest piston-engine, land-based transport aircraft ever built. Each of the big fella's 19-foot-long propeller blades exceeded Wee Bee's entire wing span. ■



Kunming, China, depicted in this 1945 painting by Loren Russell Fisher, had been a resort town in the mountains, but became one of the busiest airports in the world as the main terminus for supplies shipped over the Hump.

Painting courtesy of the Air Force Art Collection

For Imperial Japan, the top military objective in World War II undoubtedly was China. Tokyo in 1931 annexed the northeastern Chinese province of Manchuria, renaming it Manchukuo. In July 1937, Japan launched a full-scale air and land invasion of its giant neighbor.

When the Chinese capital city of Nanking fell in December, Chiang Kai-shek and the Nationalist government retreated, first to Hankow and then, in October 1938, to Chungking, which became the wartime capital of unoccupied China.

Japanese forces held all important points in eastern China, including cities, railways, rivers, and ports. From 1937 to 1941, Nationalist China was resupplied from Russian Turkestan, with the goods passing through Sinkiang on the ancient Silk Road. That route, however, was closed down when the Soviet Union signed a nonaggression pact with Japan in April 1941.

Chiang's only remaining way to obtain strategic supplies from the outside world was through British-controlled Burma. War materiel and munitions passed from the port at Rangoon to the railhead at Lashio. There began the Burma Road, winding about 700 arduous miles across the Himalaya Mountains to Kunming.

To get over the high passes, trucks took a perilous course. Drivers had to negotiate

several miles of hairpin turns for every mile of forward progress. Protecting the Burma Road was one of the main reasons China had recruited Claire L. Chennault and his American Volunteer Group, the renowned Flying Tigers.

Then, in January 1942, Japanese forces invaded Burma, and, within months, forced the British Army back to India. The British forces were able to hold at the border, and Chinese troops stopped the invaders on the Burmese side of the Salween River gorge, thanks in considerable part to the Flying Tigers. However, the overland supply route through Burma was cut off.

The US was determined to keep China in the war, and the only way to supply Chiang's army and Chennault's China Air Task Force was by air, across the "Hump" of the towering Himalayas.

US Tenth Air Force in India, ordered to initiate the airlift, was plunged into the unknown in more ways than one. That is because, before the start of the war, the Army Air Corps had never put together an organized airlift function.

The Air Corps' Ferrying Command was created in 1941 and became Air Transport Command in 1942, but ATC reported to the War Department, not to theater commanders. There was no precedent for what was about to happen.

Air routes over the mountains had been explored by China National Aviation Corp.,

owned jointly by Pan American World Airways and the Chinese government, but these routes were not in regular use. Aeronautical charts were unreliable and weather information was virtually nil.

The transports had to cross one mountain chain after another. The passes were 14,000 feet high, flanked by peaks rising to 16,500 feet. Elevations were lower at the southern end—the so-called "Low Hump"—but patrols by Japanese fighters forced most flights farther north until late in the war.

The main Hump, which gave its name to the entire route across the mountains, was the 15,000-foot Sansung range between the Salween and Mekong rivers. From bases in India, it was 500 miles across the Hump to China. Flying time was four to six hours, depending on the weather.

"Winds of as much as 100 miles an hour, piling into the steep barren slopes, would glance off to create updrafts over the ridges, downdrafts over the valleys," said William H. Tunner, as a brigadier general the last commander of the Hump airlift. "Planes caught in a downdraft could drop at the rate of 5,000 feet per minute, then suddenly be whisked upward at almost the same speed."

Turbulence could flip an airplane over on its back. Icing was a problem above 12,000 feet, and wings were sometimes bent or warped from the buildup.

Over the Hump to China

By John T. Correll

Every bomb, bullet, and gallon of gas—to say nothing of Army mules and at least one piano—had to be flown over the Himalayas from India.

It was an exceptionally dangerous place to fly. Hundreds of airplanes went down in the mountains or in the thick jungles that lay on either side. An “aluminum trail” marked crash sites over the mountains. With spare parts in short supply, teams were often sent into the foothills to recover what they could. The accidents spawned a craft industry among the mountain villagers, who produced aluminum artifacts from the crash site debris.

Over this forbidding mountain mass, “every vehicle, every gallon of fuel, every weapon, every round of ammunition, every typewriter, and every ream of paper which found its way to Free China for either the Chinese or the American forces during nearly three years of war was flown in by air from India,” the official Army Air Forces history of the war said.

Regular operations over the Hump began in May 1942 with 27 aircraft. These were mostly Douglas DC-3 airliners converted to C-47s, the military configuration which had stronger floors and larger doors.

An early commander complained that the C-47’s altitude limitations made it “entirely unsuitable” for flying the Hump, but the C-47 was famous for exceeding performance specifications. One C-47 is on record as hauling a full load over the Hump at 24,000 feet.

Initially, few supplies landed at the port of Calcutta, which was menaced by the Japanese. Most cargo bound for China came into Bombay or Karachi on the west coast of India and went cross country from there. At first, Tenth Air Force airlift flights originated in Karachi and staged

for the Hump leg of their mission though Dinjan, a British base on the flood plain of the Brahmaputra River in the upper Assam Valley.

When the port of Calcutta came into greater use, the airplanes and crews transferred to Dinjan and other bases in Assam, but that introduced a new problem. Every Indian state used a different gauge of track for its railroad, so the cargo had to be unloaded and reloaded at several points on the 600-mile trip from Calcutta north to Assam.

