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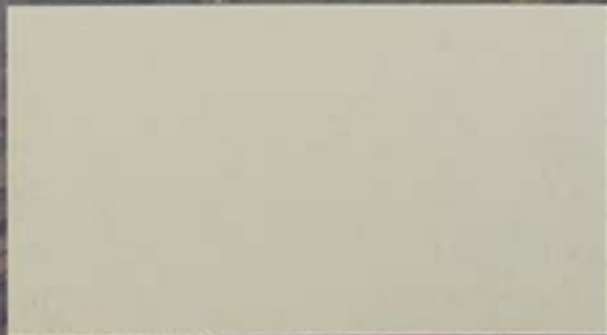
AIR FORCE

JOURNAL OF THE AIR FORCE ASSOCIATION

MAGAZINE

Fighting for Air Dominance

Redefining Airpower
Totally Educated Airmen
A Look at Ramenskoye





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LOCKHEED MARTIN**



About the cover: Capt. Michael Jokhy flies an F-15E to RAF Lakenheath, Britain. See "Fighting for Air Dominance," p. 42. USAF photo by MSgt. Lance Cheung.

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Lurching Toward a Cliff

SPEAKING to a Washington, D.C., audience on Feb. 28, Gen. T. Michael Moseley, USAF Chief of Staff, remarked that “nothing goes on in the American military [in which] the Air Force is not a primary player.” The service, he hastened to add, “is not going out of business.”

Regarding current operations, he is certainly correct. Rarely has USAF been as active or vital to US combat success as it is now.

In political terms, though, the situation is murkier. Air Force Secretary Michael W. Wynne once compared USAF to a company unable to renew its assets (i.e., aircraft), saying such a firm should be viewed as “going out of business.” For some, Wynne’s remark came forcefully to mind when they saw USAF’s latest budget.

The \$143.9 billion plan for 2009, unveiled Feb. 4, fails to address USAF’s top need—rapid recapitalization of its fleets of fighters, airlifters, and bombers after a 15-year “procurement holiday” and 17 straight years of war that have burned up aircraft at a prodigious pace.

The spending plan funds only 93 aircraft—52 of which are unmanned aerial systems. There is no new money for F-22 fighters beyond 183 already approved (the Air Force says it needs 381), or for C-17 airlifters beyond 190 already bought. Also unfunded is the new long-range bomber the Pentagon wants by 2018. The budget did contain \$900 million to start replacing old tankers—an effort now caught up in legal dispute.

With so few new aircraft in USAF’s budget—and the distinct prospect of more austerity in years ahead—worries about the fate of recapitalization have grown even more intense. Indeed, the future size of Air Force fleets has now become a subject of serious concern.

Some estimate that, given the age and retirement schedule of today’s F-15s and F-16s, the truncated size of the F-22 program, and the stretched-out production of the F-35, the fighter fleet could drop below 1,500 aircraft by 2025. The Air Force has estimated it needs 2,250 fighter-attack types.

When it comes to bombers, airlift-

ers, and tankers, the story is much the same. In the best-case scenario, the fleets for decades to come will contain large numbers of aged systems. The surprise failure of a class of aircraft would make matters worse.

In recent months, the severity of the problem has attracted widespread attention on Capitol Hill. The magnitude of the concern there is demonstrated by remarks voiced at February hearings before the House Armed Services Committee:

■ Rep. Ike Skelton (D-Mo.): “Can the force that the Air Force is budgeting for today fulfill the national military

At some point, we will have put ourselves irrevocably on course for the failure of American arms.

strategy? My review of your budget, and the full committee hearing we held on this topic last fall, suggests that the answer is ‘no.’”

■ Rep. Duncan Hunter (R-Calif.): “Decisions we make today will impact the readiness and the capability of the Air Force in the next two decades. Gentlemen, it’s clear that the budget in front of us does not meet your requirements.”

■ Rep. Ellen O. Tauscher (D-Calif.): “There’s no money to buy C-17s. ... We have a situation here where we are chasing our own tail. We are keeping C-5s online. ... We’re not procuring C-17s through the President’s budget.”

■ Rep. Jim Saxton (R-N.J.): “This base budget says, first, we need more C-17s, but we can’t pay for them. Second, we need more F-22s, but we can’t pay for them. Third, we need 76 B-52s, but we can only pay for about 40. ... We have stolen all we can from Peter, and Paul is issuing foreclosure notices.”

■ Rep. Walter Jones Jr. (R-N.C.): “[When] does the Air Force get to the point of no return? I’m not talking about giving up and closing down the Air Force, but you get to a point of no return, [where] you can’t recover what you have lost.”

These lawmakers are right to be worried. The problems began in earnest during the Clinton years, and continued during the Bush Administration. When it comes to the future of the Air Force, Washington has been lurching toward a cliff wearing a blindfold.

What we are witnessing is nothing less than the slow-motion dismantlement of the nation’s premier asymmetric military force—the Air Force. At some point, we will have put ourselves irrevocably on course for the failure of American arms in some future conflict.

In Moseley’s get-well plan, the Air Force jettisons many old airplanes. The Air Force budget proposes to retire 182 aircraft, which are inefficient, ineffective, prone to breakage, and monumentally expensive to maintain and operate.

More important, Moseley and Wynne are trying to persuade the public, Congress, and the Bush Administration to allocate to Air Force use an additional \$20 billion per year for many years to come. Most of this would go to buy new airplanes. They note that the Air Force recently delivered to Congress an \$18.75 billion “unfunded requirements list” which tracks closely to the notional \$20 billion addition. It is very much an uphill battle, however.

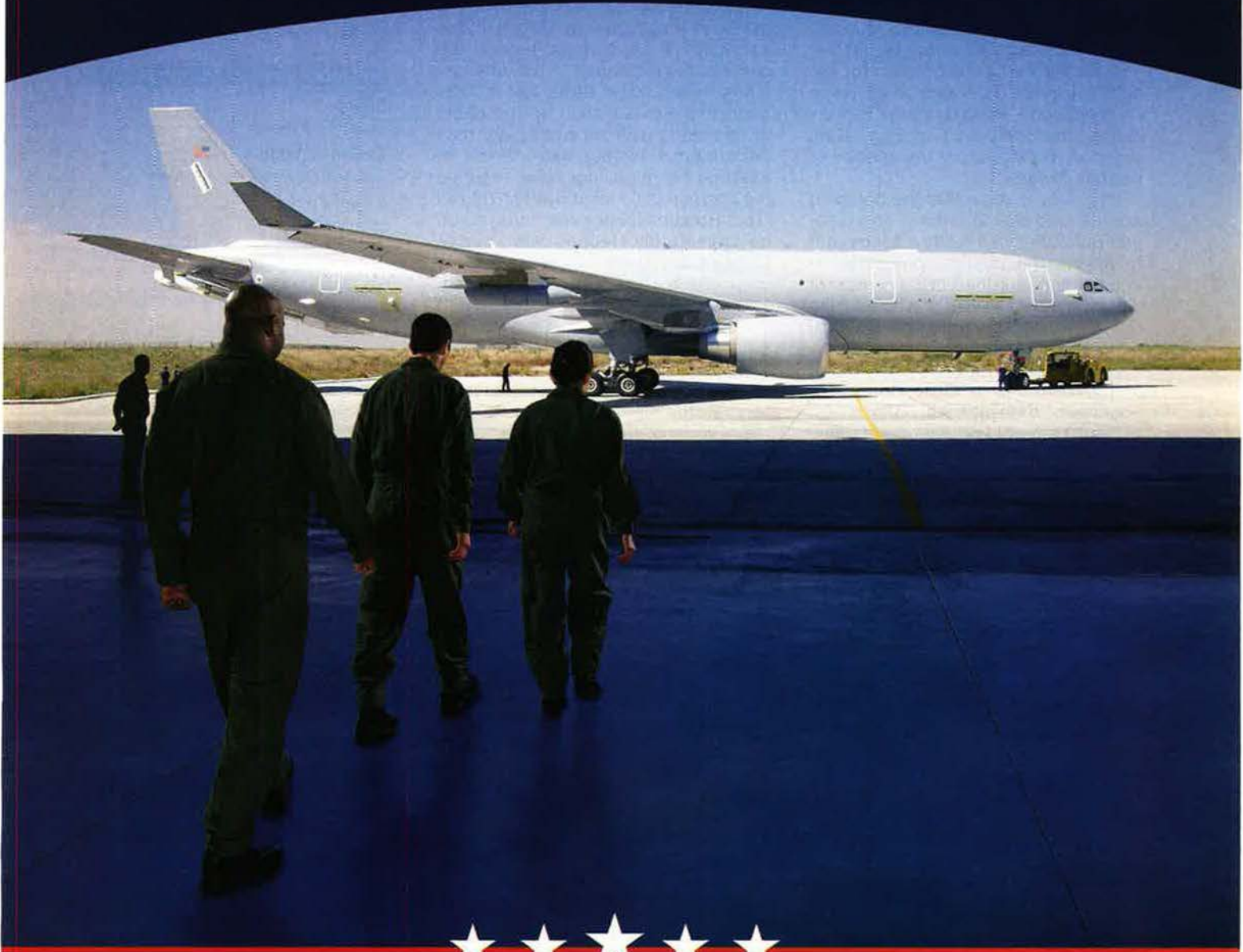
Moseley has begun to call openly for the nation to consider raising its investment in basic defense accounts to four percent of the \$15 trillion US gross domestic product, up from about 3.4 percent in 2008. That would translate into a defensewide increase of about \$90 billion, enough to cover the expenses of not only the Air Force but also the other war-weary services.

It is a decision that likely will be confronted not by George W. Bush but by the new President who takes office next January. Indeed, the Pentagon is deferring a number of tough decisions—the F-22 and C-17 in particular—over to the next White House occupant.

We expect the debate to be long and loud, but, at bottom, the problem is simplicity itself, and it can’t be avoided. As Moseley puts it, “If you don’t build satellites and airplanes, you don’t have an Air Force.” ■

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AMERICA'S TANKER

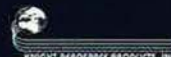


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Vindication and Vengeance

I want to commend Robert S. Dudley, editor in chief of *Air Force Magazine*, and the Air Force Association for the editorial in the February 2008 issue [*"Vindication + Vengeance," p. 2*] heralding the vindication of Brig. Gen. Terry J. Schwalier in the matter of Khobar Towers.

It is clear to most that the bombing was caused by the enemy, and General Schwalier was made a scapegoat to relieve the political pressures in Washington. Just think of the number of junior officers and NCOs who learned the wrong lesson from this political firing of a commander.

Another story here, though, is that of the courage of Gen. Ronald R. Fogleman, then our Air Force Chief of Staff. General Fogleman and many others attempted to buck the tide and defend the commander who was on the scene.

The eventual outcome was the resignation (early retirement) of General Fogleman. I can only imagine the amount of moral courage this act took—yet he did the right thing by taking care of his people and supporting his commander in the field.

As I recall my military history, this was the first time a Chief of any service resigned over a moral issue. In fact, General Fogleman may be the first four-star in the history of our nation to resign over any moral issue.

General Fogleman's act of moral courage needs to be documented and taught to generations that follow. It needs to be part of the military academies' lesson plans, in ROTC manuals, discussed at NCO academies, and taught by you and me to those whom we mentor.

Brig. Gen. Philip M. Drew,
USAF (Ret.)
Bethany Beach, Del.

The Air Force Association and retired Gen. John A. Shaud are [to be] commended for the total support of Maj. Gen. Terry J. Schwalier during the past 11 years. The Khobar Towers bombing was a terrible terrorist act, but for Defense Secretary William J. Cohen to bow down to a Capitol Hill lynch mob and make Schwalier the scapegoat was deplorable. The injustice has been corrected as far as it goes, now that Schwalier has been promoted to

major general, but was he paid the grade of major general during those 11 years? If so, it would help in the cost he has expended in his defense. If not, he should be, as he also lost the opportunity to advance up the chain of command with his exemplary duty performance to that date. Who's to say that he might not have reached the position of Chief of Staff as retired Gen. Ronald R. Fogleman had, when he prematurely stepped down due to Cohen's decision?

Col. Jack C. Bond,
USAF (Ret.)
Beeville, Tex.

The Reformers

I enjoyed the article about the "military reform" movement [*"The Reformers," February, p. 40*]. In the early 1980s, I requested a copy of the "Defense Facts of Life" by Chuck Spinney from the Department of Defense. One afternoon I received a phone call from Mr. Spinney asking about my interest in his paper. I enjoyed the short conversation that ranged from the pros and cons of the Sherman tank to my interest in military matters and the reform movement.

On the reform movement's positive side, we must include Colonel Boyd's energy-maneuverability and OODA loop theories. The participation of the "fighter mafia" in the development of the F-16 program worked to a point. The movement raised issues in the public forum that needed to be discussed in the post-Vietnam-Carter Malaise-Cold War era. This nation was on the verge of heavily investing in modernizing the military. How the billions of dollars

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were going to be spent needed to be addressed.

In the late 1970s, the movement brought to the public's attention many problems with the post-Vietnam War military. The conventional defense of Europe was provided by a "hollow" army. The reinforcement and supply of USAREUR, REFORGER, would have failed in the event of war. The military was having problems, as demonstrated by the failed Iranian hostage raid and the relatively poor showing during the Grenada and Panama operations. The nation needed to decide on the type of military it needed and could afford. The reform movement helped bring that debate public.

On the negative side, it is said that we prepare to fight the last war. This was one of the problems with the reform movement. The 1980s were a time of tremendous technological change. The movement focused upon the failures of 1950-60s technology and assumed these failures would not or could not be corrected. As a result of these concerns, they focused on weapon simplicity. However, the problem is not the complexity of the weapon system so much as its reliability. A simple weapon system that does not work is obviously inferior to a reliable complex system that does work.

As an example, the complex laser-computerized fire control on an M1 tank is infinitely superior to the simple Mk 1 eyeball. The laser system is a "point and shoot" system for the gunner. A manual system requires complex and time consuming mental calculations by the operator and is less accurate. As we demand more from our weapon systems, the complexity has to increase. It's finding a balance between capability, cost, and ease of use that is difficult. If simplicity were the sole criteria we'd still be throwing rocks and sticks at each other.

While the reform movement focused on equipment, another issue often missed was the importance of proper strategy, tactics, and training. In Vietnam, our poor air-to-air kill ratios were more the result of poor strategy, tactics, and training than due to equipment. Certain reformers still criticize the F-4 Phantom. In Air Force use, the F-4 obtained a two-to-one (plus or minus) kill ratio over Vietnam. The Navy, after instituting air combat training, obtained a 12-to-one ratio during the bombing resumption in the 1970s.

The F-86, beloved by the reformers, obtained a 10-to-one kill ratio in Korea. This was because of the quality of American fighter pilots. When Soviet pilots flying MiG-15s were fighting over Korea, the Soviet pilots obtained a two-to-one kill ratio. They, too, were World War II veterans. Chuck Yeager

wrote that he could outfly other pilots in either the F-86 or the MiG-15. As Chuck Yeager says, "It's the man, not the machine."

However, the best trained pilot or crew will be defeated if their weapons are not competitive. It's like taking the sailing frigate USS *Constitution* to sea and engaging the battleship USS *Missouri*. There may be a circumstance where USS *Constitution* could emerge victorious, but place your bet on USS *Missouri*.

The reform movement was not always

right. In fact, it was wrong about a number of issues. The defense debate did not resolve itself as the reform movement wanted. But the movement forced the issues into the halls of Congress and into the public awareness. That is a positive thing.

Steven Moreland
Boulder, Colo.

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Letters

a more relevant, flexible, and modern military force.

Now let us consider the force we have acquired without the benefit of the healthy debate triggered by the likes of John Boyd, Pierre Sprey, Chuck Spinney, Tom Christie, Bill Lind, and others.

The Air Force's strategic bomber acquisitions, the *raison d'être* for an independent air service, have shrunk, from over 800 B-52s built to just 20 B-2s. To argue that B-2s proved their worth in the air campaign against Serbia is specious. The satellite guided ordnance they dropped after flying from their hermetically sealed hangars in the States could have been delivered by any number of different airplanes.

The C-17 is the hermaphrodite of transports, too small to be an efficient strategic airlifter like the C-5, and too large to be a good tactical airlifter, like the C-130.

The centerpiece of the Air Force's current modernization, the F-22 fighter, costs over \$6,000 a pound at its empty weight of 50,800 pounds. I remember when tactical jets cost around \$1,000 to \$2,000 a pound, and that price was considered wildly excessive for what the Air Force and Navy were getting in the F-15 and the F-18.

The F-22 is a big airplane, primarily to push its impressive radar through the sky and achieve supersonic cruise with two engines. The F-22 supposedly is near-invisible to enemy radar, through a mixture of skin treatments and various electronic "black boxes." I remember Boyd arguing that such "stealthiness" starts with small size—not only as camouflage against enemy radars, but visually as well.

Spinney argued back when the F-22 was the ATF (Advanced Tactical Fighter) that the Air Force should tread carefully in the face of huge cost and performance unknowns in its quest for 750 of the airplanes.

Now the Air Force will count itself as fortunate if it procures 300 F-22s. That will not be sufficient to stave off a further decline in the number of tactical fighter wings, not to mention that the costs to maintain and operate the airplane could prove staggering. For example, the F-22 was not designed based on "lessons learned" with the F-15's electrical wiring. How all the black boxes and wiring so integral to the F-22's performance promises will be maintained at reasonable cost and effort is problematic.

The Air Force desperately needs a successful manned aircraft program to preserve not only its relevance but its independence. Tactical drones, after all, can be operated just as well by the Army.

Then again, the Army has enormous problems of its own. It hopes to cut down on the size of its armored vehicles, compensating with advanced communication and display systems intended to give tactical units a better appreciation for the battlefield. This "system of systems" will feature a number of lines of computer code that approximates the nation's air traffic control system. This is madness in an expeditionary combat system far removed from depot-level maintenance.

Meanwhile, Army soldiers are armed with the 40-year-old M-16, which fires a .22-caliber bullet that has not had the striking power (as expected) to reliably "knock down" insurgents in Iraq. Having used the M-16 in Vietnam, I can only say that a weapon featuring a little spring-loaded door on the side to keep the dirt out was not designed with the reality of combat conditions in mind.

In such things as trucks, the Army and the marines are pricing themselves out of business. Both services use five-ton payload trucks, and both services are paying about three times more per truck than they did back in the Vietnam era. One would hope that the marginal extra features were thoroughly assessed as worth the added cost, but I doubt it.

The Navy remains wedded to big carriers, warships, and nuclear submarines, although its strategy has shifted from a "blue water" face-off with the Soviets to "brown water" confrontations in the world's littorals against speed-boats. The Navy is now hoping to buy a 14,000-ton destroyer, the DDG-1000. I remember when a destroyer displaced 3,500 tons and carried an impressive array of sensors and weapons.

All of these big-ticket programs are in the Pentagon's Five-Year Defense Plan. As an analyst in the Office of the Secretary of Defense, Chuck Spinney produced two seminal studies, "Defense Facts of Life" and "The Plans-Reality Mismatch," that documented the services' tendency to lowball the cost to buy and operate the next generation of weapons. And he quantified the behavior when these plans came unraveled, as they inevitably did: The services bought fewer weapons at higher price, and they shrank the force structure.

Now it's fair to ask, is \$650 billion in 2008 reasonable for a 10-fighter-wing Air Force, a shrunken Army of more brigades than divisions, and a Navy of fewer than 300 ships? I think not.

And are these forces as presently constituted appropriate for the post-Cold War era? Again, I think not. For just one example, why does the Navy need any supercarriers?

It is time for some fresh thinking, not

added spending, to negotiate the new tasks and the fiscal realities facing the armed forces. Precious few officers or civilian officials reflect the acumen to think through these problems, but these individuals should be sought out, not suppressed or vilified.

Lt. Col. David Evans,
USMC (Ret.)
Middleburg, Va.

The Reformers weren't paying attention to AIMVAL/ACEVAL's main conclusion: Dogfights should be avoided. In the four-on-four "Towering Inferno," all eight opposing aircraft were shot down in less than two minutes.

Since then, AWACS-type planes have made dogfighting even more obsolete. However, that may change as stealthier fighters encounter each other. The ranges will shorten again due to sensor limitations on air-to-air missiles. The missiles' small diameter sensors won't be able to lock on to stealthy aircraft at long ranges.

Paul J. Madden
Seatac, Wash.

Correll states (p. 42) that AIMVAL/ACEVAL's "Red Force" consisted of "F-5Es from the Red Flag Aggressor force." It's true, the AIMVAL/ACEVAL Red Force F-5Es were from the Nellis-based Aggressors; however, neither TAC's Nellis based F-5E Aggressors nor the PACAF or USAF F-5Es belonged to Red Flag or any of the exercise organizations in the other theatres. The Aggressors were formed in 1972, and, by 1978, consisted of four squadrons. Each was an independent squadron—part of its parent wing. And it wasn't until 1990, after post Cold War drawdown requirements had necessitated closure of all the Aggressor squadrons, that Red Flag possessed their own "Red Force" aircraft, a small remnant of the 64th Aggressor squadron. (Note: The 64th and the 65th have since been resurrected and are now equipped with F-16s and F-15s, respectively. And they are, again, separate organizations from Red Flag.)

Col. Mike Scott,
USAF (Ret.)
Henderson, Nev.

The Long Arm of the USSBS

Rebecca Grant's valuable article on the US Strategic Bombing Survey [*"The Long Arm of the US Strategic Bombing Survey," February 2008, p. 64*] states: "Nitze was too late. The Pacific war survey, with its hedging about atomic attacks, had already given critics the leverage they needed."

I had the privilege of having lunch with Paul Nitze and two mutual friends (and occasionally a guest or two) several

times per year from the early 1980s until shortly before his death in 2004. At a couple of those lunches, we discussed the Strategic Bombing Survey and Japan's readiness to surrender.

Nitze explained that he and only one other member of the Pacific Strategic Bombing Survey had the clearances for seeing the highly classified intercepts of Japanese communications, from Imperial Headquarters to field commands, and from the government to embassies in Moscow and neutral European countries. Those intercepts—which are now available at the National Archives—demonstrate conclusively that the Japanese leaders intended to fight to the "last man." They planned to resist US invasions of the home islands, which they knew were being planned, and, if that resistance failed to bring about favorable negotiations, to continue the fighting in the cities and then in the hills of the main island of Honshu. (Some of these intercepts are quoted in the book *Codename Downfall* by Thomas B. Allen and myself.)

He could not share those intercepts with his colleagues on the survey because of their classification, hence they did not influence the findings.

The air assault on Japan had not forced the six men running Japan—the Supreme Council for the Direction of the War—to consider surrender; what

did was the two atomic bombs and President Truman's threat of "a rain of ruin from the air" by such weapons.

Norman Polmar
Alexandria, Va.

I'd like to put a little more meat on Rebecca Grant's insightful comment regarding the US Strategic Bombing Survey (USSBS), that "few documents can boast its staying power." In the fall of 1991, the Air Staff's director of warfighting, Col. John Warden, tasked me to "refight the combined bomber offensive with stealth and PGMs." In the immediate aftermath of the Gulf War, we were working hard to grasp and express more fully the tremendous impact that those newly matured capabilities could have on American war making. After a little discussion, Colonel Warden and I decided that my task would be to study the results of specific bombing strikes in the European Theater in World War II, to see if stealthy fighters and precision bombs would have altered the pace and/or effectiveness of the campaign significantly. Since those capabilities practically equated to a 100 percent probability of target penetration by each aircraft and a 100 percent probability that individual weapons would strike their targets, I set out to see if the targets struck at the time offered "vital components vulnerable to aerial attack"

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that, if destroyed, would have shut down the target facility as effectively as they were shut down in the actual event by Eighth Air Force mass raids. As it turned out, the meticulous and exquisitely detailed work of the survey made my job unexpectedly easy. For almost every facility surveyed, USSBS teams had plotted every significant and many insignificant bomb strikes within the target area. Moreover, the teams described the effects that particularly important bomb strikes had on the functionality and productivity of the overall facility. From my re-examination of about 40 targets, I was able to report to Colonel Warden that "a single precision strike against any target ... would likely have degraded its immediate production to the same extent accomplished by the actual mass bomber raids."

From that finding, I concluded, "something like a squadron of F-117s could have replaced the entire Eighth Air Force between 1942 and 1945, ... [and] the material effects of the actual CBO on the German war economy could have been replicated by that same force in just a few weeks." Even among we true believers on the Air Staff, the idea that 24 F-117s and couple of hundred airmen could replicate the work of almost 300,000 of our predecessors was sobering proof of the new role

Letters

that conventional airpower would play in modern warfare. That, in turn, was an insight made possible only by the careful and courageous work of the USSBS teams.

Robert C. Owen
Daytona Beach, Fla.

Note that General Hap Arnold emphasized: The Japanese surrender was brought about "because air attacks, both actual and potential, had made possible the destruction of their capability and will for further resistance." These attacks had as their primary goal the defeat of Japan without invasion. Japan had been on the ropes before the dropping of atomic bombs which, according to Arnold, provided the emperor "a way out to save face."

The surrender of Japan, Arnold wrote, "comes after the severest and most concentrated bombing campaign in history and without actual invasion of the homeland. Thus it is the first time a nation has capitulated with its major armies designed for defense of the homeland still intact."

Herman S. Wolk
Rockville, Md.

Tet Follow-up

[Regarding "Tet," January, p. 50] I think the comment that "it is impossible to say what the effect of the slanted news reporting might have been" is itself slanted. To me, it indicates that the problem was with the news reporting and not what actually happened and was communicated by the military. Few will disagree that Tet was not a military victory for the Viet Cong. However, it reinforced, one more time, that the combined US and Vietnamese militaries were not prepared. To me, there are numerous parallels with our current involvement in Iraq in [that] you don't win an occupation or internal strife with military strength. It's too bad, in my opinion, that national leaders have not learned this from past involvements.

Col. Thom Weddle,
USAFR (Ret.)
Minneapolis

Classics—F-104 Starfighter

I was a captain in the 476th TFS in the 476th TFW at George AFB, Calif., from 1961 to 1965. I accumulated about 1,000 hours in this wonderful flying machine ["Airpower Classics: F-104 Starfighter," February, p. 88]. I was in the first flight of the first squadron of F-104s to deploy to Da Nang, Vietnam. Mr. Boyne's article states, "Truth to tell, F-104s were never a significant factor in combat."

The other side of the story that is very common to hear from F-104 pilots is that we were perhaps consciously, by design, never assigned missions that would allow anything but accidental encounters with MiGs. I was No. 3 in a flight of four led by Maj. Walt Irwin, assigned to orbit 30 miles south of Hanoi, on around May 20, 1965, to protect a bombing mission going on up at Dien Bien Phu. We encountered a single MiG going in the exact opposite direction. The MiG pilot jettisoned all his external tanks and disappeared before we could engage.

The next day we received a message from Saigon stating, "Any more breaches of discipline of this nature will be met with severe repercussions." I asked Walt what this was about, and he told me they were warning us that we had breached discipline because we flew out of our orbit area to check out the approaching bogey. I pointed out to Walt that we would have gotten shot down if we had turned at the end of our orbit area. He replied, "I know, but what can one do in a chicken---- outfit like this?" The F-104 was a superior airplane. It was very easy to fly, much easier than the F-100 in which I have 800 hours. I participated in the Cuban Missile Crisis and flew John Boyd's Energy-Maneuverability profiles for him at Eglin AFB, Fla. I also had the privilege of sitting in the front seat of an F-100F with Major Boyd in the back seat as he demonstrated, twice, his "40 second" maneuver. Flying the F-104 was a great experience and privilege.

George Wells
Hendersonville, N.C.

This is an additional note to your "Airpower Classics" story on the F-104 Starfighter:

USAF also deployed some to Taoyuan AB, Taiwan, during the Second Taiwan Strait Crisis in 1958. The wings were detached and they were airlifted over in MATS C-124s.

Lt. Col. Ron Janow,
USAF (Ret.)
San Antonio

Rex Replay

[Regarding "Rex Replay," December, p. 58]: You should have mentioned the Busy Observer missions of the Cold War. These were 30-hour flights out of Maine, to the equator, then east to the coast of Africa, then north to the Arctic Circle, and then west-southwest in hunt of an uncooperative Cold War enemy vessel. Each mission sent out two B-52s—one high and one low. At launch, we were provided the shape

and electronic signature of the vessel we were looking for and told to limit our search to the North Atlantic, north of the equator. The mission would end with the low B-52 flying just above ship antennae level with bomb bay doors closed, taking pictures. One pass and then head to home base. Some of our missions were not always the smoothest. Ours was a somewhat prehistoric mission when compared to the superbly equipped and prepared Barksdale teams of today.

Col. Steven E. Cady,
USAF (Ret.)
San Antonio

Wheelus, Idris, and Me

I note with interest your January 2008 article about Wheelus Air Base in Tripoli. I visited Libya, as a civilian, in 1956; my family was in business there until the mid-60s. During the '70s, when I served as Secretary of the Air Force, I talked at length with Gen. "Chappie" James about his days at Wheelus. In more recent years, when I became an author, I sorted through the evidence of what happened in Libya after Qaddafi came to power.

First of all, King Idris was not forced on the Libyan people. He did more than side with Britain during World War II; he killed a lot of Italians, which endeared him to his peers. True, the Brits installed Idris after war's end, but his rule was then legitimized by plebiscite. In 1964, at age 74, King Idris tried to abdicate for reasons of health, but he had no children. His only heir was a nephew, Hassan al-Reda—a scoundrel known as the "Black Prince." An Idris abdication was unacceptable to the people of Libya. During the '50s and '60s, he ruled his impoverished kingdom with a kindly and welcome hand. Idris al-Senousi was not an unpopular figure, as your story claims.

Secondly, in the late summer of 1969, Idris was visiting a spa in Bursa, Turkey, for treatment of a leg ailment. He was not in Greece, as your story claims. (There is a big difference to Muslim travelers.) On Sept. 1, with Idris out of the country, Captain Qaddafi and a handful of junior officers staged their coup. Then-Colonel James, the commander at Wheelus at the time, understood the dangers. He proposed to use his overwhelming security forces to remove Qaddafi and to restore Idris' authority. Colonel James so advised the NMCC, who contacted the White House, who denied the authority to move. In later conversations with me, Kissinger tried to blame staffers at the State Department. He said, "Some saw Qaddafi as a Gandhi-like reformer." Then later, he said that he and Nixon considered Qaddafi's coup to be an "internal Libyan matter." The hard fact

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is Kissinger and Nixon were new to office, having been in power for only seven months. They apparently lacked the nerve to act.

In April 1986, as you note, the Reagan Administration attacked Tripoli and Benghazi in retaliation for Libyan terrorist activities in Berlin, but Operation El Dorado Canyon did not have a "sobering effect" on Qaddafi. He did not "reduce his actual use of violence," he simply turned his attention to more lethal weapons. In the autumn of 1986, in the aftermath of the El Dorado Canyon raids, Qaddafi began communicating with European nuclear suppliers, most of whom were hucksters. By 1989, however, he had fallen under the spell of A.Q. Khan. A hundred million dollars changed hands. By 1997, uranium centrifuge parts were arriving in Libya; in 2001, an actual weapon design was delivered. The bottom line: One must be careful when confronting or attacking oil-rich Arab rulers; one must not assume that because they are quiet they are happy.

Lastly, in 2003, Qaddafi did not simply "opt for better relations" with the West. The removal of the Taliban from Afghanistan in December 2002, followed by the equally rapid defeat of an alleged WMD producer in Iraq a few months later, got Qaddafi's attention. Good intelligence work, by CIA and Britain's MI-5, caught

him red-handed during October 2003. He was attempting to import illicit nuclear hardware into Tripoli aboard *BBC China*. It was only then, faced with hard choices, that Qaddafi decided to fold his nuclear hand. He continues to host Venezuela's virulently anti-American Hugo Chavez at his desert compound, but the younger generation within Libya may be coming to the fore.

The Libyan story is fascinating, and it is not yet over. Be sure to get it right.

Thomas C. Reed
Alexandria, Va.

■ *My sources were for the most part from official Air Force records of the period, and had no political bias whatsoever. My comments on King Idris, in fact, were generally much kinder than those to be found in various histories of the period.*

I believe there is also general agreement that Qaddafi was shaken by the 1986 El Dorado Canyon operation and that he was subsequently deterred from sponsoring further terrorist attacks.

I will respectfully stand by the article as written, but am glad to have Secretary Reed's input. It is difficult for those outside the inner counsels of government to evaluate, for example, just how sophisticated the views of President Nixon or Secretary Kissinger were at that time.

—Walter J. Boyne

Way down in the hole; Raptor sleight of hand; Retrenching on RERP

Requirements, Not "Wishes"

The Air Force has been warning for some time that its budgets, year after year, are falling short of actual need by \$20 billion. It looks like Fiscal 2009 will be no exception.

In February, USAF sent to Capitol Hill its "unfunded requirements" list for Fiscal 2009, which begins next Oct. 1. The list totals up to \$18.75 billion.

The Air Force document provides a line-by-line description of where and how it would spend that amount, should Congress be inclined to provide it. The other services submitted similar requests.

Such documents have become a tradition in the budget process, as Congress usually asks service Chiefs what they would spend "one more dollar" on, in order of preference, if it were authorized. The documents have become known as annual "wish lists," implying that the items on them were nice to have, not need to have, in nature.

The Air Force's request exceeded that of any other service. The Army and Marine Corps each requested less than \$5 billion on their lineups.

On USAF's list:

- \$4 billion for 15 C-17 airlifters.
- \$1 billion for four F-22 fighters and long-lead materials for another 20 or so.
- \$800 million for five F-35 fighters.
- \$600 million for Global Hawk unmanned aerial vehicles.
- \$275 million for A-10 engine upgrades.

On top of this, USAF seeks money for various classified projects, improved sidearms, maintenance for vehicles, retention bonuses, dorm furniture, and so forth.

The characterization of the request has changed, too. It used to be called the "Unfunded Priorities List," but many of the items on it are now well beyond priorities and are simply basic necessities, USAF Chief of Staff Gen. T. Michael Moseley told defense reporters in February.

Moseley pointed out that some items, such as funds to implement changes in how USAF handles and stores nuclear weapons, are things USAF has been ordered to do, without the money to do it. In fact, the No. 1 item on the list was \$183 million for nuclear weapons handling improvements.

Last year, the list totaled about \$17 billion.

"This year, it's about \$18 billion, and it shouldn't be lost on you ... that we've said over and over and over again that our deficit is about a \$20 billion bogey," Moseley pointed out.

"It's not a wish list," he repeated several times.

Three needs pervade the Unfunded Requirements List. One is to provide replacement aircraft for those either lost or "burned up" in 17 consecutive years of combat operations. Another is to provide logistics support, spare parts, and other measures to keep an aged fleet flying. A third is to deal with new threats not adequately addressed in the baseline budget.

The 29th item on the list was \$1.1 billion to fund contractor logistics support to 95 percent of where the Air Force needs it to be, in order to reduce the workload on "already stressed blue suit maintainers."

Another item proposed spending \$368 million to allow USAF to cut its energy consumption by three percent annually.

For \$438 million, the Air Force would be able to give its "heavy" aircraft crews—cargo, tanker, and surveillance types—warning of shoulder-fired missiles.

Maj. Gen. Paul J. Selva, USAF's strategic planning director, told the Associated Press in February that \$20 billion a year of additional procurement funding is needed every year for at least five years, over and above the planned baseline budget.

The money is necessary, said Selva, to avoid driving what is "already a geriatric Air Force ... another 20 years into an era of uncertainty."

On the Razor's Edge

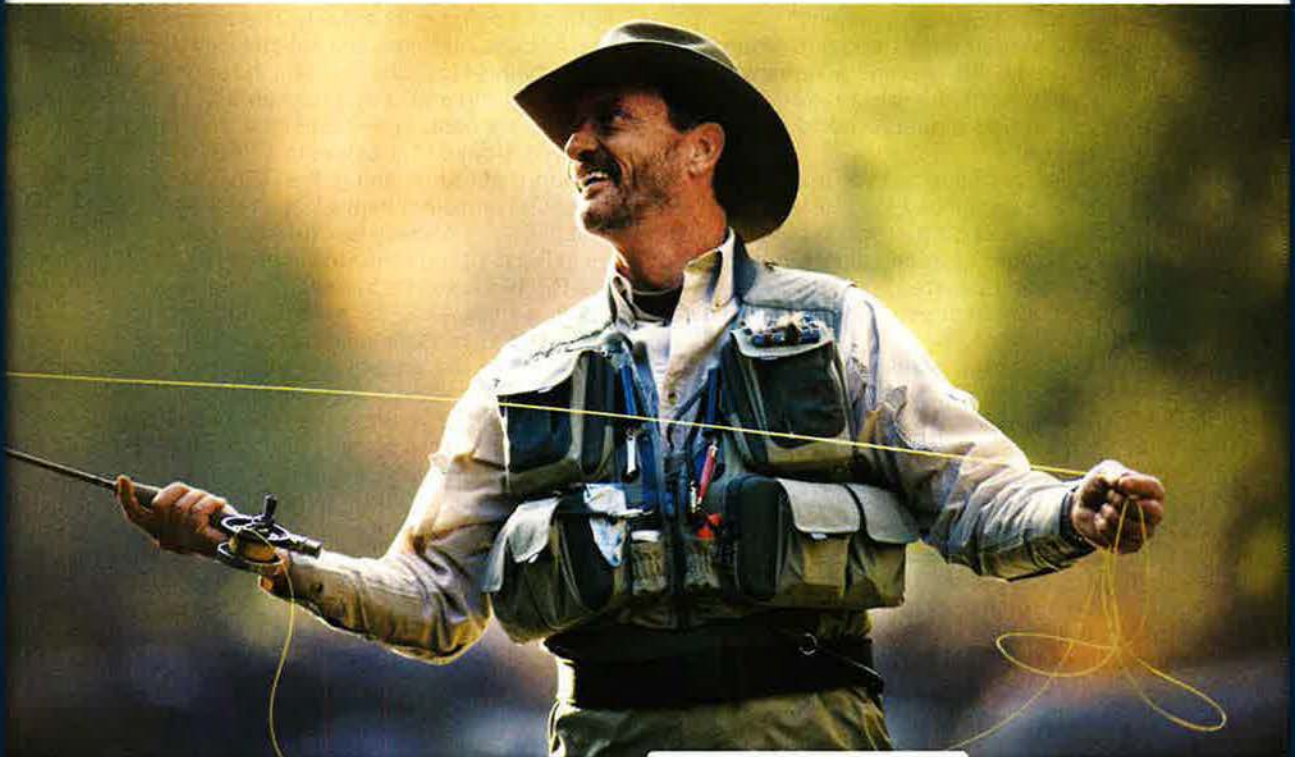
Even if the Air Force gets an additional four F-22s in the next supplemental budget request—raising the total to 187—the Raptor line will still be in grave danger.



USAF Photo by Almer Gauzman

USAF wants 15 more C-17s.

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Approval of four more Raptors would extend the production line only from November 2008 to February 2009. Thus, a new Administration, taking office on Jan. 20, 2009, would have a few days at most to decide to continue the fighter project.

Defense Secretary Robert M. Gates has said it is likely he will cede the four additional fighters, so as to allow the new President to decide the fate of the program, but the margin would be razor thin.

Larry Lawson, general manager for the F-22 at Lockheed Martin, said in an interview that work for the longest-lead F-22 vendors—those that supply titanium and aluminum, avionics, and large-scale forgings and castings—will start drying up this fall, around November. Without more orders before then, they will close down production.

Given the way that Gates and his deputy, Gordon England, have dealt the cards, the incoming Administration won't even have time to consider the matter, let alone rush an emergency spending measure up to Capitol Hill to prevent work stoppage.

The current Congress will have to take matters into its own hands and add a number of F-22s to the defense budget in Fiscal 2009 to head off a break in production. If that doesn't happen, though, Lawson said it's hard to see how the F-22 line could be restarted.

"Once you close this door, it doesn't come back; it's not recoverable," he said.

Mothballing the F-22 tooling wouldn't do much good, Lawson said, since the workforce needed to build the F-22—about 25,000 people who work "directly" on parts for the airplane, or in assembly—will scatter off to other jobs.

Lawson called it "pragmatically impossible" to get those workers back even after just a few weeks. Meanwhile, it would be too expensive to keep them on the payroll, hanging around, or building only a few airplanes a year, because the cost of overhead would blast the unit cost of the fighter through the roof.

Lawson offered the analogy of fixed costs on a car loan as being similar to the overhead dilemma.

"The payments on the car are the same, whether you have one person riding in it or six," Lawson said. For that reason, he'd like to see Congress add another year to the multiyear production deal, under which the company has been building 20 F-22s annually. That's about the minimum number needed to build the fighter economically, Lawson said. At 24 a year—the rate of delivery before the multiyear—the F-22s would be less costly each, because overhead is spread out over more units.

Gen. Ronald E. Keys, at the time head of Air Combat Command, said that cutting off F-22 production at 183 aircraft meant the service would be eliminating "the cheapest ones," since the cost of developing the aircraft and setting up the factory has now been amortized and the learning curve has risen dramatically.

Lawson said he has delivered 12 flawless airplanes—those the Air Force has accepted as having zero defects. The F-22 has also performed beyond USAF's expectations in wargames, delivering vastly lopsided victories. A USAF official said after recent exercises between the F-22 and the Navy's F/A-18s that the sea service said it wasn't inclined to participate again, "just to be slaughtered."

If the line closes, bringing the workers back and getting them retrained and recertified for the work would cost billions of dollars. A Pentagon official said that it costs more than \$300,000 and many months just to complete a security clearance for just one worker in highly classified projects such as the F-22.

The Bush Administration has left the F-22 in a kind of limbo. While it budgeted no money for long-lead funding

in the 2009 budget request, neither did it request funds to shut down the line. If more orders don't materialize, "the Air Force will get hit with those shutdown costs without any money to pay for it," a senior USAF official said.

Do the Jumbo Limbo

A DOD decision against fully rehabilitating the entire C-5 Galaxy fleet hasn't done much to resolve major strategic mobility questions that have dogged the Air Force for years. In fact, it has set the stage for what could be another round of haphazard acquisition of big airlifters.

John J. Young Jr., the Pentagon's acquisition chief, decided in mid-February that the C-5 Reliability Enhancement and Re-Engining program, or RERP, was too expensive and not worth doing in its entirety. The program's cost was soaring, and the Air Force last fall officially declared it in breach of the Nunn-McCurdy law, which requires the Pentagon to certify as "critical" any program whose cost jumps more than 25 percent. The RERP had escalated more than 50 percent, from \$11.1 billion to \$17.5 billion.