The Fireball Express

Grandiose expectations for the airlift—and promises made by the politicians to the Chinese—were at odds with the meager resources provided. A lack of engines and spare parts meant there were seldom more than 18 airplanes available to fly the Hump.

Chiang Kai-shek clamored for the airlift to fly 10,000 tons a month. The officially stated US goal was 4,000 tons. In practice, Tenth Air Force was unable to haul more than a few hundred tons a month.

Gen. Henry H. “Hap” Arnold, commander of the AAF and never a patient man, recognized the problems but felt that Tenth Air Force should have done better anyway. He transferred responsibility to Air Transport Command, which took over in December 1942.

Monthly tonnage built gradually as more and larger transports joined the Hump operation. In January 1943, the first four-engine C-87s—B-24 bombers converted into transports—arrived to supplement the C-47s. The C-87s could fly higher and

faster and carry more cargo, but they were beset with maintenance problems, leaky fuel tanks, and a vulnerability to icing.

Heavier weights at takeoff and landing added to the difficulties. The C-87 and its tanker variant, the C-109, experienced accidents at five times the rate of other transports on the route. Pilots, wary of the high-octane cargo, called the C-109 the “C-One-Oh-Boom.” Some B-24s in the original bomber configuration were pressed into service to carry aviation gas and supplies as well.

The workhorse of the Hump airlift, the Curtiss C-46, arrived in April 1943. It was the largest twin-engine aircraft built to that point. The C-46 was more temperamental to fly than the beloved C-47, but its excellent visibility, big doors, and large cargo capacity compensated for its faults.

In May 1943, when deliveries had at last surpassed 2,000 tons a month, President Roosevelt abruptly raised the goal to 7,000 tons by July and 10,000 tons by September. ATC’s India-China wing met that goal in December 1943—actual tonnage that month was 12,590—for which it received a Presidential Unit Citation.

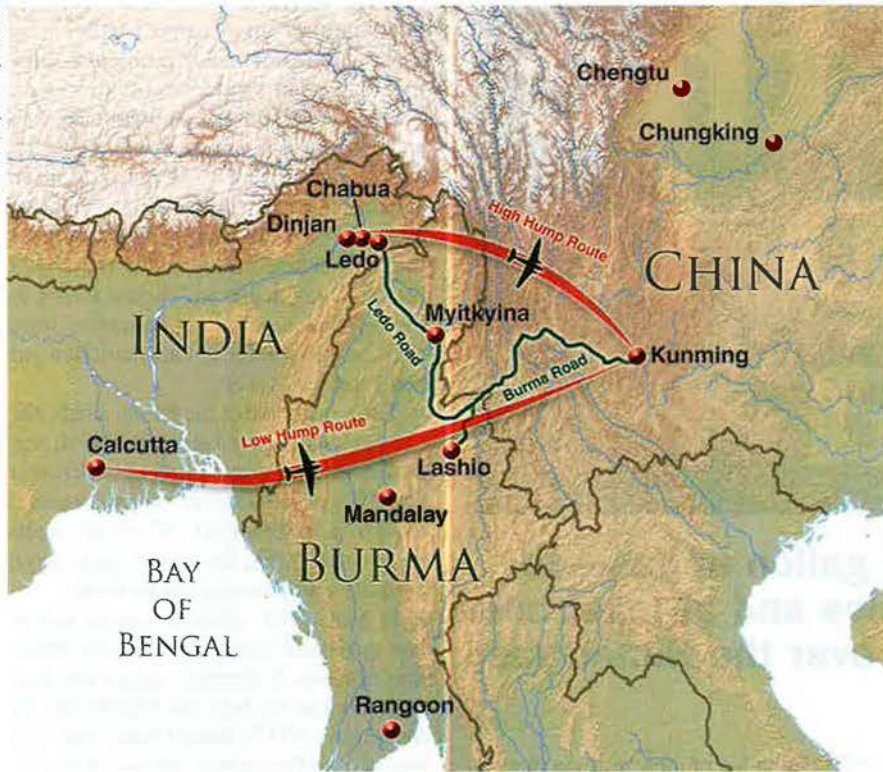
The “Fireball Express” began in September 1943, with C-87s making weekly runs to India with spare parts from the Air Service Command depot in Fairfield, Ohio. The camouflage paint was stripped off the airplanes to give them an extra 5 mph of airspeed.

The airlift ultimately operated from 13 bases in India. There were six bases in China with the main terminus at Kunming, which became one of the busiest airports in the world. Kunming, which had been a resort town in the mountains, was cooler than Assam and the food was better.

Conditions at all of the bases in Assam were primitive. Crews lived in tents and bamboo huts, with pythons and other creatures making frequent visits. Jeeps sped down the runways ahead of airplanes taking off to clear cows and local citizens out of the way. Clothing and shoes mildewed in a few days from the humidity. The heat was oppressive and the rains were heavy. At one point in 1942, the water was nine inches deep on the airstrip at Dinjan.

At Chabua, the Assam Valley floor was 90 feet above sea level, but the mountains to the east rose quickly to 10,000 feet. After takeoff, pilots circled the aerodrome twice to gain altitude. “Flying from Chabua was like flying out of a hole in the mountains,” said Otha C. Spencer who flew the Hump and wrote a book about his experiences.

In China, the aircrews could get milk and fresh eggs, even fried chicken and steak, all of which were luxury fare in



The Low Hump route over the southern end of the range was less perilous, but Japanese fighters forced most missions over the main Hump—including the 15,000-foot-high Sansung range between the Salween and Mekong rivers.