Along with re-engining, the RERP would perform certain structural and other improvements designed to get the C-5's reliability—especially its on-time takeoff performance—up by at least 10 percent. However, after weighing the cost of the RERP versus its benefits, Young said it was only worth doing on the 47 C-5B models and its two C-5C models. (The two C models are unique in having no passenger deck above the cargo bay; they are used to move large space vehicles and other outsize gear.) The C-5Bs and Cs are many years younger than the C-5As built in the 1960s. Three aircraft have already been converted to C-5M (modified) configuration and are in test, leaving 47 C-5Bs and the two C-5Cs yet to be done.

Young said that the remainder, 59 C-5As, can get a parallel upgrade, called the Avionics Modernization Program, but not the RERP. The RERP is now a \$7.7 billion program. The Air Force will retain all 111 C-5s of all models.

Air Force Chief of Staff Gen. T. Michael Moseley told defense reporters in February that the outcome of Young's review closely matched what the Air Force wanted to do "all along."

However, in a letter to members of Congress who have staked positions on the airlift debate, Young wrote that in reviewing the RERP, he considered the option of buying more C-17s instead, and ruled it out.

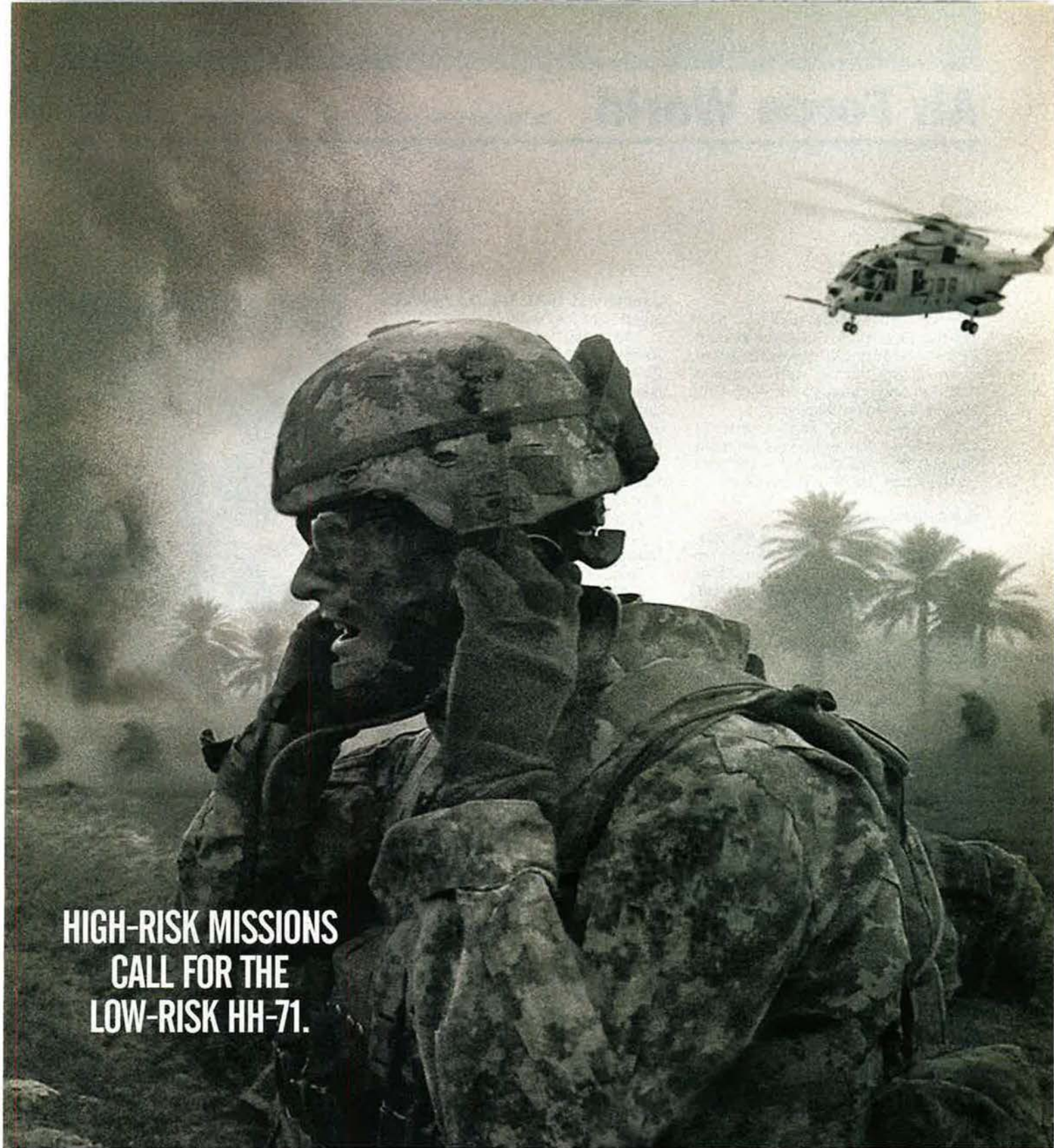
The Pentagon "rejected those options as not meeting requirements and more costly for the taxpayer," he said, adding that buying more C-17s is "unaffordable" in the Pentagon's long-term spending plan.

The Pentagon and Congress have been wrestling over whether it's more cost-effective to perform the C-5 upgrade or simply let the Galaxys age out and replace them with brand-new C-17s. The C-17s aren't as large as the C-5, but have compiled an exemplary record of reliability.

By law, the Air Force can't retire any C-5s until the three C-5Ms in test have had a chance to show what they can do. However, the C-17 production line has been dancing on the edge of closure. Boeing has spent its own money keeping it going, and Congress moved to add 10 more C-17s to the Air Force budget last year.

This year, the Air Force requested no money for C-17 shutdown, but then put a buy of 15 of the heavy lifters near the top of its Unfunded Priorities List, sent up to Congress not long after it presented its C-17-less baseline budget (see item above).

Rep. John P. Murtha (D-Pa.), chair of the House Appropriations defense subcommittee, said he would push to get at least 14 C-17s in the Air Force budget for 2009. Such a buy would cost \$3.9 billion and push the C-17 inventory out to 204 airplanes. ■



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F-15 Pilot Killed

First Lt. Ali Jivanjee, an F-15C pilot with the 58th Fighter Squadron at Eglin AFB, Fla., died due to injuries sustained in an aircraft mishap with a second F-15C during a training sortie on Feb. 20 over the Gulf of Mexico.

The pilot of the second aircraft survived, but his name was withheld pending the completion of the accident investigation, USAF officials said.

B-2 Crashes at Guam

A B-2A bomber, *Spirit of Kansas*, from the 509th Bomb Wing at Whiteman AFB, Mo., crashed on Feb. 23 just after taking off from Andersen AFB, Guam. The two pilots ejected safely, but one of them suffered a spinal compression and required medical attention, Air Force officials said.

This was the first-ever crash of the stealth bomber, which entered USAF's

inventory in 1993. The B-2 fleet now stands at 20 aircraft.

The crash took place as *Spirit of Kansas*, along with three other B-2s from Whiteman, were leaving the island for home after a four-month deployment. They had been on Guam since mid-October 2007 as part of the now-standard rotation of USAF's B-1B, B-2A, and B-52H bombers to the Pacific region to maintain a continual presence there as a means of dissuading aggression.

Moseley: F-22, F-35 Are High, Low

Despite comments from top Pentagon officials that the F-22 and F-35 are comparable—even interchangeable—they are not, Air Force Chief of Staff Gen. T. Michael Moseley told defense reporters Feb. 28 in Washington.

The best analogy, he said, is to think of the F-22 and F-35 as being akin to

Air Force Picks Northrop Grumman in KC-X Contest

The Air Force Feb. 29 crowned the Northrop Grumman-EADS North America KC-30 aircraft design the winner over Boeing's KC-767 in the multi-billion-dollar KC-X tanker recapitalization contest.

Northrop Grumman, teamed with European aircraft-maker EADS, was selected to supply up to 179 new multirole tanker aircraft to be assembled in Mobile, Ala., to replace the oldest of the service's Eisenhower-era KC-135 tankers. USAF now designates the tanker, which is based on the Airbus A330 airframe, the KC-45A.

The company won a \$1.5 billion contract for KC-X system development and demonstration. The SDD phase includes the manufacture of four test aircraft and also includes options for five production lots, together worth \$10.6 billion, for 64 airplanes, the Air Force said. Overall, the KC-X program has an estimated value of \$35 billion over the next 15 years or so for all 179 airplanes in 13 production lots.

"We had two very competitive offers," Air Force acquisition executive Sue C. Payton said during the press briefing announcing the decision. "Northrop Grumman clearly provided the best value to the government."

Air Mobility Command boss Gen. Arthur J. Lichte said he hopes to see the first aircraft in test beginning in 2010, followed by initial operational capability around 2013.

The Air Force said it could not provide additional information on the proposals until it had given Boeing a detailed debriefing, which took place March 7. Service officials said USAF did its best to run its KC-X tanker competition as openly and transparently as possible in the hopes of avoiding a long, drawn-out protest by the losing offeror.

Boeing announced on March 11 that it would protest the award. A protest was anticipated in any case: The winner may have the inside track on replacing some 500 KC-135s in the fleet under work valued at around \$100 billion.



USAF photo by MSgt. Andy Dunaway

the F-15 and F-16, which pioneered the high-low mix 25 years ago.

"I believe the two airplanes are complementary," said the Chief of Staff. "I believe the two airplanes are required."

The F-22, he went on, "is designed for a specific task," while the F-35 "is designed for a more general task. But together they provide the capability

needed for the theater commander."

Both stealthy fifth generation airplanes provide capability "to survive the new integrated air defense systems," such as the Russian-built SA-20, Moseley said. Their stealth, he said, "is very important."

Iran is reportedly taking delivery of the SA-20, which has a 100-mile radius of engagement. It represents a

"quantum leap" in capability, making air operations "more lethal" for nonstealthy aircraft, Moseley said.

Navy Zaps Dead Satellite

A Standard Missile-3 fired from the Navy cruiser USS *Lake Erie* successfully collided with a nonfunctioning, deorbiting US intelligence satellite on Feb. 20 about 153 miles over the



★ screenshot

03.03.2008

SrA. Eugene Naece, deployed to Iraq as part of the 732nd Expeditionary Security Forces Squadron, keeps a wary eye out for bad guys as he patrols a Baghdad street. The unit engages in some of the most dangerous missions of the war. Naece and other security forces airmen regularly perform "outside the wire" patrols.

Donald S. Lopez, Pilot and Historian, 1923-2008



the command of Gen. Claire L. Chennault, Lopez scored three kills against Japanese fighters. He later wrote of his experiences in the war in a critically acclaimed memoir, *Into the Teeth of the Tiger*.

After the war, Lopez stayed with the newly minted Air Force and flew as a test pilot at Eglin Field, Fla., where he put early jet fighters through their paces. He then served a short combat tour in Korea flying the F-86. Back in the US, he served in the Pentagon, then finished his postponed undergraduate degree at the Air Force Institute of Technology and earned a master's in aeronautics from Cal Tech. He then taught at the Air Force Academy for five years, retiring from the service in 1964.

As an engineer with Bellcomm, a subsidiary of Bell Labs, Lopez worked on the Apollo and Skylab manned space programs. He left the Skylab project in 1972 to join the staff of the National Air and Space Museum. In that capacity, he was part of the team that planned and built the downtown Washington, D.C., museum.

Lopez's official NASM biography credits him as being "instrumental in developing the exhibits that welcomed visitors at the museum's opening on July 1, 1976 and that have made it the most visited museum in the world."

Serving as deputy director of the museum from 1983-90, Lopez stayed on as a senior advisor until 1993, and then as senior advisor emeritus until 1996. After significant turmoil at the NASM over the exhibition of the B-29 the *Enola Gay*, Lopez was brought back as deputy director, a position he held until his death.

Some of Lopez's flying gear as a Flying Tiger, including his leather jacket, is on display at the NASM's World War II gallery. The P-40 that hangs in the museum's annex at Dulles Airport in Virginia is painted to resemble the P-40 he flew in China, *Lopez's Hope*.

Lopez wrote two other books—one about flight testing early jet fighters, and one about the NASM. He had accrued a long list of honors and awards. Those included being made a Fellow of the Royal Aeronautical Society and an Elder Statesman of Aviation by the National Aeronautic Association.

—John A. Tirpak

Pacific Ocean, Pentagon officials said. The intercept broke the satellite into small pieces, essentially removing the threat that the satellite's tank of toxic hydrazine fuel would survive re-entry and pose a hazard if it struck near a populated area, they said.

"We have a high degree of confidence the satellite's fuel tank was destroyed and the hydrazine has been dissi-

Donald S. Lopez, an Army Air Forces Flying Tiger of World War II, engineer, test pilot, author, historian, and a longtime leader of the Smithsonian's National Air and Space Museum, died March 3. He was 84.

Lopez caught the flying bug early, hanging around the Brooklyn, N.Y., Floyd Bennett Field and cadging free rides from friendly pilots. He learned to fly in college, just as World War II broke out, and as soon as the age limit for the Aviation Cadet Program was lowered to 18, Lopez volunteered.

After winning his wings, Lopez was sent to China to join the 23rd Fighter Group, which had been formed out of the American Volunteer Group, or Flying Tigers. Flying first the shark-mouthed P-40s, and later P-51s under

Fla., that USAF personnel and space-monitoring assets were "critical and significant players" in the operation.

USAF Seeks To Halt Troop Decline

The Air Staff's new personnel chief, Lt. Gen. Richard Y. Newton III, essentially told the House Armed Services military personnel panel Feb. 26 that the service's policy of self-financing weapon system recapitalization on the backs of airmen has come to an end.

The Air Force has been on a planned downslope to reach an active end strength of 316,600 in Fiscal 2009. However, service leaders have indicated that this reduction may be too big a bite given the ongoing in-lieu-of taskings in Afghanistan and Iraq and the demands of new and emerging missions, such as supporting Africa Command, a larger ground force, USAF's own new Cyber Command, and its Quadrennial Defense Review-directed 86 combat wings, known as the Required Force.

Indeed to prevent "a critical capability gap," USAF asks for \$385 million as its fourth top priority on its Fiscal 2009 unfunded requirements list in order to add back nearly 19,000 airmen split between the active duty and reserve.

Air Force Secretary Michael W. Wynne found himself in a conundrum during a Congressional hearing Feb. 27, having officially to support the President's Fiscal 2009 spending request that continues the reduction to 316,000, while acknowledging that he personally champions the increase included in the URL.

F-117s Prepare for Exit

The last of the Air Force's F-117 Nighthawk stealth fighters are nearing the end of their operational lifetimes—literally. Later this month, the few remaining Nighthawks in the inventory will leave their home of Holloman AFB, N.M., for good and be retired, USAF officials said.

One of the F-117s is being turned into a static display. Shortly after the Nighthawks are gone, Holloman will receive its new tenant: the F-22 Raptor stealth fighter. The base is slated to host two squadrons of Raptors, with the first two aircraft anticipated in June.

Cyber Command Nod Delayed

The Air Force does not expect to name the permanent location of its new Cyber Command until "closer to the end of the year," the service announced Feb. 13. The decision was supposed to come this spring, before the official stand up of the command on Oct. 1. Now USAF says it needs more time.

Maj. Gen. William T. Lord, commander

pated," Marine Corps Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff, said Feb. 25. Only small pieces of debris remained; they were expected to burn up on re-entry over a period of weeks to several months.

Gen. C. Robert Kehler, commander of Air Force Space Command, said Feb. 21 at the Air Force Association's Air Warfare Symposium in Orlando,



Yes, They're Real. DOD—finally—has confirmed the authenticity of photos showing F-22 fighters intercepting Russian Bear bombers off Alaska on Nov. 22—a Raptor first. This image shows an F-22A from Elmendorf Air Force Base tailing a Tu-95MS assigned to Ukrainka AB, Russia. This and three other images circulated on the Web for months before DOD acknowledged that they were legitimate.

of AFCYBER (Provisional) at Barksdale AFB, La., said in USAF's statement that the review continues of the candidate sites. Lord said one of the next major steps is to whittle down the list of candidates to four finalists so that initial site surveys and environmental impact studies may commence.

After completion of the environment studies, which usually takes about six to eight months, USAF said it will announce the winning location. AFCYBER "will be assigned an interim location until the final location is announced," the Air Force said. Full operational capability of the command "will take at least another year," Lord said.

USAF Gets Even Greener

The Air Force is now the nation's third

largest consumer of environmentally friendly renewable sources of energy and remains No. 1 among organizations within the federal government that purchase green power, the service announced Feb. 19.

According to the Environmental Protection Agency's quarterly list of the Top 25 green power purchasers, the Air Force increased the amount of energy that it purchased late last year from renewable sources such as biogas, biomass, geothermal, solar, and wind.

The Air Force said it buys more than 899 million kilowatt hours of green power annually, enough to meet approximately nine percent of its purchased electricity use. This amount is enough to power nearly 90,000 average American homes annually.

USAF Eyes C-130J Multiyear

The Air Force confirmed in mid-February that it is in discussions with Lockheed Martin about a potential new multiyear procurement contract that would start in Fiscal 2010 for combat-delivery C-130J transports and Super Hercules-based tanker derivatives for combat rescue and special operations. If analysis indicates that a new multiyear deal would result in "substantial savings" and comply with federal procurement requirements, the service would then request Congressional approval for it, USAF officials said.

USAF's current multiyear deal with the company for both Air Force and Marine Corps aircraft concludes this year with the manufacture of the final nine airplanes that will be delivered in 2010. On top of them, the Air Force seeks about 115 new airframes to recapitalize its aged HC-130P/N combat rescue tankers and MC-130E/P special operations platforms starting in Fiscal 2009, with initial operational capability in 2012. It also wants to buy more combat-delivery C-130Js at a rate of eight per year starting in Fiscal 2010, service officials said.

Korean War Pilot Is Ace

It took 55 years, but the Air Force has recognized retired Lt. Gen. Charles G. Cleveland as an ace for downing five MiG-15s in an F-86 Sabre fighter during the Korean War.

The Air Force Board for Military Corrections confirmed to him in January that, based on MiG flight records unearthed in Russian archives in 2003

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DOD photo

Self-Defense. An Air Force F-16C fighter unloads some electronic countermeasure flares over Iraq during a Jan. 22 mission. The two fighters, attached to the 332nd Air Expeditionary Wing at Balad Air Base, had just completed an aerial refueling. Fighters such as these F-16s have become prominent providers of close air support and nontraditional ISR in the theater.

as well as eyewitness accounts from his wingman, USAF now accepted one of his probable kills as a confirmed kill, giving him five in total to qualify him as an ace.

"It's a great feeling to have the Air Force recognize me as an ace," Cleveland said in a USAF release dated Feb. 13. "And it's a real honor to be included with that great group of men who make up the rest of the aces."

Cleveland flew an F-86 as a lieutenant with the 334th Fighter Interceptor Squadron at Kimpo Air Base starting in 1952. West Point colleague Dolphin D. Overton III, a former Air Force captain and himself a Korean War ace, came across the Russian documents in his efforts to help Cleveland be acknowledged as an ace.

Air Force, Army Sign MOA

Air Force Chief of Staff Gen. T. Michael Moseley and Army Chief of Staff Gen. George W. Casey Jr. signed a memorandum of agreement Jan. 23 that signals their intent to provide direct liaisons at various levels for dialogue on issues ranging from joint training to equipment interoperability.

The new memorandum also says the services "will seek opportunities to jointly develop doctrine, tactics, techniques, and procedures," working through personnel exchanges at service schools.

First Active J Unit Deploys

The 41st Airlift Squadron from Little Rock, AFB, Ark., became the first active duty C-130J unit to deploy to Southwest Asia, the Air Force announced in February. The unit moved to Little Rock about one year ago from Pope AFB, N.C., where it flew older model Hercules aircraft.

Another C-130 first occurred in early February when the 908th Airlift Wing at Maxwell AFB, Ala., became the first Hercules unit within Air Force Reserve Command to deploy to the region under a new rotation scheme filled by volunteers who serve one-month tours.

Mullen Sees the Link

Adm. Michael G. Mullen, the Chairman of the Joint Chiefs of Staff, affirmed on Feb. 6 that the expansion of US ground forces will exert a direct effect on the future size of the Air Force's strategic airlift fleet.

Mullen's statement was made necessary by an earlier remark uttered in public by a key member of his Joint Staff.

Two days prior, Vice Adm. P. Stephen Stanley, the joint staff's director of force structure, told reporters that the two

Bent Spear Incident Prompts Large-scale Changes

The Air Force has instituted wholesale changes to ensure the safety and security of its nuclear weapons in the aftermath of the August 2007 errant transfer of nuclear-tipped cruise missiles on a B-52 flight from Minot AFB, N.D., to Barksdale AFB, La., senior service officials said. Improvements are also being implemented to counter the declining focus on the strategic nuclear bomber mission that was identified during three in-depth reviews of the so-called Bent Spear incident, they said.

Gen. T. Michael Moseley, Chief of Staff, said Feb. 28 that the three reviews (Air Combat Command Commander-Directed Investigation, USAF Blue Ribbon Review, and Defense Science Board study) resulted in 128 recommendations, adding that he considers what transpired last year a "very serious" issue.

In January, USAF revised the procedures for how it will handle nuclear weapons. Among the more significant changes, bases are prohibited from commingling nuclear and non-nuclear weapons in the same storage structure. And there will be a single individual to perform munitions accountable systems officer and weapons custodian duties.