Assam, where the mess halls served Spam and K-rations. Spencer recounts the story of a B-24 pilot based at Chengkung who carried 24 dozen eggs along on a flight to Chabua, where he traded them for an unused piano in the mess hall. He loaded the piano on his airplane and took it back to his squadron in China.

The most critical commodity delivered by the airlift was 100-octane aviation gasoline, typically carried in 55-gallon drums. Elephants were trained to lift the gasoline drums to the cargo door of the airplanes, with one elephant doing the work of a dozen laborers.

In flight, the gasoline drums often sprung leaks with changes in the atmospheric pressure and had to be wrestled out the door by the crew. If a drum broke loose from its bindings in heavy turbulence, a pilot could count himself fortunate to land with no more than a few dents in the roof of the cabin.

In the last years of the war, much of the gasoline was carried by tanker aircraft. By 1945, gasoline and oil accounted for nearly 60 percent of the tonnage flown eastward over the Hump.

The airlift brought about 3,000 mules over the Hump, mostly for the Chinese army. They rode four mules to a transport, with four Chinese “cowboys” keeping

them under control. Crew members said it took a day to clear the smell out of the airplanes.

Into the Weather

The most unusual cargo may have been bales of Chinese paper money, printed by the American Note Co. and delivered by Hump transports.

With more and better transports on the job, 1944 saw a surge in deliveries to the China bases. By the end of the year, 250 aircraft were operating over the Hump, four times the number flying the route the previous year. Each C-46, now the dominant airlifter in the fleet, carried twice as much cargo as a C-47.

Considerable credit for the increase is accorded to Col. Thomas O. Hardin, a hard-charging former airline executive, who had taken command of the airlift in September 1943.

Hardin ordered a bolder approach to operations. Missions would be flown as scheduled, without regard to storms over the Hump, reports of enemy aircraft, or whether a transport fully met tech order specifications. He also began night flights over the Hump. Between September 1943 and August 1944, Hardin forced Hump deliveries up from 4,624 tons a month to 23,675 tons. When the India-China Wing of ATC became a division, Hardin was promoted to brigadier general and put in command.

Losses rose as well. Japanese fighters were a threat, but accidents took a heavy toll.

Between June and December 1943, there were 155 major accidents on the Hump route, with 168 crew fatalities.

Air patrols searched the jungles of Burma and China for aircraft wreckage. Light aircraft brought out survivors, medics parachuted in when needed, and supplies were air-dropped to crews able to walk out.

Hump aircrews wore “blood chits” made of leather or silk inside their flying jackets. These colorful patches, about 8 by 10 inches, promised a reward to villagers and tribesmen who took down aviators to the nearest US base. Blood chits were introduced in China by the Flying Tigers, who wore them outside, on the backs of



Photo by Cal Bannion via Warren Thompson

A US C-47 flies over Burma in 1945. The massive undertaking to supply China during World War II defined a new mission for USAF—critical airlift.



This lineup of C-46 aircraft on the ramp at Ondaal, India, was destined for China's Nationalist Air Force—a gift from the US.

their jackets, but chits made good targets for snipers, so Hump pilots sewed them on the inside.

Just as Hardin was getting the tonnage up, a major new customer arrived. In the spring of 1944, Operation Matterhorn brought B-29 bombers to India. From there, they staged through forward bases in China to fly bombing missions that reached as far as the southernmost Japanese home islands. This required the pre-positioning of supplies, particularly fuel, at the B-29 bases around Chengtu in China. XX Bomber Command, which flew the missions, carried a substantial amount of its own cargo to the forward bases and converted some of its B-29s to tankers to haul aviation gas. Even so, 12 percent of the ATC tonnage flown over the Hump was to support the B-29s before Operation Matterhorn ended in 1945.

A number of other units flew Hump missions, too. Foremost among them was China National Aviation Corp., the organization that had first explored routes over the Himalayas. In 1944, CNAC delivered 41,000 tons of cargo to supplement the 230,000 tons flown in by Air Transport Command.

The most famous commander of the Hump airlift, Tunner, took over from Hardin in September 1944. Tunner wrote in his memoirs that the orders from ATC were “to continue the increase in tonnage but at less cost in American lives” and to improve morale in the India-China Division, which was “none too good.”

His first order was to cancel Hardin’s policy that forced pilots to fly regardless of weather. Tunner emphasized regularity, standardization, procedure, and safety. He was dubbed “Willie the Whip” for the discipline he imposed.

Tunner also enforced military standards of personal appearance, which had slipped badly. This was unpopular at first, but

morale rose, especially as food and living conditions improved. Tonnage over the Hump continued to increase—reaching 53,315 tons in July 1945—and the accident rate dropped to one-seventh its previous rate.

A Major New Mission

Tunner’s success was due in part to the actions he took, but several other developments gave him a huge boost. In May 1944, the Allies recaptured Myitkyina, the main base in Burma from which Japanese fighters threatened the Hump. This made it possible for Tunner’s aircraft to use the Low Hump route in the south.

Using Myitkyina as a halfway station, the airlifters were able to increase deliveries to China.

The last of the major Hump transports, the four-engine Douglas C-54, joined the operation in October 1944. The C-54 could not be used on the northern route because of altitude limitations, but it was ideal for the more benign southern route, where elevations were 12,000 feet or lower.

The C-54s were based in Calcutta and had sufficient range to fly directly to China, which eliminated the need to shuttle cargo by rail from the port to the upcountry bases.

By July 1945, Tunner had on average 332 airplanes a day operating over the Hump, a far cry from the hard-pressed 62 on the route in January 1943. He would have liked to replace the accident-prone C-87s altogether with C-54s but was unable to obtain enough. In fact, additional B-24s, no longer needed in their primary bombing mission, were assigned as cargo haulers to augment the Hump transport fleet.

Meanwhile, the Allies had finally established an overland route into China. This was the Ledo Road, begun in 1942 and finished in January 1945.

The Ledo Road ran 465 miles from Ledo in Assam to link up with old Burma Road north of Lashio near the Chinese border. The first convoy of 113 vehicles reached Kunming, 1,100 miles from the starting point, Feb. 4, 1945.

Over the next seven months, 35,000 tons of supplies moved over the Burma Road in 5,000 vehicles. Still, the transports brought more than that every month.

The Hump operation was officially closed Nov. 15, after the war had ended.

In all, the Hump airlift had carried 650,000 tons of gasoline, supplies, and men to China, more than half of that total in the first nine months of 1945. The results had come at a great price. During the operation, 509 aircraft from Air Transport Command and other organizations were lost. The total of crew members known dead was 1,314, with 345 listed as missing. Almost 1,200 had been rescued or walked out to safety.

The search for aircrew remains continues. Earlier this year, a recovery team from the Joint POW/MIA Accounting Command reached a remote site in India where a B-24J went down Jan. 25, 1944.

The airlift over the Hump succeeded in its main objective. China was able to remain in the war, thanks to the airlift and American airpower, which the airlift supported. Allied operations held off the Japanese, kept pressure on Japan from another front, and tied up a large enemy force on the Asian continent.

Beyond that, the flights over the Hump established airlift as a major new Air Force mission. ATC evolved into Military Air Transport Service, then Military Airlift Command, and finally today’s Air Mobility Command.

The Hump set the model for large-scale aerial supply and sustainment operations from the Berlin Airlift in 1948-49—which Tunner, by then a two-star general, was called in to command—the Yom Kippur airlift to Israel in 1973, and the massive airlift that supported the Gulf War in 1990 and 1991. ■

John T. Correll was editor in chief of Air Force Magazine for 18 years and is now a contributing editor. His most recent article, “Over There,” appeared in the September issue.

Books

Compiled by Chequita Wood, Media Research Editor

52-Charlie: Members of a Legendary Pilot Training Class Share Their Stories About Combat in Korea and Vietnam. Edward T. Gushee. Wheatmark Publishing, Tucson, AZ (888-934-0888), 299 pages. \$22.95.



History of Operations Research in the United States Army, Vol. III: 1973-1995. Charles R. Shrader. GPO, Supt. of Documents, Washington, DC (866-512-1800), 352 pages. \$57.00.



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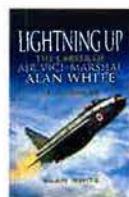


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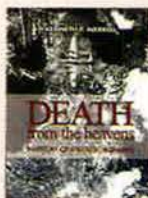


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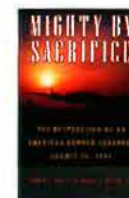


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Until the Last Man Comes Home: POWs, MIAs, and the Unending Vietnam War. Michael J. Allen. The University of North Carolina Press, Chapel Hill, NC (800-848-6224), 433 pages. \$30.00.



Fighting Chance: Global Trends and Shocks in the National Security Environment. Neyla Arnas, ed. Potomac Books, Dulles, VA (800-775-2518), 330 pages. \$35.00.



Nancy Batson Crews: Alabama's First Lady of Flight. Sarah Byrn Rickman. The University of Alabama Press, Tuscaloosa, AL (800-621-2736), 207 pages. \$29.95.



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Airpower Was Decisive

The war with Hitler was in its final months when President Franklin D. Roosevelt ordered up a survey. He wanted to know the details of what Allied airpower had done to Nazi Germany and its military capabilities. Soon, the project had drawn in 350 officers, 500 enlisted personnel, and 300 civilians, and had acquired a name—the United States Strategic Bombing Survey. The first fruit was a 13,000-word “Summary Report” of operations in Europe, based upon data filling more than 200 volumes of research. This was a unique record of damage inflicted on everything from oil refineries to railways. Its conclusion about the contribution of airpower was unequivocal: “Allied airpower was decisive in the war in Western Europe.”

The new relation of airpower to strategy presents one of the distinguishing contrasts between this war and the last. Airpower in the last war was in its infancy. The new role of three-dimensional warfare was even then foreseen by a few farsighted men, but planes were insufficient in quality and quantity to permit much more than occasional brilliant assistance to the ground forces.

Airpower in the European phase of this war reached a stage of full adolescence, a stage marked by rapid development in planes, armament, equipment, tactics, and concepts of strategic employment, and by an extraordinary increase in the effort allocated to it by all the major contestants. England devoted 40 to 50 percent of her war production to her air forces, Germany 40 percent, and the United States 35 percent.

Nevertheless, at the end of hostilities in Europe, weapons, tactics, and strategy were still in a state of rapid development. Airpower had not yet reached maturity, and all conclusions drawn from experience in the European Theatre must be considered subject to change. No one should assume that because certain things were effective or not effective, the same would be true under other circumstances and other conditions.