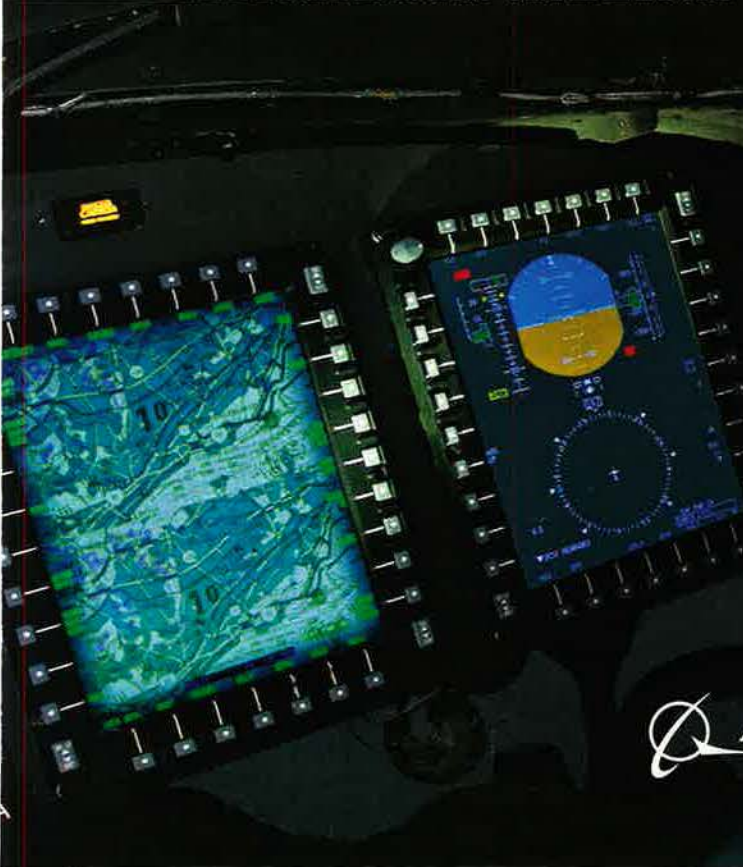
Moseley said the service is also close to implementing policy under which bomber units capable of both conventional and nuclear strike missions, such as B-52 squadrons, would be assigned responsibility solely for the latter during extended intervals of training and being on call for operations.

The DSB review, briefed to lawmakers Feb. 13, identified a "dramatic reduction" DOD-wide in a dedicated focus on the nuclear mission. To counter this, the panel recommended creating an assistant secretary position within the Office of the Secretary of Defense to oversee the nuclear enterprise.

The BRR, also discussed publicly that day before Congress, found that, in addition to the unit-level leadership and discipline breakdowns, the declining nuclear focus contributed to the Bent Spear incident. As a result, the Air Force plans to appoint a two-star general on the Air Staff, whose sole duty would be nuclear mission oversight, senior USAF officials said.



FACT: COMBAT PROVEN, PRODUCTION READY.



The search and rescue mission of the U.S. Air Force has never been more urgent. It's not surprising then that the HH-47, with its combat-proven capabilities, was first selected to fulfill this critical requirement. Offering superior range, speed and payload, the HH-47 also takes advantage of existing production—so it can be fielded more rapidly. For the warfighter in harm's way, there's not a minute to lose.

 **BOEING**

Operation Iraqi Freedom—Iraq

Casualties

By March 12, a total of 3,975 Americans had died in Operation Iraqi Freedom. The total includes 3,967 troops and eight Department of Defense civilians. Of these deaths, 3,238 were killed in action with the enemy while 737 died in noncombat incidents.

There have been 29,395 troops wounded in action during Operation Iraqi Freedom. This number includes 16,257 who were wounded and returned to duty within 72 hours and 13,138 who were unable to return to duty quickly.

F-16s Target Explosive-Rigged Houses in Baqubah

Working with coalition ground forces, Iraqi armed forces, and local militia units, Air Force F-16s carried out several air strikes in and around Baqubah in early February to destroy house-borne improvised explosive devices and weapons caches of insurgents and al Qaeda fighters.

On Feb. 4, F-16s dropped GBU-38s and a GBU-31 on a house in Baqubah that was reportedly rigged with explosives. The Air Force joint terminal attack controller on the ground reported that the house was successfully destroyed. The same day, another F-16 air strike destroyed a weapons cache near Baqubah with GBU-38s.

On Feb. 6, F-16s used a GBU-12 and GBU-38s to successfully destroy another house-borne IED, an enemy combatant command-and-control building, and a weapons bunker in the vicinity of Baqubah.

Operation Enduring Freedom—Afghanistan

Casualties

By March 8, a total of 482 Americans had died in Operation Enduring Freedom. The total includes 481 troops and one Department of Defense civilian. Of these deaths, 289 were killed in action with the enemy while 193 died in noncombat incidents.

There have been 1,894 troops wounded in action during OEF. This number includes 739 who were wounded and returned to duty within 72 hours and 1,155 who were unable to return to duty quickly.

Afghan Air Corps Building Capability With New Aircraft

The Afghan National Army Air Corps is a small but rapidly growing force that will eventually boast about 7,400 personnel and 112 aircraft under its authority, a senior official with the Combined Airpower Transition Force said in late January.

Air Force Brig. Gen. Jay H. Lindell, the CAPTF's commander, told Pentagon reporters via teleconference from Kabul that the Afghan Air Corps has doubled its capacity since October 2007 and plans to double it again over the first half of 2008. The Afghans are in the early stages of an expansion that will raise the number of fixed-wing aircraft and rotorcraft in its inventory from 22 in late January to 61 by 2011.

The inventory will feature new Mi-17 helicopters from the Czech Republic and the United Arab Emirates, refurbished with US and NATO funding. The first three helicopters arrived in December 2007 and the last three arrived in late March. The Air Corps will also get four more Antonov An-32 transports, due later this month from the Ukraine, Lindell said. A portion of the force's Mi-17 helicopters will also be equipped for an armed escort role—armed with forward-firing rocket pods and door guns designed for escort missions, not close air support.

One of the largest problems facing the Air Corps is the lack of tooling and the absence of an established logistics infrastructure, Lindell said. To alleviate the situation, the CAPTF contracted a \$20 million agreement in September 2007 for parts for the legacy Antonovs and Mi-17s. Work is also being done with the Afghans on logistics systems for tech orders, tooling, and maintenance training. A survey team is currently working with the Afghans on logistics system development, which should take about two to three years, he added.

The 1,950-strong corps plans to take over mobility operations to support the Afghan Army soon. Most of its daily sorties are currently training, but it plans to conduct medical evacuation flights from its new joint aviation facility, inaugurated in January in Kabul. By the end of April, the Afghans plan to be flying mobility and medevac operations out of Kandahar as well, Lindell added.

issues are "not directly related," and that the addition of nearly 100,000 ground forces might not have anything to do with USAF's strategic mobility capabilities.

Mullen left no doubt that he does see the connection, telling the House Armed Services Committee that the impact of the ground-force growth on airlift "is a legitimate question that we don't have an answer to yet."

Meanwhile, the Air Force, too, is still crunching the numbers, said Gen. Arthur J. Lichte, commander of Air Mobility Command, in a Feb. 22 appearance at AFA's Air Warfare Symposium in Orlando.

The current uncertainty is the reason why the Air Force favors keeping the C-17 production line open, said Lichte.

Minuteman Upgrade Complete

The Air Force announced in late February that it has completed the process of upgrading the guidance sets on the nation's 450 Minuteman III ICBMs, thus concluding the \$2.4 billion guidance replacement program "on time and on budget."

"We are fully operational and capable," said Maj. Gen. Roger W. Burg, 20th Air Force commander, Feb. 25 during a ceremony at F.E. Warren AFB, Wyo.

The project started in 1999 and ended in January with removal of the 1960s-era NS-20 guidance set and addition of the new NS-50 on the last missile at Minot AFB, N.D.

Missing WWII Airmen Identified

The remains of three airmen missing since the crash of their A-20J bomber in December 1944 over Germany have been identified, the Pentagon announced Feb. 15. They are 2nd Lt. John F. Lubben, Wisconsin Rapids, Wis.; Sgt. Albert A. Forgue, North Providence, R.I.; and Sgt. Charles L. Spiegel, Chicago. They left Coullomiers, France, on Dec. 12, 1944, crashing near Cologne, Germany.

The three airmen will be buried April 18 in Arlington National Cemetery, DOD said.

A Mixed Retention Bag

While the quality of USAF's recruits is good, Lt. Gen. Richard Y. Newton III, head of personnel on the Air Staff, said Feb. 26 on Capitol Hill that enlisted retention in 2007 "fell about eight percent below the goal."

This was offset, however, because officer retention was about 11 percent over its goal, Newton said.

Lawmakers Slam VA Budget

The Bush Administration's \$93.7 billion request in Fiscal 2009 for Veterans Affairs—\$3.4 billion more than 2008



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Senior Staff Changes

RETIREMENTS: Lt. Gen. Bruce A. Wright, Brig. Gen. Bradley W. Butler.

PROMOTIONS: To AFRC Brigadier General: Daniel P. Gillen, Michael J. Yaszemski.

NOMINATIONS: To be AFRC Major General: Robert B. Bartlett, Thomas R. Coon, James F. Jackson, Brian P. Meenan, Charles E. Reed Jr., James T. Rubeor. **To be AFRC Brigadier General:** Robert S. Arthur, Gary M. Batinich, Richard S. Haddad, Robert G. Kenny, Keith D. Kries, Muriel R. McCarthy, David S. Post, Patricia A. Quisenberry, Robert D. Rego, Paul L. Sampson.

CHANGES: Maj. Gen. David M. Edgington, from Dir., Air Component: Coordination Element, Multinational Force-Iraq, ACC, Baghdad, Iraq, to CS, JFCOM, Norfolk, Va. ... Brig. Gen. David S. Fadok, from Dir., Warfighter Systems Integration & Deployment, Office of Warfighting Integration & Chief Information Officer, OSAF, Pentagon, to Dir. of Strategy, P&P, SOUTHCOM, Miami ... Brig. Gen. James W. Hyatt, from Cmdr., 455th Air Expeditionary Wg., ACC, Bagram AB, Afghanistan, to Sr. Mil. Asst. to the Dep. SECDEF, OSD, Pentagon ... Brig. Gen. Charles W. Lyon, from Cmdr., 379th Air Expeditionary Wg., ACC, Al Udeid AB, Qatar, to Dir., Jt. Integration, DCS, Ops., P&R, USAF, Pentagon ... Brig. Gen. Stephen P. Mueller, from Dir., Jt. Integration, DCS, Ops., P&R, USAF, Pentagon, to Dir., Operational Capability Rqmts., DCS, Ops., P&R, USAF, Pentagon ... Maj. Gen. (sel.) Cecil R. Richardson, from Dep. Chief of Chaplains, USAF, Pentagon, to Chief of Chaplains, USAF, Pentagon ... Maj. Gen. Marshall K. Sabol, from Dir., Operational Capability Rqmts., DCS, Ops., P&R, USAF, Pentagon, to Dir., Strat. P&P, AFMC, Wright-Patterson AFB, Ohio ... Brig. Gen. Lawrence L. Wells, from Cmdr., 380th Air Expeditionary Wg., ACC, Al Dhafra AB, UAE, to Dir., Warfighter Systems Integration & Deployment, Office of Warfighting Integration & Chief Information Officer, OSAF, Pentagon.

SENIOR EXECUTIVE SERVICE CHANGES: David R. Beecroft, to Dep. Dir., Security Forces, DCS, Log., Instl., & Mission Spt., USAF, Pentagon ... Mark D. Johnson, to Executive Dir., Ogden ALC, AFMC, Hill AFB, Utah ... Mary Christine Puckett, to Dir., Instl. & Log., AFSPC, Peterson AFB, Colo. ... Maureen A. Quinlan, to Dep. Dir., Strategy, Policy, Prgms., & Log., TRANSCOM, Scott AFB, Ill.

spending levels—is simply not enough when “basic factors, such as medical care inflation and other increases in VA’s operational costs, are taken into account,” said Sen. Daniel K. Akaka (D-Hawaii), chairman of the Veterans’ Affairs Committee, in February.

Akaka said the VA budget doesn’t provide for “needed increases” in areas to support veterans suffering from traumatic brain injury or posttraumatic stress disorder. His counterpart in the House, Rep. Bob Filner (D-Calif.), has similar complaints, saying in February the Administration’s planned increase in medical care “has come at the expense of other VA programs,” including construction and medical and prosthetic research.

Blackswift Unveiled

The Department of Defense in February unveiled a project—named Blackswift—to mature technologies that would enable aircraft to cruise at many times the speed of sound.

Blackswift is an outgrowth of Defense Advanced Research Projects Agency’s Falcon initiative under which the agency is developing hypersonic technologies applicable to future Air Force long-range strike and space-access systems.

Under Blackswift, engineers are creating a reusable flight vehicle, about the size of an F-16 fighter, that is known as

the Hypersonic Technology Vehicle 3X, or HTV-3X. They will use it to conduct flight tests that will “allow for the study

of tactics for a hypersonic airplane that includes a runway takeoff, Mach 6 cruise, and runway landing.”

HTV-3X will be powered by a combined-cycle propulsion system comprising a high-speed turbine engine for the lower echelons of speed and a supersonic combustion ramjet to achieve the hypersonic rates.

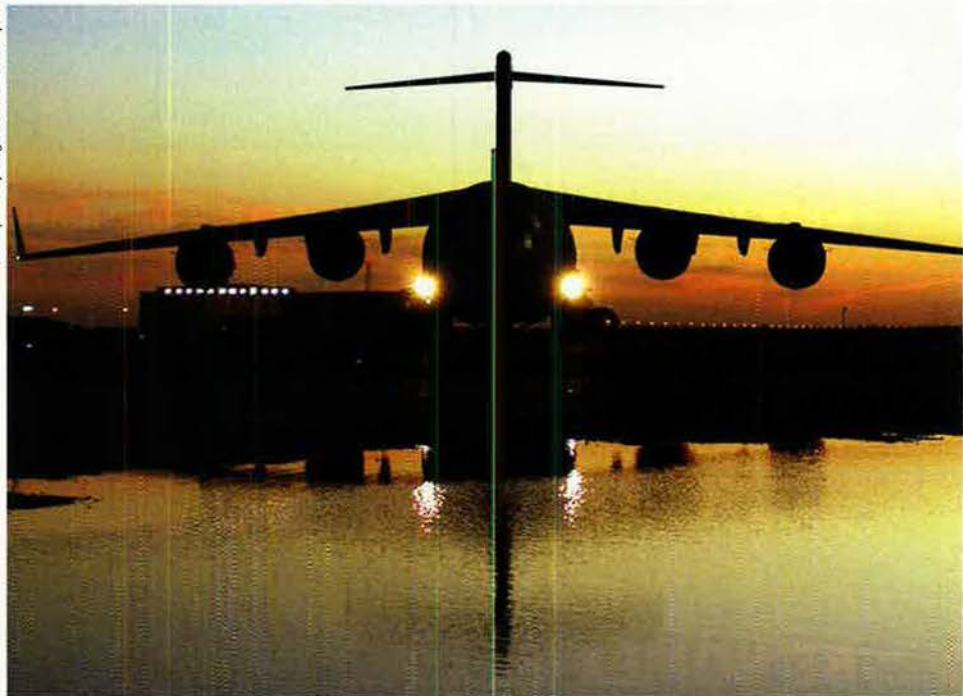
Punaro Defends Report

During a Senate oversight hearing on Feb. 7, members of the Commission on the National Guard and Reserves adamantly disputed that their final report, issued Jan. 31, recommends converting the National Guard into a domestic-only force and cutting reserve pay in half. But they acknowledged using “probably a poor choice of words” in some passages, thereby creating confusion.

“We absolutely do not recommend converting the National Guard into [a] domestic crisis response force only,” retired Marine Corps Maj. Gen. Arnold L. Punaro, head of the commission, said in discussing the 448-page report.

Commissioner Patricia L. Lewis, a former Navy civilian and Congressional staffer, said the panel did not recommend a cut in reserve pay, but rather a streamlining of the current 29 duty status categories to just two: either on active duty or not. In fact, the commission champions changes to “put additional money in reservists’ pockets,” she said.

USAF photo by SSGT Edward D. Holzapfel



To Save Lives. At an air base in Southwest Asia, aeromedical evacuation crew members prepare to move US service members wounded in Iraq from this C-17 to another facility. AE units in the region have become increasingly important to the war effort, rapidly transporting battle casualties to receive life-saving treatment elsewhere. The C-17 is only one of many types of USAF aircraft flying this mission.



Doomed Spirit. This is a recent photo of the B-2 Spirit of Kansas, the stealth bomber that crashed Feb. 23 just after taking off from Andersen AFB, Guam. Its serial number, 90127, is clearly visible on the front gear door. The name Spirit of Kansas is barely visible on the door in the right of the photo. It began flying from Guam last Oct. 16.

The release of the report caused consternation both in Pentagon and Capitol Hill circles. For example, Army Lt. Gen. H. Steven Blum, NGB chief, declared on Feb. 1 that a domestic-only reserve would “unhinge the volunteer force” and break the Total Force.

USAF Eyes Huey Replacement

The Air Force wants to do in Fiscal 2009 what it hasn't been able to do in past budgets: include funding for the future helicopter that will replace its Vietnam War-era Huey UH-1Ns.

USAF has sought for years to retire

these Hueys, which help protect the nation's ICBM fields, shuttle VIPs, and perform civil rescue missions, with a new more capable helicopter provisionally called the Common Vertical Lift Support Platform. But it hasn't had the money to do so, given the long list of more pressing recapitalization and modernization needs such as a new tanker, bomber, and combat rescue helicopter.

Now, however, CVLSP appears to be emerging out of the shadows, as the service seeks \$3.87 million to launch the helicopter program next fiscal year and lay the groundwork for fielding the platform in Fiscal 2015.

CCAF Gains Enlisted Leader

The Community College of the Air Force, part of Air University at Maxwell AFB, Ala., in January gained its first enlisted vice commandant, CMSgt. Joseph Thornell, an Air National Guardsman from South Dakota.

Thornell, who had been serving as the CCAF's senior enlisted manager, took the post, which had previously been reserved for an active duty lieutenant colonel, USAF said.

According to Air Education and Training Command, this is one of the initiatives by Air University to transform and enrich enlisted education and training. AU also plans to install a chief master sergeant as CCAF commandant to align all of the enlisted programs for education, militarily, with a chief master sergeant at the helm.

Formerly Grounded F-15s Return to Flight

The Air Force cleared the remainder of its grounded F-15A-D model fighters—nearly 150 of the fleet's approximately 440 Eagles—to return to flight on Feb. 15, except for those nine F-15Cs found to have structural cracks.

USAF stopped flying its Eagle fleet in the wake of the Nov. 2, 2007 crash of a Missouri Air National Guard F-15C due to what investigators determined to be a cracked structural beam called a longeron near the cockpit. The airplane essentially broke apart in midair.

Gradually Eagles were returned to flight duty after safety inspections, except for this last group of airplanes found to have longerons of under-spec thickness. After additional examination, ACC gave the green light to resume flights without restriction.

As of early March, the Air Force did not say if it would fix the nine F-15Cs with cracked longerons or retire them. Nor had the service determined how many of the aircraft with too-thin longerons would get new ones. Plans are to start phasing out some F-15A and B models in Fiscal 2009, so it might not make sense to replace the beams on all of the affected airframes, USAF officials said.

There have been several F-15 mishaps since last November. In addition to the fatal accident Feb. 20 over the Gulf of Mexico (see “F-15 Pilot Killed,” p. 14), an F-15C slid off the runway after landing on Jan. 22 at Tyndall AFB, Fla. The pilot was not injured. The cause may have been brake failure, but the investigation was still under way as of early March.

Further, a Hawaii Air National Guard F-15D went down Feb. 1 during a training flight off the coast of Oahu. The pilot ejected safely. An investigation was still under way as of early March. Since the airplane did not break apart when it went down, the Air Force did not think the loss was due to the same structural issue that doomed the Missouri ANG F-15C.



Into Thin Air. Somewhere high above the waters off Djibouti, three United States Air Force pararescue jumpers on March 13 conduct a parachute training jump from an HC-130 aircraft. These PJs are assigned to the 82nd Search and Rescue Squadron from Moody AFB, Ga., but have deployed to the small nation in the Horn of Africa. Djibouti has become the focus of a growing US military presence in the Horn.

Space-based Sensor Nears End

The Air Force expects to stop using the Space Based Visible sensor "for operational purposes" later this year, according to Gen. C. Robert Kehler, commander of Air Force Space Command.

Kehler told reporters Feb. 21 at AFA's Air Warfare Symposium in Orlando that the visible-band optical sensor, which was the United States' first on-orbit space-surveillance asset, "is to the point that it has significant technical issues and it is

not going to get better." SBV is part of the Midcourse Space Experiment satellite that the Department of Defense launched in 1996. Built to operate for five years, the satellite has already lasted more than twice as long.

Replacing SBV's on-orbit monitoring capabilities will be the Space Based Space Surveillance satellite, due for launch around 2009.

Gustav Lundquist, 1920-2008

Retired Brig. Gen. Gustav E. Lundquist, who served as a test pilot before and after World War II and ended his Air Force career in 1969 as commander of Arnold Engineering Development Center, died Feb. 5 in San Antonio. He was 88.

Lundquist entered the service as an aviation cadet in 1940 and graduated from test pilot school in 1942, flying prototypes out of Wright Field, Ohio. He flew P-51s from England but was shot down over Germany and interned as a POW for almost a year. He returned to Wright Field, where he led the fighter test section and flew the F-80, winning the Thompson Trophy air race in 1946.