In the European war, Allied airpower was called upon to play many roles—partner with the Navy over the sea-lanes; partner with the Army in ground battle; partner with both on the invasion beaches; reconnaissance photographer for all; mover of troops and critical supplies; and attacker of the enemy’s vital strength far behind the battle line.

In the attack by Allied airpower, almost 2,700,000 tons of bombs were dropped; more than 1,440,000 bomber sorties and 2,680,000 fighter sorties were flown. The number of combat planes reached a peak of some 28,000, and, at the maximum, 1,300,000 men were in combat commands. The number of men lost in air action was 79,265 Americans and 79,281 British. (Note: All RAF statistics are preliminary or tentative.) More than 18,000 American and 22,000 British planes were lost or damaged beyond repair.

In the wake of these attacks, there are great paths of destruction. In Germany, 3,600,000 dwelling units, approximately 20 percent of the total, were destroyed or heavily damaged. Survey estimates show some 300,000 civilians killed and 780,000 wounded. The number made homeless aggregates 7,500,000. The principal German cities have been largely reduced to hollow walls and piles of rubble. German industry is bruised and temporarily paralyzed. These are the scars across the face of the enemy, the preface to the victory that followed.

How air supremacy was achieved and the results which followed from its exploitation are the subject of this summary report. The use of airpower cannot properly be considered, however,

The United States Strategic Bombing Survey: Summary Report (European War)

United States War Department, Washington, D.C.
Sept. 30, 1945

Find the full text on the
Air Force Association’s Web site
www.airforce-magazine.com
“Keeper File”

except in conjunction with the broad plans and strategy under which the war was conducted. ...

The foregoing pages tell of the results achieved by Allied airpower, in each of its several roles in the war in Europe. It remains to look at the results as a whole and to seek such signposts as may be of guidance to the future.

Allied airpower was decisive in the war in Western Europe. Hindsight inevitably suggests that it might have been employed differently or better in some respects. Nevertheless, it was decisive. In the air, its victory was complete. At sea, its contribution, combined with naval power, brought an end to the enemy’s greatest naval threat—the U-boat; on land, it helped turn the tide overwhelmingly in favor of Allied ground forces. Its power and superiority made possible the success of the invasion. It brought the economy which sustained the enemy’s armed forces to virtual collapse, although the full effects of this collapse had not reached the enemy’s front lines when they were overrun by Allied forces. It brought home to the German people the full impact of modern war with all its horror and suffering. Its imprint on the German nation will be lasting. ...

The air has become a highway which has brought within easy access every point on the Earth’s surface—a highway to be traveled in peace, and in war, over distances without limit, at ever increasing speed. The rapid developments in the European war foreshadow further exploration of its potentialities. Continued development is indicated in the machines and in the weapons which will travel the reaches of this highway. The outstanding significance of the air in modern warfare is recognized by all who participated in the war in Europe or who have had an opportunity to evaluate the results of aerial offensive. These are facts which must govern the place accorded airpower in plans for coordination and organization of our resources and skills for national defense. ■

AIR FORCE ASSOCIATION'S GLOBAL WARFARE SYMPOSIUM



Thursday, November 19 - Friday, November 20, 2009

The Beverly Hilton Hotel
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By Frances McKenney, Assistant Managing Editor

Back-to-Back in Alabama

Air Force Association Chairman of the Board Joseph E. Sutter was keynote speaker for both the **Montgomery Chapter (Ala.)** Community Partner Appreciation Luncheon and the Alabama State Convention, hosted by the chapter in August. The events took place back-to-back at Maxwell Air Force Base.

Larry G. Carter, chapter information management VP, said that Sutter took a good news-bad news approach in his remarks to the Community Partners: He spoke about the reduction in numbers of Air Force fighter aircraft; termination of F-22 production; USAF's aging aircraft fleet; and the impact of budget decisions on the industrial base. Turning to the good news, he praised the quality of today's airmen and described how AFA works on their behalf.

The Montgomery Chapter has more than 70 Community Partners.

Alabama State President Thomas W. Gwaltney chaired the state convention that followed the luncheon.

As convention speaker, Sutter presented an update on AFA activities, emphasizing four areas: improving AFA's role as an advocate, grassroots communications, membership, and financial resources.

Mark J. Dierlam, South Central Region president, led a discussion on how to improve chapter operations. His topics ranged from information available on AFA's Web site to an example of an active chapter's annual activity plan.

In elections, Gwaltney was re-elected, as were the other state officers: Joseph A. Panza Jr., vice president; William Voigt, treasurer; and James E. Dotherow, secretary.

Community Partner Dinner: Plan B

After the Community Partner Dinner hosted by the **William J. "Pete" Knight Chapter (Calif.)**, Randolph H. Kelly had two words to describe it: "Semper Gumby."

"Always flexible," the chapter VP translated, explaining the phrase as a combination of the Marine Corps motto and a reference to the bendable clay-animation toy figure.

Kelly went on to say that the dinner had been planned months ahead of

AFA Board Chairman Joe Sutter (right) chats with CMSgt. Brye McMillon and Joe Panza of the Montgomery Chapter. Sutter spoke at the Alabama State Convention and the chapter's Community Partner luncheon. McMillon is the command chief master sergeant for Air University, Maxwell AFB, Ala. Panza is the state VP.



time for Aug. 19. But as he drove to work at Edwards AFB, Calif., that day, he learned that the venue—the base's Club Muroc—had been broken into the night before, and the Office of Special Investigations had closed it off as a crime scene. Dinner location, catering, audio-visual and manpower support—all gone. Kelly said he panicked for three seconds. Then the chapter, headed by Rex Moen, organized a Plan B.