He also served as one of three test pilots for the X-1 rocket airplane. Lundquist subsequently had a variety of senior staff and command positions, primarily in research, development, and engineering. He took command of AEDC in August 1967. ■

News Notes

- Lt. Gen. Edward A. Rice Jr. assumed command of US Forces Japan and 5th Air Force during a ceremony Feb. 25 at Yokota AB, Japan. Rice, most recently vice commander of Pacific Air Forces, replaced Lt. Gen. Bruce A. Wright, who retired after nearly 35 years of service.

- An F-16 crashed during takeoff in July 2007 at Balad AB, Iraq, due to an underinflated nose gear tire and the pilot's misinterpretation of the situation, Pacific Air Forces announced on Jan. 30, citing the findings of the accident investigation board. The F-16—assigned to the 35th Fighter Wing, Misawa AB, Japan—was completely destroyed; the pilot safely ejected.

- The Air Force on Feb. 22 celebrated the 30th anniversary of the first Global Positioning Satellite signal from space. The first GPS satellite was launched into orbit in February 1978.

- One C-17 from Hickam AFB, Hawaii, and a second Globemaster III from Elmendorf AFB, Alaska, delivered about 226,000 pounds of humanitarian supplies to Shanghai, China, on Feb. 8. The US sent the supplies after severe winter storms hit 19 of China's provinces.

- A remotely controlled unmanned

QF-4 full-scale aerial target drone launched an air-to-ground missile during a test in January at Holloman AFB, N.M. The test marked the first time that the Air Force fired an air-to-ground missile from a full-scale target.

- Pacific Air Forces commander Gen. Carrol H. Chandler redesignated 7th Air Force as 7th Air Force, Air Forces Korea, during a ceremony Jan. 30 at Osan AB, South Korea. Lt. Gen. Stephen G. Wood, former 7th Air Force commander, remains in charge of the new Korean command.

- Lt. Col. James Kromberg on Jan. 30 became the first USAF pilot to fly the F-35. Kromberg, director of operations with the 461st Flight Test Squadron at Edwards AFB, Calif., flew a sortie with aircraft AA-1, the first F-35 test aircraft, at Lockheed Martin's facility in Fort Worth, Tex.

- Engineers completed installation of all six Chemical Oxygen Iodine Laser modules aboard the Airborne Laser aircraft, the ABL industry team announced Feb. 25. Overall integration of the megawatt-class laser on the modified 747-400F platform is now more than 70 percent complete.

- The Massachusetts Air National Guard's 102nd Fighter Wing flew its final F-15 mission in late January. Per BRAC 2005, it will become the 102nd Intelligence Wing and operate one of USAF's Distributed Ground Stations.

- The Air Force launched its new "Above All" advertising campaign in February. Print, TV, and Internet ads feature airmen at work. It's "a great slogan because it says how we shine in what we do to defend our nation and accomplish our mission," said SSgt. Lee Jones, an airman in the first ads.

- The National Museum of the US Air Force has put an F-22A Raptor stealth fighter on display at its facility in Dayton, Ohio. The aircraft, #91-4003, was one of nine Raptor test aircraft built and the first to launch an AIM-120 air-to-air missile at supersonic speeds, USAF said.

- The Civil Air Patrol has embarked on a pilot program at Randolph AFB, Tex., and Wright-Patterson AFB, Ohio, to provide additional assistance to the Air Force. The new Volunteer Support of the Air Force initiative will enable CAP volunteers to aid airmen and their families. ■

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WorldView-1 image of Houston, Texas
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The Fighter Numbers Flap

Gordon England, the Pentagon's No. 2 official, has claimed that the F-22 is "designed for a specific mission" and 183 of them are "enough to do that mission," so USAF should buy no more. His words do not reflect the way the Air Force sees its requirements.

England's comment was a non sequitur. The Air Force does not build a fighter inventory—whether F-22 or F-35—to any "specific mission." It seeks the number needed to maintain 10 rotational air and space expeditionary forces. That number, insists the Air Force, is not 183 Raptors. It is not 250 Raptors. It is not 400 Raptors. It is exactly 381 Raptors.

Where does the figure 381 come from? Is it justifiable?

In simplest terms, the force-sizing exercise begins with the **squadron**, the basic unit of organization and building block of an AEF. The Air Force has determined that each AEF requires at least one F-22 squadron for air superiority, interdiction in high threat areas, and so forth.

The standard squadron contains 24 **combat-coded fighters**. The F-22's Operational Requirements Document validated that metric. The ORD was signed by the vice chairman of the Joint Chiefs of Staff.

Do the math: 10 squadrons times 24 aircraft equals 240 fighters.

Does that mean that 240 F-22s are enough? No. Note that the requirement is for 240 *combat-coded* F-22s. In order to maintain that many fighters constantly in a combat-ready condition and able to deploy on a wartime mission, the Air Force needs more F-22s for other needs. The question is: How many?

The Air Force has analytic formulas for determining the answer. Here they are:

- **For training**, 25 percent of the combat-coded force, or 60 more fighters.

- **For test purposes**, five percent of the total of combat-coded and training aircraft, or 15 more fighters.

- **For backup inventory**, 10 percent of the combat-coded, training, and test aircraft, or 32 more fighters.

- **For attrition reserve**, 10 percent of everything above, or 34 more fighters.

Those four categories, taken together, generate an additional requirement for 141 F-22s. Add up those fighters and the combat-coded ones and you come to—*voilà*—381 fighters.

The Air Force has stuck to that figure since 2002. The Joint Requirements Oversight Council, comprising the vice chiefs of staff of each service, validated the number in February 2004.

England's view notwithstanding, this number is not derived from some specific mission, specific threat scenario, budget levels, or wishful thinking. It does, however, provide the Air Force with the fifth generation fighter in numbers sufficient to avoid the creation of yet another low-density, high-demand weapon system.

Indeed, the AEF system provides continuous capability for combatant commanders without breaking the force. The difficulties the Army experienced in recent years (and the Air Force in the 1990s) show what happens when a force is not properly structured for long-term deployments.

Categories	USAF	DOD	Δ
Total F-22s	381	183	-198
Training	60	29	-31
Test	15	7	-8
Backup	32	15	-17
Attrition	35	17	-18
Combat-coded	240	115	-125
Full Squadrons			
Total	10.0	5.0	-5
Per AEF	1.0	0.5	-0.5

Now consider what happens when the Air Force is forced to buy substantially fewer numbers.

The table on this page compares USAF's preferred program and the one DOD has actually approved. With a 183-aircraft inventory, the table shows, the Air Force can generate only 115 combat-coded F-22 fighters—less than half the required number.

That translates into only one-half a squadron of advanced fighters per AEF, much less than is needed.

To compensate, the Air Force has altered the traditional per-squadron aircraft numbers so as to increase the number of squadrons. It now considers the standard F-22 squadron to have 18 airplanes, not 24. Even so, the plan struggles to flesh out seven squadrons, and the smaller units have higher overhead costs with less flexibility and combat power.

Even the one-squadron-per AEF metric is a change. USAF has historically used roughly 1.5 squadrons of F-15s per AEF, but the F-22 is more capable and so, the thinking goes, the Air Force can get by with less in the way of numbers. As matters stand, the 381 F-22s would have to replace roughly 700 F-15s.

When it comes to the F-35 fighter, the situation is less mature and therefore much looser and subject to revision down the road. The Air Force requirement, at present, is for 1,763 F-35s. That number roughly equals today's number of legacy fighters other than the F-15s.

The Air Force would use the F-35 to replace about 1,300 F-16s, 350 A-10s, and 50 F-117s. However, few believe the Air Force will be able to replace those aircraft on a one-for-one basis, as the 1,763 number implies.

The irony is plain. Though the F-35 requirement number is squishy, the Pentagon refuses to allow the Air Force to revise it downward, and, while the Air Force's F-22 number is firm, the Pentagon will not allow the Air Force to pursue it. ■

More information: <http://www.fas.org/sgp/crs/weapons/RL33543.pdf>

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The Redefinition of AIRPOWER



Speakers at AFA's Orlando Symposium said USAF is committed—really committed—to a new “flight path.”

By John A. Tirpak, Executive Editor

If it hopes to remain a dominant part of the nation's military might, the Air Force must reinvent the way it organizes, trains, and equips its fighting forces for combat in a world of rapid change. There is no other option.

That is the conclusion reached by top USAF leaders who addressed the Air Force Association's annual Air Warfare Symposium, held Feb. 21-22 in Orlando, Fla.

The service's most senior generals warned that sweeping change is unavoidable. Some of it is under way, and some is still being considered. All are focused on achieving “cross-domain” dominance in air, space, and cyberspace.

Gen. T. Michael Moseley, Chief of Staff, told attendees, “We're way past refusal speed. We're committed to this. This is the flight path.”

The senior USAF leadership urged

An F-15 (top) and two F-22s soar above the Virginia countryside.

Photo by Rick Linares



USAF photo by SrA. Julianne Showalter

At Balad AB, Iraq, SrA. Rebeca Hill (top) and SrA. Christopher Jaeger perform maintenance on a deployed F-16. The F-35, shown during a test flight below, is needed to replace old F-16s and other fighter-attack aircraft.

that the service be allowed to refresh the fleet with new machines and new capabilities, while getting rid of old hardware that no longer meets the nation's needs. They pushed for streamlined acquisition that will bring on new capabilities faster, and for

organizational shifts that will make wartime deployments more seamless than ever.

The leadership also urged that USAF do a better job at advocating for its needs, since both national leaders and the public seem not to grasp

the service's crucial role in national defense.

Moseley used his time at the podium to summarize the new Air Force white paper, a vision statement that "connects the dots" between requirements, capabilities, strategies, and budgets. The



Lockheed Martin photo



new vision document took more than a year to craft and “lays out how we see the future ... and what we are going to do about it,” Moseley said.

“I believe we have an opportunity to redefine American airpower,” Moseley said, adding that the opportunity will be lost if the service fails to become more intellectually nimble and adaptive to a future summed up best as “uncertain.”

He pointed to economic globalization, intensified competition for all kinds of resources, proliferation of weapons of mass destruction, climate change and rapid technological change as factors all conspiring to create a world “equally complex, if not more,” than that of today, and one requiring an Air Force that is fully capable of handling any air, space, and cyber threat.

Moseley asserted that the service has “140 initiatives” at work aimed at linking strategy to budget and fielding new systems “in a much more timely manner.”

The Organizational Template

For starters, Moseley said, USAF is restructuring itself to make the squadron the “building block of everything,” since USAF typically presents forces to combatant commanders in squadrons.

“The organizational template [when] deployed should be the same as the template at home station,” he asserted. Too often, units deploy to war missions and “somewhere over



Artists' conceptions of future bombers by Northrop Grumman (top) and Boeing (above) could presage USAF's 2018 Bomber.

the Atlantic, some magic fairy dust is sprinkled over the people and the organization, and then you become a theater command structure.” Not anymore, he said.

Major commands have been asked to “push ... down” their combat headquarters into numbered air forces, since those outfits are typically already organized in line with regional air operations centers, and are configured to match up against joint organizations. This was also the reasoning behind the restructuring of the Air Staff to match up with similar organizations in the Joint Staff, such as A2 for intel-

ligence, organized to mirror the Joint Staff J2.

The Air Force has extended and toughened basic training, with greater focus on the ground combat skills airmen are likely to face when they deploy to Southwest Asia, Moseley noted. He also wants to fill in the gaps that occur in the periods between stints of professional military education to reinforce skills and the warrior “ethos.” He is pushing for greater language training at all levels and plans to expand the opportunities for enlisted as well as officers to obtain advanced degrees.

Moseley acknowledged some USAF missteps that he hopes to rectify. The Air Force has “drifted” in its cultivation of intelligence professionals and selecting them for higher command. As a result, there are no USAF intelligence leaders “in any combatant command.” He said, “We need to do

something about it,” and has instructed Lt. Gen. David A. Deptula, head of USAF intelligence, surveillance, and reconnaissance, to find a better way.

Similarly, Moseley said USAF’s skills at strategic communications—informing Congress and the American public about USAF’s roles and needs—have atrophied. The Air Force must “be able to tell that story much better than we have in the past.” In the near future, USAF will “reach out” not only to media, but “academia, think tanks, etc.” Moseley said, “We can do better in our communications business.”

The Chief said he’s pursuing 150

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initiatives toward Total Force Integration and is moving to ensure that the reserve component is equally involved in all new missions, such as the F-22 and the new tanker.

Moseley plans to merge Red Flag Alaska and Red Flag Nellis to improve combat training opportunities for USAF and allies. He wants to upgrade range threats "as close to fifth generation as we possibly can."

In acquisition, there's been some progress in speeding up the delivery of new space systems, and he wants to achieve the same with aircraft. Moseley believes getting a new bomber in service by 2018 is "doable," if the existing plan is not perturbed.

Summarizing the new vision, Moseley said it gets back to the roots of the Air Force—range and payload, and "to fly and fight" and "to win our country's wars"—with the new twist of doing it across the domains of air, space, and cyberspace.

However, the new vision may not come to fruition if the Air Force can't trade away obsolete aircraft for new ones appropriate to the threats faced by the nation. So said Gen. John D.W. Corley, head of Air Combat Command.

In a blunt warning, Corley said the US simply must have air dominance, but seems to be losing it.

Aggression, Simply to Survive

"It is a strategic imperative," he said, and "fundamental to any military strategy. It saves lives, it directly impacts the length of the conflict, as well as the quality of the subsequent peace." Air dominance allows all other functions of the military to perform their roles, he said.

"We must possess and maintain overmatch, and I would argue ... that's ... increasingly at risk," he said. It isn't enough that USAF overwhelm the adversary with quality; it must have quantity, too, Corley said.

"Decades-old F-15s, F-16s are now overmatched by newer operational fighters," he declared. Adversaries around the globe are aggressively pursuing new technologies to erase America's asymmetric advantage in airpower, and their aircraft aren't battle-worn.

The "legacy" fleet must fly "more aggressive tactics, simply to survive" against hot new adversary fighters and murderous advanced air defenses. Harder maneuvering puts more stress on old airplanes already tired from 17 years of continuous combat operations.

The View From US Strategic Command

The February shutdown of a derelict reconnaissance satellite was a historic first because it marked the first operation in which US Strategic Command was the supported entity, its chief, Gen. Kevin P. Chilton, told the AFA symposium.

"Our space forces are normally in support of other regional combat commanders," Chilton said. "In this case, we needed support from regional [and functional combatant commanders] as well, to pull this off."

A Navy cruiser fired a specially modified Standard missile to break up the satellite while still in space, because it was feared that the spacecraft's hydrazine propellant tank would survive re-entry and pose a hazard to people on the ground.

Chilton said STRATCOM got everything it needed from US Pacific Command, Air Force Space Command, the National Reconnaissance Office, NASA, the State Department, the Missile Defense Agency, the Defense Advanced Research Projects Agency, US Transportation Command, and others for the highly successful mission. There was never any question over who was in charge, nor any hesitation to support the operation, Chilton said. The effort showed that STRATCOM has it "about right" in how it is addressing its missions and capabilities.

Chilton is charged with eight missions, but focuses on three: "space, cyberspace, and strategic deterrence." He puts those first because they are the ones in which STRATCOM actually has forces assigned and for which it is the logical focal point for execution.

STRATCOM has intelligence-surveillance-reconnaissance responsibilities, but this is chiefly in the area of apportioning "very limited ISR resources, to find better ways that we can share" air-breathing, space-based, and seaborne capabilities.

Chilton insisted there be no letup in fielding the next generation of early warning systems. The nation "cannot tolerate a gap in missile warning from space," he said, nor can it bear an interruption of ISR services from space.

"We shouldn't have continuing discussions on this," he said. By now, it ought to be understood as the right thing to do, "and we just move on and make it happen."

Chilton also pushed for the restoration of an ability to build and test nuclear warheads. Within 40 years, he said, the plutonium in the warheads in America's nuclear arsenal will decay to the point where the weapons may not work properly. Meanwhile, the people with the expertise to do such work have nearly all retired.

He advocated making new warheads of a configuration making them useless if stolen by terrorists. He also argued for developing a new, nonexplosive way to test the weapons and ensure their safety, reliability, and effectiveness.

"We cannot do that today in our Cold War-era weapons," he said.

To maintain a level of 2,000 warheads at a 40-year replacement rate, the US would have to start immediately building new ones at rate of 50 per year, Chilton noted.

If the US fails to keep its nuclear warheads credible, nations under the US nuclear umbrella might feel compelled to develop their own, and proliferation would ensue, he argued.

"No one has to stand up and clap on this one, but I'm telling you folks, we've got to get on with this. This is a problem that we need to invest in and focus on today."

New adversary defenses have greatly expanded range, putting US fighters in danger far away from the target, and putting some targets flat out of reach.

"We can't allow a veiled curtain to be put around targets and not be able to provide our nation and our President options," Corley insisted.

In fact, the US fighter fleet has decayed so badly that the US "no longer can dictate the time and place

and the tempo of modern air warfare," he asserted. American air dominance is "in doubt for today."

In the 1980s, the US was technically at peace, but building up to 300 fighters a year, Corley noted. Today, the nation is at war, but is only buying 30 or so fighters a year.

"It's not a viable strategy," he maintained.

"History kind of gives us some pretty



Carlson noted that the last time the Air Force had the luxury of trying out an aircraft design and then not using it was in the 1980s, with the F-20 Tigershark. Since then, “there’s just no room for error,” Carlson said. Each program has become too precious, and “*must* succeed,” because “we’re only going to get one or maybe two per decade.”

That’s not healthy, he said, and the result is that there’s a steadily decreasing pool of expertise, “financial resources, [and] political support” for new aircraft. Moreover, the industrial base is no longer robust enough to permit trying out a number of concepts and choosing one that works best.

It’s a deficit in what’s called “developmental planning,” Carlson said, and

graphic examples [of] what happens” when a nation doesn’t have air dominance. He added, “We’re way into the red line on the acceptance of risk.”

Corley said last fall’s F-15 crash, which led to a fleetwide grounding for months, was a “wake-up call” that the fighter force’s age can’t be ignored anymore. The F-15’s woes, he said, are “not an isolated incident,” and he noted that F-16s are flying with cracked bulkheads while A-10s need a massive rewinging program to keep them viable.

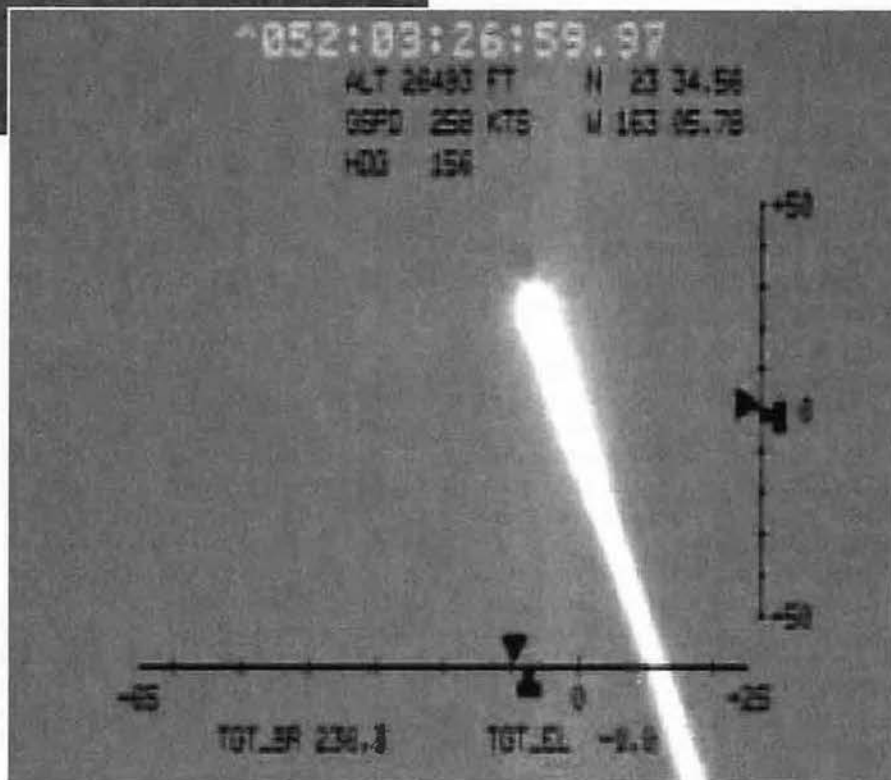
Given the years of “Band-Aids” and patches put on the airplane to try to keep it going, Corley said stress has been shifted on the F-15 in unknown ways, and he’s had to ask Air Force Materiel Command to test the Eagle to see just how much more it can take.

“For far too long, we have bought way too much risk because we bought too little iron. If we don’t have the iron, we will not have any options,” Corley said.

Time Now an Absent Luxury

He advocates upgrading those aircraft that can endure a while longer, but “ramp ... up ... existing production lines” of combat aircraft to get them at economical rates, and try not to recapitalize “on the cheap, inside the supplementals.”

Air Combat Command is readying a combat air forces strategic master plan that will rationalize the combat fleet



Two Navy images capture the missile shot and destruction of a defunct spy satellite in February. USAF Gen. Kevin Chilton, commander of US Strategic Command, led the shutdown operation.

with service strategy, and identify the “ends, ... ways, [and] ... means required to succeed against the threat.” It will also serve as a “master document” that will explain the role of each airman in supporting the wider mission.

New aircraft programs come along so infrequently that the Air Force has lost many of its skills in developing them, Gen. Bruce Carlson, head of Air Force Materiel Command, told the attendees.

encompasses a broad array of disciplines from threat assessment—not just at the outset, but at initial fielding and every decade after that—to maintenance innovation.