Kelly said that chapter members, some of them still driving to work through the Antelope Valley area, began replanning the dinner. Tasks were "farmed out by cell phone to board members all over the valley," Kelly said. Chapter Secretary Cindy Phillips and Leigh Kelly served as coordinators between chapter members and the base's organizations.

By the afternoon, the group lined up the Air Force Flight Test Center Museum as the new dinner location, and signs

placed around the base diverted guests to the right place.

An honor guard presented the colors, that evening. Maj. Gen. David J. Eichhorn, the test center commander, was guest speaker. Gail Knight—wife of the late Air Force test pilot-astronaut and state senator Pete Knight—was there, as well as many of the chapter's 66 Community Partners. The chapter even signed up a new one, that night.

Kelly noted that the chapter carried out "a first-class social event replanned and executed in basically a business day."

Keystone State Convention

The Pennsylvania State Convention took place in August in Carlisle, Pa., a city known in military circles as home of the US Army War College. In fact, **Olmsted Chapter** President Earl T. Kuhn Jr. arranged for an AWC student to be the convention's awards dinner speaker.

Air Force Lt. Col. Gregory Payne was commander of the 7th Operations Support Squadron at Dyess AFB, Tex., before his selection for the War College. His convention presentation focused on the diverse assignments his squadron conducted in the war zones.

State President Robert Rutledge said Payne's photos and illustrations showed how the Air Force is on the ground with soldiers and marines, driving trucks, going into combat situations as explosive ordnance disposal technicians, and carrying out duties not usually associated with the Air Force.

During awards presentations, the **Lt. Col. B. D. "Buzz" Wagner Chapter** of Johnstown was named State Chapter of the Year, and Karen G. Hartman of the **Joe Walker-Mon Valley Chapter** was announced as State Member of the Year. Also honored were AFA national-level 2009 awardees Charles R. Harker, George D. Henderson, Eric P. Taylor, and Gary M. Wolbert.

State officers were re-elected during the convention's business session: Rutledge of the Buzz Wagner Chapter, president; Susanna B. Gyger of the **Eagle Chapter**, vice president; Thomas G. Baker, **Altoona Chapter**, secretary; and Hartman, treasurer.

Convention in Atlantic City

Hosted by the **Highpoint Chapter**, the New Jersey State Convention took place in May at an Atlantic City resort.

Newly elected State Secretary Mary F. Lower described a presentation by two airmen from McGuire AFB, N.J., as a highlight of the two-day convention. TSgt. David Williamson and SrA. Daniel Zaleski, from the 87th Logistics Readiness Squadron, showed photos and video from a deployment to Afghanistan, where their duties included protecting convoys. Lower said she was almost overcome with tears when she watched their video showing a truck accidentally triggering an improvised explosive device.

James R. Lauducci, AFA's vice chairman of the board for field operations, was keynote speaker for the convention's business session. His topics included chapter revitalization, leadership development, communications, the focus on gaining new members, and AFA's education programs.

Other convention speakers were Col. Gina M. Grosso, commander of the 87th Air Base Wing at Joint Base McGuire-Dix-Lakehurst, N.J.; Army Col. Ronald J. Thaxton, at the time commander of Ft. Dix; and Navy Capt. Phillip L. Beachy, commander of Naval Air Engineering Station Lakehurst. Property and funds for Ft. Dix and Lakehurst transfer to Air Force control Oct. 1.

Among the AFA state leaders returned to office are Norman G. Mathews of the **Mercer County Chapter**, re-elected as state president, and Geraldine Jones from the **Thomas B. McGuire Jr. Chapter**, re-elected as state VP.

AFRC Awards in Ohio

Air Force Reserve Command's 910th Airlift Wing at Youngstown ARS, Ohio, was the focus of the awards banquet hosted by the **Steel Valley Chapter** at the air station's Eagle's Nest consolidated club in late May.

Col. Timothy S. Costa, wing vice commander, received the 2009 Officer of the Year award. The banquet program brochure stated that he is an FAA air traffic controller "in civilian life" and has commanded units during the wing's activation for service in Europe, Iraqi Freedom, and Enduring Freedom.

SMSgt. Eric W. Stere, 910th Security Forces Squadron operation superintendent, was named Enlisted Member of the Year. Employed by the state Department of Rehabilitation and Corrections, Stere has deployed five times, including consecutive deployments to Iraq.

Chapter President Fred Kubli Jr. presented the other two awards, that evening. Alyshia D. Borntreger received the AFJROTC Cadet of the Year award, while Marine Corps Reservist Maj. Maureen R. McFarland was named Teacher of the Year. Borntreger was the AFJROTC squadron commander at Trumbull Career and Technical Center in Warren. McFarland is a Kent State University assistant professor of aero-

nautics and was chosen for the honor by the university's AFROTC cadets at Det. 630.

Chapter Secretary Lori Stone, served as master of ceremonies for the evening. Ohio State President John W. McCance was among the other AFA officials at the gathering.

Focus on Aviation

In Delaware, the **Brig. Gen. Bill Spruance Chapter's** annual Focus on Aviation awards event featured former Vietnam War POW Jon A. Reynolds as guest speaker.

An F-105 pilot at Takhli AB, Thailand, in November 1965, Reynolds was shot down and imprisoned at several POW sites, including the Hanoi Hilton and Son Tay. He was repatriated in February 1973. A captain at the time he was shot down, Reynolds later retired from active duty as a brigadier general and worked for Raytheon in a civilian career.