The pressure to keep the few approved programs on track is great. Programs find themselves being pushed forward before they are technologically ready to proceed, with the result that AFMC has sometimes been “unable to deliver” when expected. Moreover, the political



An MQ-9 prepares to launch from Creech AFB, Nev. Gen. Bruce Carlson, AFMC commander, says the Air Force must strive for rapid developments of the sort that fielded the Reaper.

process is totally unforgiving of any missteps, he said.

"There are fewer dollars, fewer new starts, and our aircraft are flying longer," meaning there are very few opportunities for engineers to gain experience in developing aircraft, Carlson noted.

"It will take some time to rebuild" USAF's expertise in this area, he said. "We simply can't do it overnight."

Programs will work better, he said, if more attention is paid up front to life cycle costs, requirements, and technical maturity.

Healthy aircraft development is not just a matter of time, Carlson emphasized. He pointed out that Russia started its F-22 equivalent program in the late 1990s, and said it will fly the aircraft, called the T-50, in 2012 and enter production in 2015. He believes Russia will "hold to" that schedule.

"So, it's possible to do this, and do it in a shorter time frame than we do," he observed.

Carlson also warned that the US is experiencing a brain drain, and that foreign students who come and take advantage of America's excellent education system return home and are "leveling the playing field" by developing technology equal to our own.

The US lead in "propulsion, in metals, in nanotechnologies ... has decreased significantly, and it's decreasing at an ever-increasing rate," he cautioned.

AFMC is in the midst of a debate

to determine its new philosophy about how airplanes are maintained. In the 1970s, Carlson said, the Air Force's idea was called "safe life," and it mandated that every part on the airplane be perfect through a predicted lifespan. However, once that age was reached, it grounded them.

The Air Force then went to an inspection regime, in which it would inspect parts, replace them, and send the aircraft back up to fly. He said the air logistics centers, when asked, will dutifully agree that they can keep practically any machine flying, no matter how old. However, that doesn't address the issue of operational obsolescence, and becomes a liability when the service is trying to argue for more modern equipment. So, the inspection regime is being rethought, Carlson said.

Despite the challenges, AFMC has had some big successes in recent years, such as fielding the MQ-9 Reaper and Small Diameter Bomb well ahead of schedule, and getting the ROVER system into the hands of the troops, Carlson said. He believes that, with the right levels of support, AFMC will be able to do as well in the future.

Cross-Domain Domination

Gen. C. Robert Kehler, head of Air Force Space Command, echoed Moseley's remarks, saying that USAF is no longer supported by space and cyber capabilities, but is now "all about cross-domain integration."

Since space assets operate in both space and cyberspace, and aircraft operate in air and cyberspace, it's "critically important ... how we put those three domains together to fly, fight, and win," Kehler said. Space Command is working to unify its efforts across all three.

Kehler believes that space capability has come to be taken for granted, as an always-on 365-day utility that no one pays much attention to unless it isn't working.

Space is an inherent part of everything the US military does, he asserted. If the nation were to lose a significant chunk of its space capability, it would be like going "back in time," Kehler suggested; the US would still be able to fight, but it would require far more assets, funds, and "far more casualties."

He said that the Air Force doesn't get "the credit that we deserve for the national and ... international mission that we perform," to include global positioning navigation, weather, communications, space surveillance, and a wide range of other missions. He wants a better effort at conveying to the public and the rest of the national security community "what it is that the United States Air Force does."

"None of our space capabilities ever are down for a week or two ... while we modernize," he said. That's like changing a TV from analog to digital "while the TV's on." If ever a space asset is offline even shortly, the joint community is "on your case about, 'where are you?'"

In short, Kehler summarized, "we don't have the luxury" of not providing expected capabilities for the military, nation, or the world.

Kehler believes that "we have turned the corner on the worst of our acquisition issues," and while "we ... still have problems to solve," Air Force Space Command is setting records for successful launches and years of on-orbit operations "without a premature failure."

However, "as we look to the future, we're going to have to come to grips with a new way of developing and deploying space capability," because the current system "takes us too long" to put new capabilities in orbit. He pointed to the ability to quickly launch satellites, and the use of smaller satellites, as two ways to approach this requirement. "Tacsats" won't last as long as big ones, but will cost less, can be fielded in larger constellations, and can be refreshed more rapidly. ■

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*Gen. Bruce Carlson,
Commander, Air Force Materiel Command*

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The Heavy Toll of High Optempo

At AFA's Orlando Symposium, senior airmen spell out what's happening to a force constantly in motion.

By Marc V. Schanz, Associate Editor



The war in Southwest Asia may be unfolding in a specific geographic region, but it exerts a strong gravitational pull on the entire Air Force. Combat operations in Iraq and Afghanistan, bringing constant deployment and redeployment of equipment and personnel, have piled up on

top of USAF's other, more permanent missions worldwide.

As a result, Air Force readiness has been plunged into an increasingly precarious position.

The Air Force has performed superbly, but the stress and strain have been adding up. Events such as the

recent grounding of the F-15 fighter fleet and imposition of flight restrictions on many mobility forces make this point, said top USAF officials speaking at the Air Force Association's annual Air Warfare Symposium, held Feb. 21-22 in Orlando, Fla. The Air Force's ability to provide dominant air, space, and cyber



Joint service members assigned to the Special Operations Command-Pacific prepare to board a C-17 Globemaster III at Hickam AFB, Hawaii.

mander of Air Combat Command. He said that the combat hours add even more stress and pressure to every airframe in the USAF inventory. "I'm still generating the same sorties, but I'm doing it with far fewer airplanes," Corley noted.

USAF has effectively transitioned from a garrison force to an expeditionary force, Corley said, but the optempo and the demands have only increased. Since the demise of the Soviet Union, the US has drastically reduced its force structure. Thirty-eight fighter wings have been reduced to the equivalent of 20, and the Air Force now has fewer than 200 bombers, Corley said.

When it comes to end strength, the service has dwindled from 535,000 airmen in 1990 to a planned 316,000 in the next year. With funding tight, the service has had to further cut back on manpower in an attempt to free up money to pay for new equipment—and keep old iron flying.

The age of the fleet is a big concern. Corley pointed to the increasing capability of combat air fleets worldwide. This threatens the underpinning of the service's mission: dominance of the air.

The longer legacy aircraft are kept in service, the riskier the Air Force's position becomes. Over the past few years, potential adversaries have slowly caught up, Corley warned. With the benefit of watching 17 years of American combat operations, competitors and rogue nations have a good understanding of how the United States employs airpower—and have developed programs to counter it.

The Air Force's F-15s and F-16s—now decades old—are inferior to new fighters built in China, such as the J-11B, and in Russia, such as the Su-27. The Chinese multirole fighter is an adaptation of the Russian model.

The once-dominant advantage possessed by F-15s and F-16s has eroded in the face of new foreign fighters that average about six years of age. Even with new F-22s flying operational missions, USAF's fighter force averages more than 20 years of age.

As a result of last year's F-15 crash in Missouri, many Eagles remain grounded and other fighters have had to sub in. This is particularly noticeable for the Noble Eagle homeland air defense mission, where F-15Es, F-22s, and Canadian CF-18s have filled in for the grounded F-15s.

A requirement for cross-domain

capabilities could be compromised if the demands of nonstop combat are not addressed soon, they warned.

The service's equipment is quickly wearing out and, though the number of airmen continues to decline, operating tempo goes on at a high level. Funding to sustain these capabilities for the

long term has not kept pace with the requirement.

Gen. John Corley, Air Combat Command

A relatively small force repeatedly deploys to the Middle East for combat, said Gen. John D.W. Corley, com-



USAF photo by SSgt. Shane A. Cuomo

Aircraft maintenance personnel from the 392nd Air Expeditionary Wing inspect and refuel an A-10 Thunderbolt II in Southern Iraq.

dominance—in air, space, and cyberspace—will drive the redefinition of air combat and Air Force operations. Whether the goal is humanitarian relief, bombs on target, or “strategic paralysis,” Corley said USAF must “look for opportunities to improve our current operations,” adding, “we need to do that now.”

Gen. Carrol Chandler, Pacific Air Forces

Gen. Carrol H. Chandler, commander of Pacific Air Forces, noted that his airmen, though nominally based far away from the wars in Southwest Asia, are fully engaged in the fight. On average, more than 2,000 PACAF airmen are deployed to the war region every day. Earlier this year, PACAF sent F-16s from Misawa AB, Japan, to fly patrols in Southwest Asia, and C-130s from Yokota AB, Japan, are providing airlift as well.

That comes on top of other missions. Some 6,800 airmen serve on the front lines of the Korean Peninsula.

Within PACOM’s area of responsibility are, in addition to the United States, five of the world’s largest armed forces—China (which is rapidly arming), Russia (in the early stages of remilitarization), North Korea (nuclear armed and belligerent), India, and South Korea.

“The Pacific is not a theater at war

but it’s not a theater at peace” either, said Chandler.

Nowhere is this more true than on the Korean Peninsula, where the United States is adjusting its forces and helping South Korea better deter the North Korean military massed just miles north of Seoul.

The South Korean military is making great improvements in its combat capability and effectiveness, US officials say. The American presence on the

Korean Peninsula, mainly soldiers, is on path to draw down to about 25,000 personnel in the coming years, from about 37,000 in 2003.

USAF, however, is staying put. Chandler said the Air Force is committed to the defense of South Korea, and will continue to field a squadron of F-16s and a squadron of A-10s at Osan Air Base, near Seoul, along with two F-16 squadrons at the remote Kunsan Air Base.

Earlier this year, the Kunsan F-16s were replaced with advanced Block 40 models, putting fighters with new data links, all-weather capability, and improved avionics at the forefront of South Korea’s defense.

Maintaining allies and relationships is critical to doing business in the region.

“It’s my belief that persistent involvement is the key,” Chandler said, noting that PACAF is fine-tuning the placement of its personnel, training, and equipment throughout the Pacific.

Central to PACAF’s long-term basing strategy is the “strategic triangle” of Guam, Hawaii, and Alaska. The command has also taken steps to move out farther if necessary. Continuous bomber rotations of B-1, B-2, and B-52 bombers and supporting tankers have been on Guam for four years now, Chandler noted.

As part of PACAF’s efforts to bolster its rapid reaction capabilities, the Air Force has set up on Guam the 36th Contingency Response Group—which combines RED HORSE engineers



USAF photo by MSgt. Demetrius Lester

Left to right: SSgt. Jeremy Woodruff, A1C Zack Demeter, and TSgt. Ben Walker assemble GBU-38 bombs at Bagram AB, Afghanistan.

A Strong Force for the Future

The Air Force may be losing billets due to the personnel drawdown, but the men and women in the Air Force today are the best possible recruits the service could hope for, Gen. William R. Looney III told AFA's Air Warfare Symposium.

In his final appearance at the event as the commander of Air Education and Training Command, Looney told the audience that the service is well on its way to meeting its 2008 active duty goal of 27,800 new airmen with a force of 1,244 recruiters across the nation. The ratio of recruits to recruiters came to 22 to one—the best of all the services. USAF only spent \$8,741 per recruit in signing them up, which includes enlisted bonuses and loan repayments. The effort resulted in the Air Force leading all military branches in top flight recruits, known as 13-As. Ninety-nine percent of the enlisted force has a high school degree and 91 percent don't require an entry waiver.

The service is seeing challenges in some areas—notably recruiting enough doctors and dentists, Looney said. With the high cost of medical school and competition in the private sector, the Air Force has to contract out for medical and dental services in many instances, which is proving costly. To counter the trend, AETC has launched a new recruiting initiative to attract candidates who agree to put on a blue suit in exchange for the Air Force footing the cost of their degree.

The service's much-touted expansion of basic military training will also commence in October, with construction of the necessary facilities nearly complete at Lackland AFB, Tex., Looney said. The new BMT course will run 8.5 weeks instead of 6.5 and will emphasize more combat and expeditionary skills. The Air Force is also planning to reveal the location of its Common Battlefield Airman Training center by summer. The site finalists are Arnold AFB, Tenn., Barksdale AFB, La., and Moody AFB, Ga.

Closing his remarks, Looney confirmed that he plans on retiring from active duty this year. In February, President Bush nominated Lt. Gen. Stephen R. Lorenz, commander of Air University, to replace Looney as AETC commander.

with security forces, combat communications, and airlift mobility support squadrons.

The unit can quickly establish an airfield during a crisis or a humanitarian disaster anywhere in the Pacific.

The Pacific Theater will see a steady buildup of capability—both in combat and mobility power over the next few years. For some capabilities, an infusion of new equipment cannot come quickly enough.

Chandler said the tankers at Hickam AFB, Hawaii, are about 45 years old and average about seven hours of maintenance for every flying hour. "In the end, we keep [KC-135s] in the air on the backs of our maintainers," he said.

Air assets will shift to address new security and operational needs. For example, PACAF is progressing with plans to bed down the RQ-4 Global Hawk on Guam beginning in 2009. The Air Force has worked to articulate a vision on what can be provided in the area of "global vigilance" for strategic partners in the region, Chandler added.

The unmanned aerial vehicle can play a key role in monitoring sea-lanes and aiding in natural-disaster recovery

across the Pacific in the years ahead.

A PACAF "Global Hawk capabilities forum" is planned this month in Hawaii and at Beale AFB, Calif., to discuss with allies how the new capability will be used in the region.

Other areas of the Pacific also have new capabilities arriving soon. Three of the seven programmed F-22 squadrons will be assigned in the Pacific, and PACAF's organic airlift capability will be enhanced with the addition of two C-17 squadrons—one at Hickam and one at Elmendorf AFB, Alaska.

Gen. Arthur Lichte, Air Mobility Command

For Air Force mobility forces—no less than fighter and bomber forces—the demands are multiplying.

Gen. Arthur J. Lichte, head of Air Mobility Command, said airlift requirements continue an upward trend and are being met with a smaller personnel contingent. "We made the right choices as an Air Force to start drawing down our force, but ... we have to ... start thinking about future operations," he said.

AMC's end strength has declined by six percent since the onset of war in September 2001.

Lichte related today's worldwide mobility operations to the 60th anniversary of the Berlin Airlift and the "first shot of the Cold War," when airlift redefined the possibilities for American airpower. As was revealed in dramatic fashion over Germany in 1948, global airlift became an integral part of US foreign policy.

In 1948, the mission was delivering cargo—the lifesaving supplies Berliners needed to survive the siege.

Today, airlifters and tankers constant-

USAF photo by SrA Chad M. Kellum



On the snowbound upper Great Plains, aircrew members at Grand Forks AFB, N.D., ready a KC-135 Stratotanker for a refueling mission.

ly move cargo, passengers, and fuel to and from the US Central Command area of operations. Each day in the theater, Air Mobility Command lifts more than half of the average daily tonnage of the Berlin Airlift but with only one-fifth the number of aircraft, Lichte pointed out. And while the Berlin operation lasted for about a year-and-a-half, mobility forces have been at this mission for the last six-and-a-half years.

Aerial refueling tankers, the enablers of global power, offload about 408,000 gallons of fuel every day. Since September 2001, Air Force tankers have cumulatively delivered almost one billion gallons of fuel just to support the Global War on Terror, Lichte noted.

With high fuel costs becoming more of an issue to the budget-conscious Air Force, additional scrutiny is used to determine the most efficient transport routes. Work is also proceeding on using advanced alternative fuels—such as the recent successful use of a blended synthetic fuel in the C-17.

Halfway around the world, tankers out of Hawaii, Alaska, Japan, and Guam create the air bridge required to move air assets throughout the Pacific.

The refuelers there create effects not often ascribed to the flying gas stations. Perhaps more than any other command, PACAF uses tankers to dissuade, deter, and defeat adversaries.

The similarly overlooked Civil Reserve Air Fleet has become an integral cog in the mission of moving materiel

USAF photo by SSgt. Vanessa Valentine



Airmen prepare a B-2 stealth bomber at Andersen AFB, Guam. The B-2 is deployed from Whiteman AFB, Mo.

from the United States to the front lines, said Lichte. New partners are being brought into the CRAF process.

Tactical airlift is an increasingly critical piece of the war effort. Part of this owes to the development of the Joint Precision Air-Drop System, which uses Global Positioning System guidance to precisely deliver air-dropped

supplies. This enables increased use of C-130s and C-17s to ferry supplies to troops on the ground. This in turn reduces the exposure of ground convoys to devastating improvised explosive device attacks.

In January, officials say, the Air Force took about 12,000 soldiers and marines off the roads through the use of airlift.

While there is less cargo going into Iraq and Afghanistan than at the beginning of OEF and OIF, the need now is for time-sensitive cargo to get to its destination quickly. The C-130 Hercules fleet is a vital part of this mission.

The Air Force plans to modernize 222 of its C-130Hs, but a large number of C-130Es remain on flight restriction and are effectively taken out of the fight, a fact that concerns Lichte.

In the meantime, older aircraft are repeatedly patched up and put back into the theater, gathering more hours and wear and tear. "We'd like to get rid of all the E models, period," he said. Unfortunately, the C-130 is yet another platform suffering because of the euphemism of "fiscal reality."

With the recent stand-up of US Africa Command, Lichte observed, there will be a new demand for mobility as the US government expands its relationships on the continent while



USAF photo by MSgt. Andy Dunaway

Security forces airmen conduct a search of Iraqi police officers before granting access to a secure area at Sather AB, Iraq.

Toward a Defense of the North American Theater

A good portion of USAF's current operational burden is over America. Gen. Victor E. Renuart Jr., the head of US Northern Command and of North American Aerospace Defense Command, says the recent stand-down of the Air Force F-15 fleet forced air defense operations into a significant readjustment.

NORAD borrowed F-22 crews that were qualified for air defense, but whose squadron was not yet operational. Those crews were paired up with Raptors at Elmendorf AFB, Alaska, to help maintain air defense.

The Canadian government dispatched some of its CF-18 fighters to Elmendorf as well, and Air National Guard F-16 units expanded their participation in Operation Noble Eagle (ONE)—with some Guard units flying from two or three separate alert sites.

"We were able to adjust the force and maintain the level of security we required," Renuart said. Now, many of those F-15s are back off restriction and are flying missions again.

Maj. Gen. Henry C. Morrow runs the second busiest numbered air force, Renuart told the symposium audience. Morrow, commander of 1st Air Force at Tyndall AFB, Fla., and an Air National Guard officer, is air component commander for NORTHCOM.

"Every day, Hank is launching fighters to intercept some aircraft that is not complying with the rules of our national aerospace system. Fortunately, most of that is buffoonery," Renuart quipped. But ONE aircraft are ready for combat and have come close to shooting down threatening aircraft several times.

Noble Eagle shows no sign of slowing. More than 48,500 ONE sorties have been flown since September 2001. First Air Force typically manages a fleet of 40 fighters—mainly ANG and Reserve aircraft—at roughly 20 locations across the country.

KC-135 tanker and E-3 AWACS sorties are also part of the daily mix in support of this largely unseen effort over American skies.

Renuart warned that some budget watchers argue that the Air Force should absorb the costs of such duties.

"There are some in government who would say you get no credit for that—you have to just absorb it out of what you do every day," he said. "I think that's unrealistic."

New demands have even arisen from old missions—as evidenced by the restart of Russian bomber patrols around the edges of US airspace last year.

Even so, Renuart said his primary concern is for safety, not a Russian bomber threat.

Russian flights, mostly conducted by Tu-95 Bear bombers, are by and large legitimate training missions in international airspace, he noted. But the Russians are not filing an international flight plan, in accordance with international flight rules—and are flying in increasingly congested airspace along the polar routes near Canada and Alaska.

Russia has telegraphed when and where training events will occur, but the US would "like to continue to work with the Russians to get better transparency," Renuart added.

dealing with vast distances and limited infrastructure.

The question of balance between C-17s and C-5s will only become more acute, Lichte said. Does it make more sense to repair and upgrade large numbers of C-5s, or to buy and fly additional C-17s? The question has not yet been answered, but it needs to be—and soon.

Gen. C. Robert Kehler, Air Force Space Command

As airmen assess danger, they see that it exists not only in the traditional air realm. The danger exists in space as well. China's Jan. 11, 2007 anti-satellite weapon (ASAT) test is proof positive that space is not a sanctuary. "Our ex-

pectation is that we will be challenged," said Gen. C. Robert Kehler, head of Air Force Space Command.

The danger to assets in space is especially troubling because of the enormous strides USAF has made in providing on-orbit capabilities in recent years. Kehler said AFSPC has performed 56 successful launches in a row, and now has five years of on-orbit operations without a premature failure, both new records.

Assets in orbit also need to be protected. "Some of our on-orbit assets today [are] well protected, ... others are not," Kehler said bluntly.

The ASAT test gave the Air Force's space warriors a sense of "urgency" that was much needed in order to realize that space dominance should not be taken for granted, he said.

Successful ASAT strikes are only part of the vulnerability puzzle. Physical security of ground segments and stations is part of the equation, as well as security of data links to valuable assets like the GPS constellation.

Many of the Air Force's satellites are lasting longer than their planned service lives, but this is a double-edged sword, argued Kehler.

Unlike the case with terrestrial systems, the Air Force is largely stuck with what it launches aboard satellites. "You can't go replenish them ... with new software or with other new features you would like to put on," Kehler said.

Space Command is delighted with the long-lasting service the satellites have provided thus far, since this allows the pace of modernization to slow down at a time when the service is scraping for every dollar it can muster. ■

USAF photo by SrA. Levi Riendobau



SrA. Jonathan Cantrell, a crew chief at an air base in Southwest Asia, removes the cooling tube from a U-2 sensor pod as the pilot prepares for takeoff.

Fighting for Air Dominance

The US hasn't worried about command of the air for more than 50 years, but the trend lines all are negative.

By John A. Tirpak, Executive Editor

In five years, the Air Force will lack sufficient fighters to meet the basic requirements of the national military strategy. The inventory in 2013 will dip below 2,250, the minimum needed for meeting national needs, and it won't rebound for a long while.

This is going to happen. Indeed, it is already too late to avoid the crisis.

And without intervention some time soon, the weakness will continue for decades.

The crisis will be brought about by two separate but interrelated factors—massive retirements of worn-out or obsolete fighters, and failure to provide sufficient numbers of modern replacements. The combination of the two will produce rapid shrinkage of the

inventory in years just ahead.

The Air Force calls 2,250 fighters “the required force.” What USAF actually will possess a few years hence is the “program force.” This will be the result of the dramatically underfunded fighter acquisition plan foisted on USAF by Pentagon leaders.

The number 2,250 was developed in the aftermath of the Quadrennial Defense

USAF photo by MSgt. Lance Cheung



Sukhoi photo via Piotr Butowski

Opposite, Capt. Michael Jokhy checks six in an F-15E on his way back to RAF Lakenheath, Britain. Above, a Russian test pilot takes off in a new Su-35, Russia's newest fighter.

Review of 2006. This is the air armada USAF's leaders say will be needed to fight two major regional wars more or less simultaneously, fill out the 10 rotational air and space expeditionary force (AEF) units, and meet other demands such as providing forward presence.

The number also reflects USAF's most up-to-date analysis about the nature of future battlespaces, which it warns will be increasingly deadly to so-called "legacy" aircraft, such as the F-15 and F-16. It's the number needed to be able to win with "acceptable" losses, a senior USAF official said.

Today's Air Force inventory comprises about 2,400 fighter aircraft. In many cases, service lives already extend well beyond original dates. The fleet, as a result, is getting smaller at a rapid rate.

- In 2008, USAF will retire 35 F-16s, 32 F-15s, and its last 42 F-117 stealth aircraft.

- In 2009, if all goes as planned, the Air Force will let go of 45 F-16s and 17 more F-15s.

- In 2010 and years beyond, the service annually will retire some 50 to 70 fighters.

Air Force leaders describe 2013 as the crossover year. Numbers will crash right through the 2,250-fighter floor and then keep on falling for another two decades.

In the Air Force view, the window of vulnerability extends from today through the early 2020s, when more than half of USAF's fleet will be newer, fifth generation F-22 and F-35 fighters.

Even then, however, the service still

will be flying a significant number of F-15s and F-16s, some of them more than 40 years old.

A "High Risk" Plan

Moreover, intelligence analysts expect that foreign nations—China and Russia specifically—will by the early 2020s have fielded not one but two new fifth generation fighters comparable to the best in the Air Force stable. These and other potential adversaries also will have sophisticated ground-based air defenses. Even today, those modern air defenses are considered deadly to legacy fighters.

The current fighter acquisition plan is "high risk," said Maj. Gen. Mark

T. Matthews, chief of requirements at Air Combat Command, Langley AFB, Va.

"We think ... we're already at a point where, in certain environments, we can't take the F-15 [and] F-16 into the battlespace" without losing aircraft in battle at rates "higher than what we've historically ever been willing to take," Matthews said in an interview.

The Air Force long expected to replace its F-16s and A-10s with F-35s at the rate of about 110 a year, which would have seen the force modernized by 2030. Instead, its last two budgets have forecast a purchase rate for F-35s at only 48 per year, meaning the buy of 1,763 won't be completed until 2050. The old fighters



Photo via SinoDefense.com

Four Chinese J-11s, the licensed copy of Russia's Sukhoi Su-27SK fighter, fly on a training mission.



This illustration shows a Sukhoi T-50, also called a PAK FA, in flight. It was designed to compete with USAF's F-22 fighters.

will retire long before that, however, leaving a deep deficit in the number of fighters USAF fields.

"We'd like to see it up to 110 aircraft a year," Matthews said. "In fact, it actually needs to get up in the outer years closer to 135 aircraft per year on F-35 production to meet what we see as being the strategy-required force."

Matthews said it's important to understand that combat relevancy, and not just age of the aircraft, is the key consideration. Simply carrying out another service life extension program—a structural upgrade, along with some capability enhancements—won't do much good.

"If you were to SLEP, you would delay" dropping below 2,250, "but you wouldn't delay it by much. Maybe about three years or so, out to around 2016, 2017." After that, the shortfall would take hold and "the gap would continue to grow."

Matthews said, "It comes up pretty quickly—faster than most people realize."

The Air Force has been hoping that it could win approval to forestall the coming drop-off in fighter levels by continuing production of the F-22 beyond Fiscal 2009. The F-22 buy has been capped at 183 aircraft by Pentagon leaders in what all concede was a move prompted by finances and not strategy.

Last fall, 96 members of Congress demanded that Deputy Defense Secretary Gordon England provide a rationale for halting F-22 production at 183 aircraft, especially since they had been informed

that numerous studies had validated a need for far more than the capped level.

According to an Air Force briefing delivered to Congressional staffers in February, there were numerous fighter studies in the period 2001-07. All but one, including an outside look for the Pentagon by the consulting firm of Whitney, Bradley, and Brown, found a need for at least 277 F-22s, and most confirmed the Air Force's own number of 381.

A Debatable Finding ... At Best

Only one study, "Joint Air Dominance," found sufficient combat power in a 183-Raptor fleet. That study, conveniently, was produced by the Office of the Secretary of Defense—the center of anti-F-22 sentiment.

Joint Air Dominance found that a fleet of 265 F-22s wasn't all that more effective than the smaller one. It found that, in various scenarios, the power of the F-22 was vitiated by the lack of F-35s, which had been deleted to pay for more Raptors.

How did OSD interpret this result? It concluded that the F-35 was the more effective machine, and therefore was the superior investment.

This was, to say the least, debatable. The Air Force has always said that the two aircraft are complementary, and both are needed to achieve victory in future battles.

"They are not interchangeable," Maj. Gen. Jeffrey R. Riemer, F-22 program executive officer, said at an industry symposium in February. The F-22, he

said, provides air dominance, which is the clearing of enemy fighters and the ability to transit enemy airspace with impunity, by virtue of its stealth and supercruise speed. The F-35, he said, offers "the persistent force" to linger in the battlefield and strike targets far and wide.

Combined, they make possible all other aspects of US airpower—intelligence-surveillance-reconnaissance, airlift, and the ability to roam at will over the battlefield.

The two aircraft are optimized for different roles. Although a credible dog-fighter, the F-35 won't be able to clear the skies the way the F-22 does, but is more than up to the stealthy strike tasks required for a "backbone of the force" fighter like the F-16 it replaces.

Defense Secretary Robert M. Gates said that 183 F-22s—or 187, if the Pentagon gets four additional airplanes as part of its supplemental funding request—is "probably the right number." He said he worries "that if the F-22 production is expanded, that it will come at the expense of the [F-35]."

Gates' deputy, England, wrote back to the 96 Congressmen that the Pentagon believes that the F-35 is the better buy. He again was framing the issue as an either-or decision. Why is anyone's guess.

The funding problem in fighters dates back to the 1990s and early 2000s, when there was a major disruption to the Air Force's modernization plans. The F-22 was supposed to be bought in quantities of up to 48 a year, closing out in about 2012. It was to be followed immediately by production of the F-35, with no funding overlap and no break in Air Force fighter production. However, delays in the F-22 mounted—some demanded by Congress, some by the Clinton Administration, some due to technical holdups. By the time the Raptor was ready to be produced in large lots, the US was at war in Afghanistan and Iraq, and the required number—381—was thrown overboard by the Bush Administration as unaffordable, regardless of strategy. The F-22 was downsized to a program of just 183 aircraft, and would end production before the F-35 began production in quantity. Studies which validated any larger number were ignored, classified, and shelved.

Rep. John P. Murtha (D-Pa.), chairman of the House Appropriations defense subcommittee, told reporters in February that he wasn't satisfied with the Administration's fighter procurement plans. He said there may be a perception

around the world that the US is weak “and the reason is because everything is getting older.” He said the Air Force hasn’t been buying new aircraft and is “wearing ... out” the old iron in the two ongoing wars in Southwest Asia. He judged the Air Force to be “in bad shape” and said he would take up extended fighter buys with his colleagues.

Although many F-15s were restored to flight status in mid-February, the defect found to have caused a recent crash may have been a harbinger of other problems that may erupt as the Air Force tries to fly a fighter for 50 years—something that’s never been done. In a press conference to explain the F-15’s woes, Gen. John D.W. Corley, the ACC commander, told reporters, “We may never get back to full health with this fleet.”

Due in large part to doubts about F-22 production, some 177 F-15s will be kept in the inventory into the 2020s. The aircraft will get structural fixes to stretch their years of service and a new radar, but they will be consigned to those battles where stealth and superspeed are not needed.

Some of the “new” fifth generation fighters may start to age out of the fleet before 2030. The first all-up F-22 fighter rolled off the assembly line in 1998, and is already 10 years old. The F-22 has a design life of some 30 years. Matthews said the Air Force has begun to think about what will replace the F-22, since it took 20 years to get the Raptor from drawing board to ramp.

Regardless of the annual buy rate, the Air Force has stuck to a production objective of 1,763 F-35s. It simply has to buy that number to have enough fighters to go around.

“Some people say, ‘Well, you’re getting a more capable aircraft, so the numbers need to come down,’” Matthews noted. “We are getting a more capable aircraft, that’s true, but there’s a certain level ... you can’t go below just because of geography. I can’t be in two places at the same time.”

He also noted that not buying enough F-22s will create a permanent condition wherein the F-22s are a high demand-limited availability asset. Regional commanders demanding them will be perpetually shortchanged, and not just in air superiority; one-half squadron of F-22s will essentially be substituting for “two and a half squadrons per AEF” of today’s aircraft.

Matthews acknowledged that some USAF critics believe so-called “short-range fighters” are the wrong place to

put scarce procurement dollars—that if China and Russia are the emergent and re-emergent threats, then the Air Force ought to invest in long-range bombers instead.

However, said Matthews, “Many of the types of conflicts that we’re looking at are not going to be amenable to relatively modest fleet sizes operating from great distances.” A small fleet of bombers simply couldn’t match the sortie rate of fighters, and access at foreign operating bases will still be needed.

A Critical Part of CONOPS

“The mix is highly sensitive to what kind of assumptions you’re making about what the mission sets are and what type of threat you’re going to get,” Matthews noted. The 2,250 fighter fleet number is the one that offers the best combination for most scenarios.

Likewise, Matthews said, it’s not sufficient merely to load up on stealthy standoff missiles as a substitute for fighters.

“You can never fully ... get around the requirement to have a stand-in capability, just because of the dynamic nature of the battlefield,” Matthews said. He added that standoff weapons are “a critical part of all our concepts of operation” but will never substitute for a larger, flexible platform.

In the debate, the Air Force doesn’t have to assume that adversary fighters will get stronger. It’s already happening.

Critics of the Air Force’s fighter modernization plans often put forth an argument that the F-22 in particular was

a Cold War weapon designed for a threat that “never materialized,” citing the fact that the Soviet Union went out of business in 1991. Pierre M. Sprey, an Air Force gadfly who had a hand in designing the F-16, recently declared air-to-air combat a thing of the past.

Apparently, foreign air forces didn’t get the memo. Russia never paused in developing, building, deploying, and selling its best fighter, the Su-27 Flanker (and derivatives), one of the best-selling and most capable combat aircraft in the world. About 1,200 Flankers in a bewildering array of variants have been deployed or sold to 15 countries, including China, India, Venezuela, and Belarus.

As recently as the late 1990s, the Air Force F-15C was still considered the best all-around fighter in the world, owing to its radar range and aerobatic abilities. However, according to internal USAF documents, the F-15C is now second best to the Flanker in practically every important comparison, such as radar, weapons, range, processors, and maneuvering. Plus, most Flankers are less than half the age of the F-15.

Flankers boast thrust vectoring, some variants have close-coupled canards, and nearly all have Digital Radio Frequency Memory jammers on wingtip pods, which are adept at confusing older-style radars such as those on most F-15s and F-16s. They make the Flanker appear to be somewhere it isn’t.

The Air Force plans to upgrade many of its F-15s with active electronically scanned array radars, or AESA, which will buy back some of the Eagle’s de-



Crew chiefs marshal F-15s to parking spaces at RAF Lakenheath. These aircraft belong to the 492nd Fighter Squadron.

USAF photo by MSgt. Lance Cheung



Three F-22 Raptors fly in formation. Even when the F-22 buy is complete, USAF still will be flying large numbers of geriatric F-15s and F-16s.

tection range, but such improvements won't make the F-15 any younger or more agile. The recent F-15 grounding, due to cracks in supposed life-of-the-aircraft parts, was evidence enough that the fleet is tired after 17 years of continuous combat.

That the Flanker has matched the F-15 was borne out in Cope India exercises a few years ago, in which US F-15s were defeated by India's Flanker-led forces.

Russia's Sukhoi aircraft company announced late last year that it will flight-test a fifth generation aircraft of its own design in 2009, and start deliveries to the Russian Air Force in 2015. Sukhoi said the aircraft, known as the T-50, will be comparable to the F-22 and is already being fabricated. Last November, Russia announced it was in negotiations with India's Hindustan Aeronautics Limited to jointly develop and build the aircraft.

Claims of a Russian fifth generation fighter have been made several times in the last 15 years, and all have proved to be wishful thinking. However, Russian President Vladimir V. Putin last year pledged to apply a good chunk of his country's new oil wealth toward making Russia's aerospace products dominant in the market.

Chinese military white papers have urged the development of aircraft to equal those in USAF, and Air Force analysts say China is indeed making preparations to build an F-22-like aircraft, called the XJ-12, late in the next decade.

The Flanker is not the only formidable air-to-air threat faced by the Air Force today. Even the "second string" fighters in Russia, China, India, and other countries are rapidly advancing. The MiG-29 is considered an aerodynamic match for

the F-16 and F-18 and has been sold to 34 countries, including Iran, Syria, and North Korea.

Fighting in an Enemy's Airspace

China has now fielded its own indigenously built counterpart of the F-16, called the J-10, and is jointly developing the FC-1 or JF-17 with Pakistan. The JF-17 is externally similar to the F-16 and F-20 Tigershark and shows potential to be a world-class point defense fighter.

Raw comparison of fighter numbers is not useful in gauging USAF's needs. With a fleet of fewer than 200 Raptors, USAF will be able to go to war with 125 or so, at most. The rest will be in maintenance, training, or test.

Moreover, USAF fights in an enemy's airspace. The first squadrons in wartime deployments will find themselves outnumbered by some of the larger air forces in the world, operating from their own home bases, demanding that the Raptors achieve a heavily lopsided kill ratio. They will have to be many times better than the aircraft they face in battle just to survive.

Fighters represent just part of the threat equation. Integrated air defense systems, or IADS, are proliferating, and in recent years, the "threat rings" around adversary targets are expanding, USAF documents show. The SA-20 system, in service with Russia and China, already offers a detection range of 124 miles. A near-term improvement, the SA-21, will have a detection and engagement range of more than 230 miles. In practical terms, such a system deployed by China on the edge of the Taiwan Strait would put any aircraft taking off from Taiwan immediately within range of China's surface-to-air missiles. Naval variants of these air defense systems, such as

Russia's SA-N-20 and China's HHQ-9, are also making it harder to engage surface vessels. They also have greater capability against stealthy aircraft and cruise missiles.

In addition, both Russia and China are fielding new air-to-air missiles with active radar. The Russian AA-12 and its Chinese counterpart, the PL-12, have been dubbed the "AMRAAMski" because of their close patterning on the American Advanced Medium-Range Air-to-Air Missile (AMRAAM), which has never been beaten in combat. "We're real concerned with ... their continued advancements," Matthews allowed.

Some of the Pentagon's leadership may be thinking that the F-22 would only be useful for the opening hours of a future conflict, an assumption that would be false, Matthews said.

"It's wrong-minded to think that suddenly, after four days," an air defense threat will be beaten down and never pose a problem again, he said. The Air Force experience in Serbia in 1999 showed that adversaries learn from others' mistakes, and that surface-to-air missiles lurked undestroyed and were still problematic throughout that conflict.

"A lot of these surface-to-air missile systems ... are mobile. We don't expect them all just to sit there and radiate constantly until we destroy them. They'll move around; they'll hide."

Gates, in his testimony to Congress, said he sees little chance of a tangle with a "near peer" country "over the next four or five years," leading him to be satisfied that the F-22 buy of 183 aircraft is enough.

However, Matthews said, "It's important ... that we not get focused too much on what the next four years of warfare might be." The next half-decade may be reasonably predictable, "but we sure don't know what the next 34 years of warfare is going to be."

He added that it is hard to answer one of the biggest questions: How many conflicts have been avoided because no one wanted to take on the Air Force's fighters?

"You can never really quantify what that is, but ... certainly ... it was a key element of our winning the Cold War, preventing a lot of other major conflicts, and deterring a lot of other bad things." Matthews said USAF wants to "make sure we're doing the same thing for the next 30 years."

The question is how to do it with a numerically deficient fighter force. ■

Shortfall in Airpower

"I think the Air Force and naval airpower are right on the verge of crashing on us. We have not made the investments. The technology is old. We're running them into the ground."—*Ret. Army Gen. Barry R. McCaffrey, "NBC Nightly News," Feb. 3.*

The Tiers of NATO

"I worry a great deal about the alliance evolving into a two-tiered alliance, in which you have some allies willing to fight and die to protect people's security, and others who are not. ... It puts a cloud over the future of the alliance if this is to endure and perhaps get even worse."—*Secretary of Defense Robert M. Gates, Senate Armed Services Committee, Feb. 6.*

Unknown, But Big

"It was positively, absolutely nothing from these parts."—*Local resident Steve Allen, describing the UFO he estimated to be a mile long and half-a-mile wide, hovering over Stephenville, Tex., in an area where Air Force Reserve F-16 fighters were flying, Dallas Morning News, Jan. 17.*

First Things First

"I am concerned about the possibility of a rapid deterioration of security and stability in Afghanistan. History will judge us very harshly if our focus and effort in Afghanistan are insufficient to the task. A failure of the mission there would not only damage our security, it would do serious damage to NATO. We should do first things first, just as in World War II where we focused more of our resources on Germany and the war in Europe until that war was won."—*Rep. Ike Skelton (D-Mo.), House Armed Services Committee chairman, Feb. 6.*

Bastion of Liberty

"If you're going to join the marines, you're going to join the marines, but you don't have to join the marines from our town."—*Zanna Joi, spokesman for Code Pink, after the Berkeley, Calif., City Council gave her group a reserved parking space directly in front of the Marine Corps recruiting office and the authority to use loudspeakers in weekly protests, New York Times, Feb. 1.*

Toward Mach 6

"The Chinese and Russians have learned how to disable our spy satellites, so we need some way to avoid being blinded in a war. A really fast aircraft that could get over those countries right away would be a good backup to losing our spy satellites."—*Loren B. Thompson, analyst at the Lexington Institute, on resurgence of interest in hypersonic vehicles, Fort Worth Star-Telegram, Feb. 8.*

Adjusting to Terrorism

"Pakistan, Israel, and the UK, when a terrorist activity takes place, ... they move right on back to their life. It's a tough go for the United States. So us US folks, we probably have to prepare in our psyche that there is the potential for terrorist activity. ... We have to look at it, not overreact, assimilate it emotionally and professionally, and then move on with our lives."—*Dell Dailey, State Department coordinator of counterterrorism, Defense Writers Group, Jan. 22.*

Bomber Prospects Dim

"The Air Force's commitment to field a new bomber in 2018 (the 2018 Bomber) as mandated by the 2006 Quadrennial Defense Review report is, at best, uncertain. ... Its advocacy for a new bomber lacks conviction and credibility. ... Fielding a penetrating bomber by 2018 is probably not doable, because the technology is not mature enough, and almost certainly not affordable, because the cost of trying to field immature technology will lead to skyrocketing costs."—*Center for Strategic and International Studies report, Jan. 25.*

Fewer Willing, Able To Join

"The propensity for young Americans to serve their country, coupled with a drop in key influencers—such as teachers, coaches, and family members—recommending service, is at its lowest point in 35 years. Moreover, nearly three-quarters of America's youth do not meet eligibility standards to serve in our nation's military."—*Brig. Gen. Suzanne M. Vautrinot, commander, Air Force Recruiting Service, who also said USAF is meeting 101 percent of its recruiting goal and maintaining high quality standards, Senate Armed Services personnel subcommittee, Jan. 31.*

Russians Toss High Hats

"The time has definitely come to reform military uniforms. Those utterly shameful caps need to be taken away or minimized. It is simply impossible to walk around in them when there is a strong wind, since they get blown away."—*Retired Russian Army Gen. Eduard Vorobyov, agreeing with the decision to abolish high peaked caps designed to accommodate a two-headed eagle insignia, Moscow Times, Feb. 6.*

To Fight and To Stabilize

"Army doctrine now equally weights tasks dealing with the population—stability or civil support—with those related to offensive and defensive operations, the manual states. 'Winning battles and engagements is important but alone is not sufficient. Shaping the civil situation is just as important to success.'"—*New Army operations manual, New York Times, Feb. 8.*

Staying on Them

"Part of our strategy is to stay on the offensive against these folks—I mean every day, stay on the offense, an unrelenting effort to find them and bring them to justice. It's hard to plot, plan, and attack America if you're running and hiding."—*President Bush, Las Vegas, Jan. 31.*