Chapter President Howard Sholl Jr. said that Reynolds spoke to the chapter about leadership, based on experiences as a POW.

Focus on Aviation took place this year near Wilmington, at New Castle County Airport, home of the Air National Guard's 166th Airlift Wing.

Receiving awards at Focus on Aviation for outstanding performance as members of the 166th were MSgt. Todd Hughes, MSgt. Robbin Moore, MSgt. Carrie Wade, TSgt. Elizabeth Fleischer, and SrA. Mark Rutt.

The event also honored Joseph Nickle, for excellence in flight training; chapter Teacher of the Year Beenu



Central Indiana Chapter President Michael Malast (l) thanks guest speaker retired Lt. Col. Todd Lovell for briefing the chapter on the CV-22 tilt-rotor aircraft. Lovell was commander of the 71st Special Operations Squadron, Kirtland AFB, N.M., until retiring in 2008. He spoke about the unit's Osprey flight crew training mission.

Gupta, from The Charter School of Wilmington, where she teaches biology; and Civil Air Patrol officers Gene Egly and Kevin Lighter.

Take Me Out to the Ball Game

In July, the **Northern Shenandoah Valley Chapter (Va.)** took 32 military veterans out to the ball game.

The chapter guests were clients of the Martinsburg (W.Va.) Veterans Affairs Medical Center, and the chapter hosted them at a Winchester (Va.) Royals baseball game.

Joining the vets in the stands were a dozen chapter members and guests, including Thomas G. Shepherd, aerospace education VP; Raleigh H. Watson Jr., leadership development VP; and Arthur Olson. James R. Phillips, veterans affairs VP, organized the event, working with the hospital staff.

Before the game, the announcer told the fans about the chapter's sponsorship, and one of the veterans threw out the first pitch. She got the ball to the catcher on one bounce, Chapter President Norman M. Haller reported.

The Royals—a summer collegiate team—lost the game, nine to three, to the Haymarket Senators, "but the vets enjoyed the outing," Haller said.

More Chapter News

■ At a Community College of the Air Force graduation May 28, **Ark-La-Tex Chapter** President Jack M. Skaggs presented an AFA Pitsenbarger Award to SSgt. Danielle N. Dial of AFRC's 917th Maintenance Squadron, Barksdale AFB, La. Dial, a journeyman aircraft mechanic, received an associate degree in aviation maintenance technology at the ceremony. AFA's Pitsenbarger Awards are \$400, granted to CCAF graduates who plan to pursue a bachelor's degree. They are named after Medal of Honor recipient A1C William H. Pitsenbarger, a pararescue jumper who died while on a mission in the Vietnam War.

■ In August, Maryland State AFA hosted the annual Teacher of the Year Luncheon near Andrews Air Force Base, with Maj. Gen. Ralph J. Jodice II, Air Force District of Washington commander, as guest speaker. Honorees at the event were Christopher Orlando, State Teacher of the Year; Bonnie Beavan, the **Thomas W. Anthony Chapter** Teacher of the Year; and Julie Harp, **Baltimore Chapter** Teacher of the Year. Offering congratulations were Robert B. Roit, state president, and Chapter Presidents Robert J. Hawkins, of the **Central Maryland Chapter**, and Charles X. Suraci Jr., of the Thomas W. Anthony Chapter. Robert Pelletier represented the Baltimore Chapter.

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

■ Capt. John W. Picklesimer received a 2008 national-level AFA Medal of Merit at Hickam AFB, Hawaii, in July. **Hawaii Chapter** President Nora Ruebrook made the presentation at a chapter board meeting held at the Hickam Officers Club. Picklesimer is executive officer in the Directorate of Communications, Pacific Air Forces. ■

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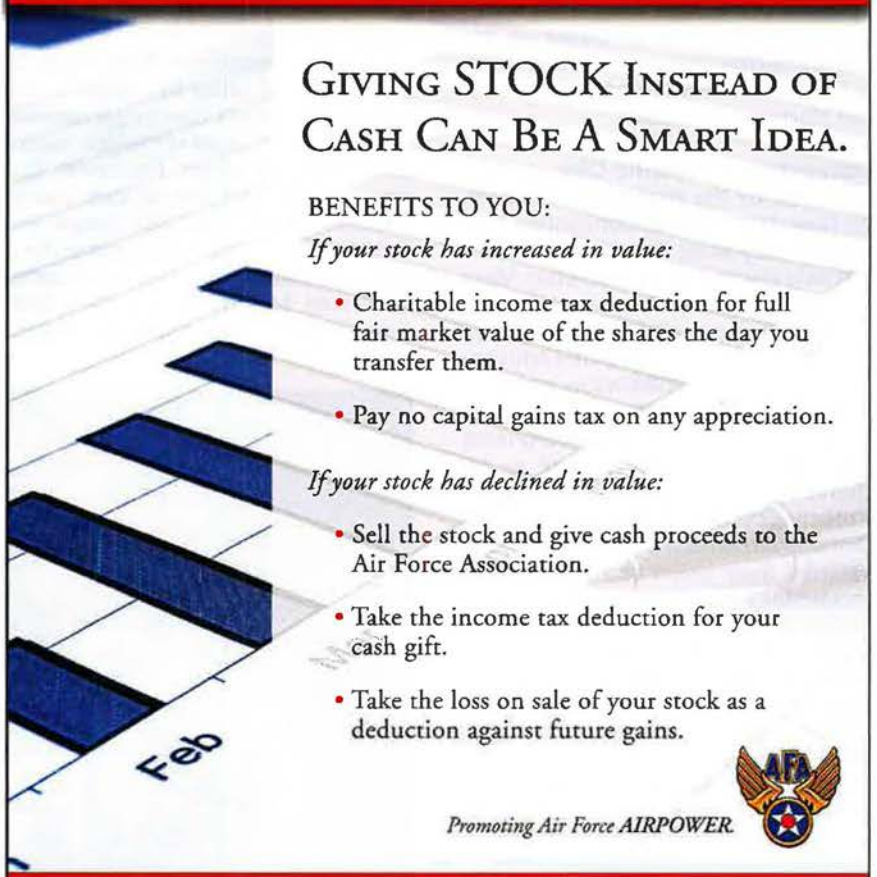
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20th Air Police/Security Police (1960s). May 11-13 at the Stone Castle Hotel in Branson, MO. **Contacts:** Gerald Dickey (raf_wethersfield@yahoo.com) or Roy Johnson (360-929-3791) (fidalgomax@wavecable.com).

Pilot Tng Class 60-H. June 11-13 at Saddlebrook Resort, in Tampa, FL. **Contact:** John Granskog (239-384-9371) (granskog@comcast.net).

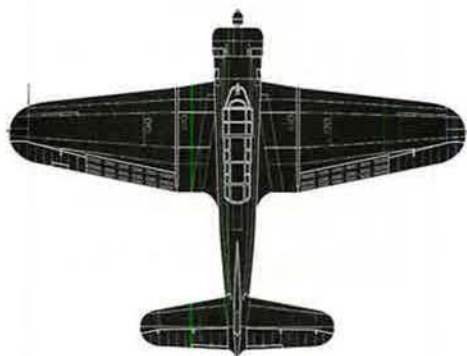
SAC Airborne Command Control Assn. Sept. 8-12, 2010, in Seattle. **Contact:** Wilton Curtis (804-740-2290) (wcurtis135@aol.com).

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Airpower Classics

Artwork by Zaur Eylanbekov

SBD Dauntless



On June 4, 1942, the Navy's SBD Dauntless dive bombers changed the course of World War II. These Douglas aircraft, at the Battle of Midway, sank three Japanese carriers in just six minutes. After sending to the bottom *Akagi*, *Kaga*, and *Soryu*, the Navy aircraft a few hours later finished off a fourth, *Hiryu*. Though the SBD made its greatest mark at Midway, it served brilliantly, especially at the Battle of the Coral Sea and in the Solomons.

The SBD design can be traced to the Northrop XBT-2. Douglas acquired Northrop in 1937, giving its name to the new aircraft. The first production model became the SBD-1 (Scout Bomber Douglas-1). The National Advisory Committee for Aeronautics, a federal agency, worked closely with both Northrop and Douglas on cleaning up the

design. One result: the much debated perforated "Swiss cheese" dive flaps, which permitted the Dauntless to dive steeply without gaining excessive speed. The well-designed SBD served as the Navy's front-line dive bomber until late 1943, when it was superseded by the SB2C Helldiver.

The Dauntless' accurate dive bombing capability proved to be vitally important in naval and land battles in the Pacific. (The USAAF version, called A-24, took part in combat in Indonesia, New Guinea, and the Gilbert Islands.) The all-metal SBD could survive major battle damage, and its heavy armament made it a formidable opponent.

—Walter J. Boyne

This aircraft: US Navy SBD Dauntless—No. B4—as it looked in early 1942 when assigned to VB-6 aboard USS *Enterprise* in the Pacific.



A Dauntless on the hunt.

In Brief

Designed, built by Douglas ★ first flight May 1, 1940 ★ crew of two ★ number built 5,936 ★ one Wright R-1820-60 Cyclone engine **Specific to SBD-5:** max speed 255 mph ★ cruise speed 185 mph ★ max range 1,565 mi ★ armament two .50-cal machine guns; two .30-cal machine guns; one 1,600-lb bomb; two 325-lb bombs ★ weight (max) 10,700 lb ★ span 41 ft 7 in ★ length 33 ft 1 in ★ height 13 ft 7 in.

Famous Fliers

Medal of Honor: William Hall, John Powers (WWII) **Notables:** Richard Best, Turner Caldwell, Cook Cleland, Robert Elder, Earl Gallaher, Elmer Glidden, Maxwell Leslie, Richard Mangrum, Wade McClusky, Joseph Sailer, Wallace Short, D. W. Shumway, Stanley Vejtasa.

Interesting Facts

Flown by US Navy, USMC, USAAF, Royal New Zealand Air Force, French Air Force, French Navy, Chile, Mexico, and Morocco ★ piloted by Stanley "Swede" Vejtasa who, when attacked by three Zeros, destroyed all three ★ spun off as USAAF A-24, identical except for tailhook and inflatable tail wheel ★ saw combat against Japanese forces on Dec. 7, 1941 at Pearl Harbor ★ became first US airplane to sink a Japanese ship (Dec. 10, 1941) ★ nicknamed Slow But Deadly, Barge, Clunk, Speedy-D, Speedy-3, Banshee (A-24) ★ used not only in anti-shiping but also anti-sub warfare, photo reconnaissance, training, and policing roles ★ shown in many films, often mistakenly identified as a Japanese dive bomber.

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