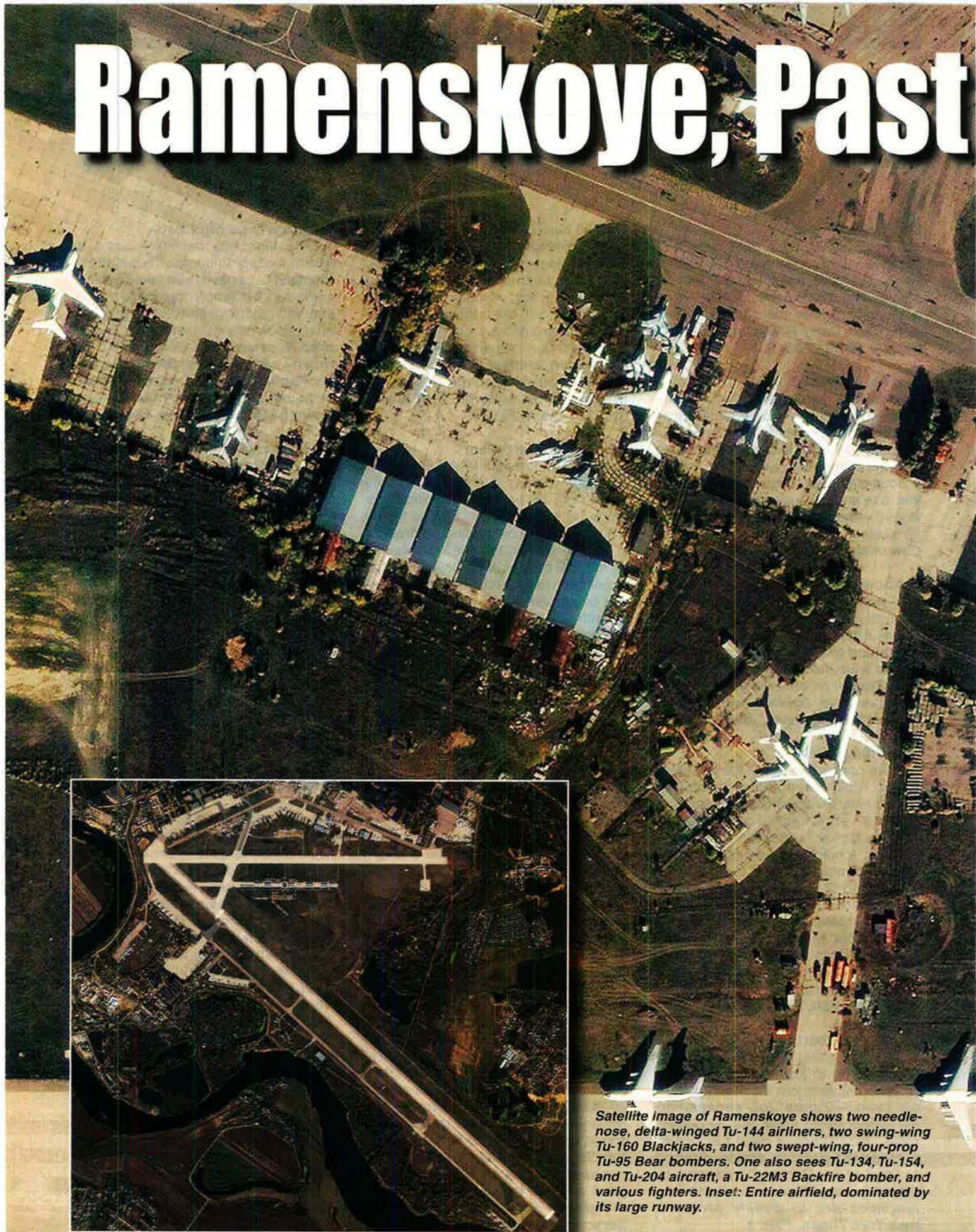
Remember Robert E. Lee

"Consider that 72 years after our Constitution was ratified in 1789, many people—including men like Robert E. Lee—still saw themselves more as citizens of their respective states than as Americans. How long will it be, for example, before a Shi'ia Arab sees him/herself as an Iraqi first and a Shi'ia Arab second? It is a hard truth that achieving US objectives in Iraq will require a sizeable long-term American military presence."—*Andrew F. Krepinevich, Center for Strategic and Budgetary Assessments, House Armed Services oversight and investigations subcommittee, Jan. 23.*

Ridge on Waterboarding

"I believe, unlike others in the Administration, that waterboarding was, is, and always will be torture."—*Tom Ridge, former (and first) Secretary of Homeland Security, Associated Press, Jan. 19.*

Ramenskoye, Past



Satellite image of Ramenskoye shows two needle-nose, delta-winged Tu-144 airliners, two swing-wing Tu-160 Blackjacks, and two swept-wing, four-prop Tu-95 Bear bombers. One also sees Tu-134, Tu-154, and Tu-204 aircraft, a Tu-22M3 Backfire bomber, and various fighters. Inset: Entire airfield, dominated by its large runway.

and Present

An aerial photograph of an air base, showing numerous fighter jets parked on the tarmac. The jets are arranged in rows, and some are parked near buildings. The base is surrounded by a fence and some vegetation. The overall scene is a detailed view of a military airfield.

Westerners have finally gotten a look at "Russia's Edwards Air Force Base."

Photography by Aleksey Mikheyev and from Gromov LII archives

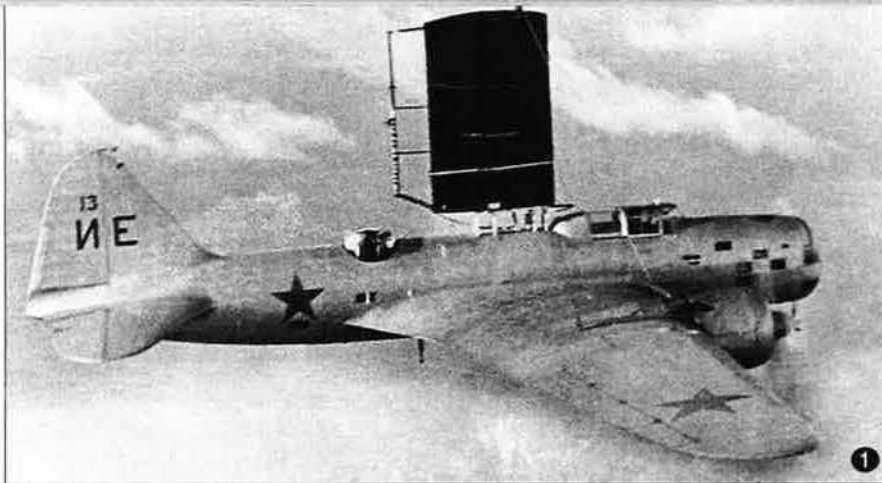
Satellite image by Dierks/Global

The Ramenskoye Airfield, near Moscow, has been the heart of Soviet and Russian aviation for 60 years. Until recently, it was also highly secretive. The facility is capable of testing every type of aircraft Russia has. It has three runways; one stretches for 3.3 miles, making it the longest in Europe. The Gromov Flight Research Institute (the Russian acronym is LII) was founded there in 1941 and is viewed as the Edwards Air Force Base of Russia—the nation's premier aviation test and engineering site. Virtually all major design bureaus are present. Since 1993, Russia has held a biennial air show there, lifting the curtain somewhat. Still, Ramenskoye remains the tightly secured center of development of Russia's new and highly advanced aircraft.

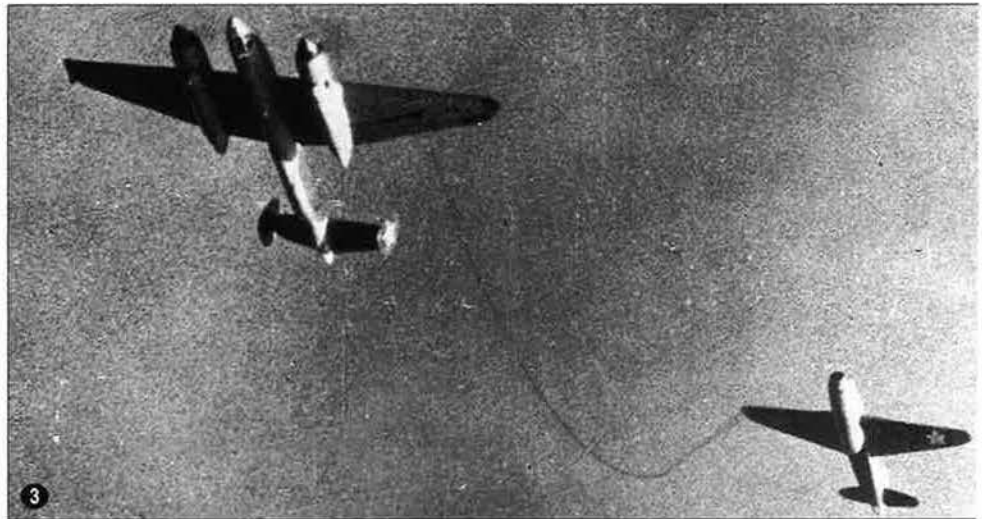
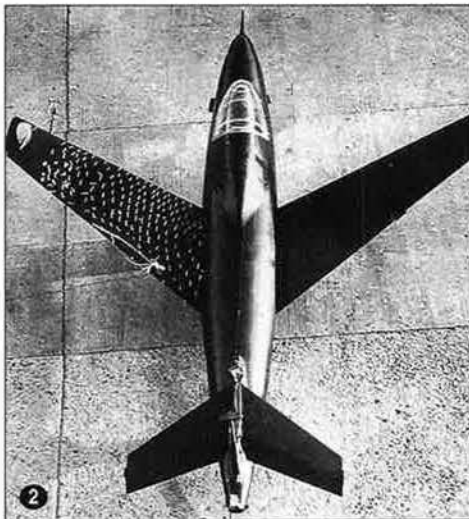


111 This is the Myasishchev Experimental Design Bureau ramp in the 1950s, with a Tu-4 Bull in foreground. The Tu-4 first flew in 1947. This aircraft was converted in 1952 into a flying laboratory to test a landing gear for the M-4 Bison bomber, seen on the taxiway. 121 A Tu-4LL outfitted with an eight-bladed propeller and an NK-12 engine for the Tupolev Tu-95 Bear strategic bomber. The then-new power plant was tested at Ramenskoye in 1952. 131 In 1951, this Tu-4KS was used as a test-launch platform for the KS missile, designed by Mikoyan. The missile went operational on Tu-16KS Badgers in 1957. 141 Mikoyan's MiG-9 took to the air for the first time on April 24, 1946, about three hours before the Yak-15. 151 This prototype Yak-15 was extensively tested in taxi and wind tunnel trials at Ramenskoye. The fighter was designed in the 1940s, and based on the Yak-3. The engines were based on a German engine. Yakovlev pulled the piston engine from its Yak-3 and replaced it with a jet engine.



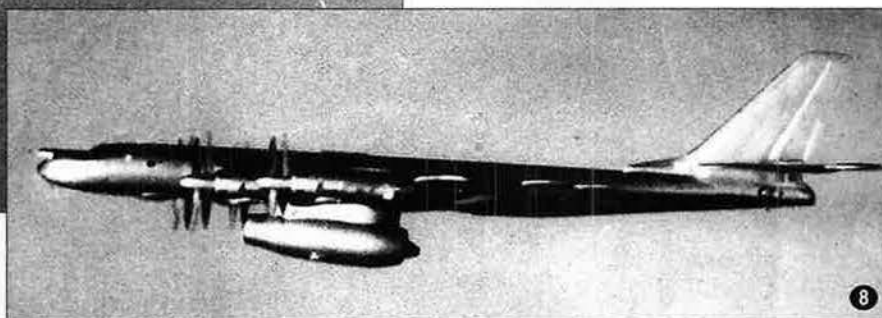
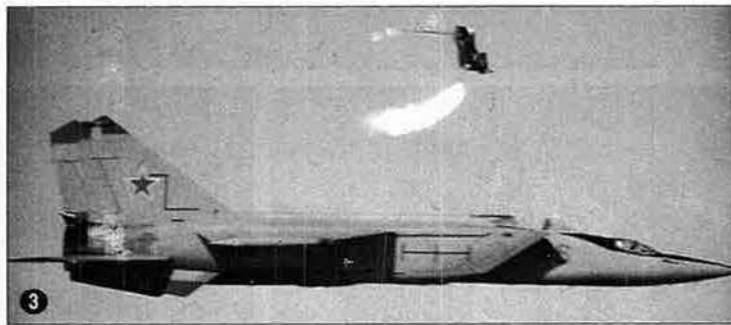


111 This DB-3 bomber was used in 1941 for laminar-flow tests. It had a test airfoil section installed vertically above the fuselage center section. 121 A forward-swept-wing glider, designated LL-3, was powered by rocket boosters. It was tested in 1947, as was a second such glider designed by Pavel Tsybin. Both gliders were towed to their test altitudes by converted Tu-2 bombers. 131 A Tu-2LL (1) plays the part of a tanker in initial trials of aerial refueling techniques. Here, the tanker and a Yak-15 fighter engage in a highly unusual and quite dangerous wingtip-to-wingtip refueling operation.



141 A single Tu-4LL, serving in the role of a tanker, refuels two MiG-15 fighters by means of a relatively new hose and drogue system. 151 This strange air vehicle, called Turbolet, was used in early tests of vertical takeoff and landing (VTOL) designs in the period 1957-59. The craft was powered by an engine from a MiG-19 and was used in research of flight dynamics and maneuverability at near-zero flight speeds. The data was later used in creation of the first Soviet VTOL aircraft—the Yak-36. 161 A modified MiG-19, redesignated SM-30, carries out a so-called "zero-length launch" in the mid-1950s. The aircraft was mounted on top of a trailer at a 15 degree angle. A solid fuel booster under the fuselage provided the thrust. The first manned tests occurred in April 1957.

111 A modified Pe-2 dive bomber in 1946 carries out the first Soviet tests of ejection seat technologies. 121 A MiG-15UTI tests a new ejection system in 1951. 131 A trainer aircraft, the MiG-25RU, goes through trials of an ejection seat later considered for the Soviet space shuttle Buran. 141 A modified Su-7U fighter tests the K-36 seat in a zero-altitude, zero-speed trial. 151 In a test, explosions blow the blades off a remotely controlled Mi-4 helicopter so that technicians could observe the effects.



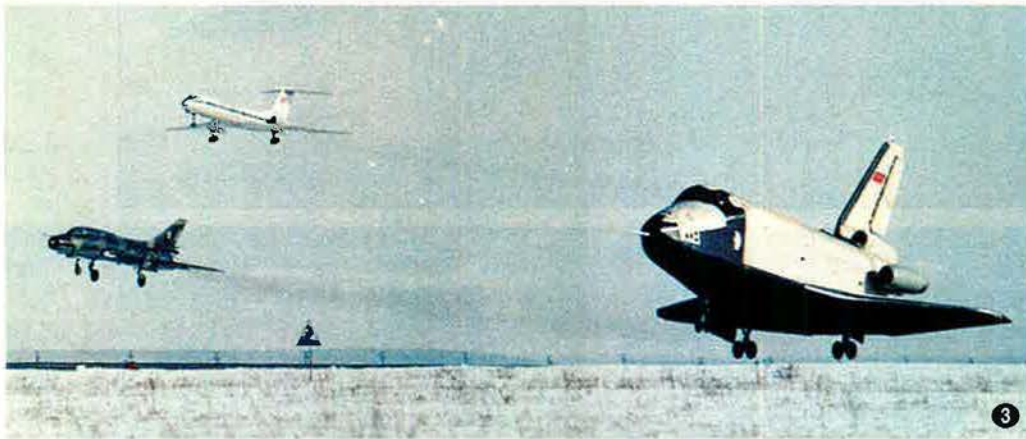
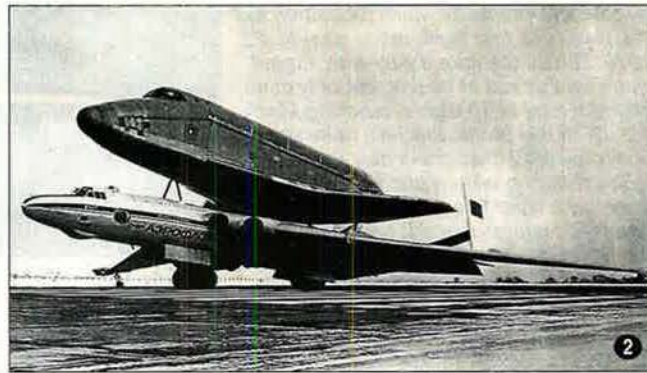
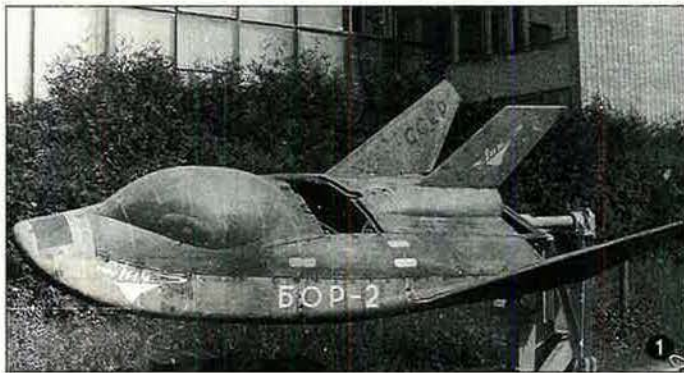
161 Mi-8 Hip helicopter, shown here in a parachute "capture," served as one of two specialized flying laboratories during the period 1975-89. 171 An An-12 Cub aircraft—the other flying laboratory—was used for ejection seat trials conducted from a special rotary cockpit installed at the extreme tail of the aircraft.

181 Soviet anti-submarine aircraft, such as this Bear, had cavernous bomb bays and were used as test beds for most new engines. Today, Il-76LLs are mostly used in this role.

111 Sukhoi's proposed Mach 3 bomber, the T-4, awaits its first flight, made on Aug. 22, 1972. The all-titanium, fly-by-wire aircraft was years ahead of its time but only completed a total of 10 flights, reaching Mach 1.3. 121 In this photo, the T-4's nose section is lowered. Designers built the nose to lower during takeoff and landing, giving the crew a clear forward view. The T-4's futuristic features made it expensive and the Soviet government chose to cancel the program. Tupolev's Tu-22M Backfire was chosen instead, as a more "down-to-earth" design. The sole T-4 prototype was transferred to the Monino museum outside Moscow, where it remains to this day.



131 This photo, taken on Aug. 11, 1971, at the Myasishchev design bureau's ramp, depicts an M-4 bomber—the 3MD Bison-C. Behind the Bison are a French-built Mirage III (foreground) and an American F-4 Phantom, both of which are covered with fabric. It is not known where they came from or whether they are actual aircraft. Further in the background, to the right of three Il-18 Coot airliners, is a prototype of a Myasishchev M-52 bomber. The M-52 was never given engines and never took to the air. 141 This prototype of the Tupolev Tu-144 supersonic airliner made its first flight from Ramenskoye on Dec. 31, 1968. It was the first airliner to break the sound barrier and to exceed Mach 2. The Tu-144 prototype was put in the air in such a hurry that it had no passenger seats, and its crew had ejection seats.



111 Bor-2, an experimental hypersonic test vehicle, flew in December 1969 at speeds of up to Mach 13.3. A member of the family, Bor-4, achieved speeds up to Mach 25. 121 A converted Myasishchev Bison bomber carries the Buran shuttle externally, piggyback fashion. There were two such carriers at Ramenskoye. 131 A full-scale Buran replica lands after a test flight. The vehicle made several flights from Ramenskoye under its own power. Here, an Su-17 fighter-bomber (foreground) and a Tu-134 airliner fly chase.



141 A new forward-swept wing design, created by Sukhoi, is about to be dropped from a helicopter; it is a scaled-down aerodynamic test article. The full-scale aircraft, originally designated S-37 Berkut, made 61 flights in the late 1990s. 151 An Su-47 prototype fighter, shown here in a test, is said to have many advanced features. Sukhoi claims that the fighter is stealthy, having a radar cross section of 3.2 sq. ft. 161 A production Tu-144 airliner in 1995 was modified by NASA, Boeing, and Rockwell as a test bed for NASA's High-Speed Commercial Research program. Note the US and Russian flags on the tail. After 27 test flights, it was returned to storage at Ramenskoye.





111 This photo captures an unlikely formation of three Ilyushin-designed transports, which are (front to rear) the Il-114, Il-76, and Il-96. 121 An Su-34 ground attack aircraft, now being fielded by Russia's Air Force, on approach to Ramenskoye. 131 A new Russian MiG-29K carrier-borne fighter, its canopy raised, awaits its next flight.



141 An F-15C from the 48th Fighter Wing, RAF Lakenheath, Britain, blasts off the Ramenskoye runway. The US Air Force aircraft was there in August 2007 to take part in an air show. (USAF first participated in this air show in 2003.) 151 USAF brought to the 2007 show a variety of aircraft, including a KC-135R aerial refueler from the 351st Air Refueling Wing, also based at Lakenheath, and 161 a C-17 Globemaster III airlifter flown in from McChord AFB, Wash. 171 A portion of the static display at a recent air show, as glimpsed from the gondola of a hot-air balloon. ■





Curtain Up on White Space

The trend is toward military use of unclassified satellite data.

By Jeremy Singer

Several efforts—developing both inside and outside of the United States Air Force—may in the next few years bring much of the nation's space surveillance capability out of the secretive "black" world and into the open.

The trend is toward relying on unclassified satellite systems to acquire vital space-based intelligence-surveillance-reconnaissance (ISR) data. In time, said officials, the openly acknowledged space systems could increasingly supplant the highly classified satellites of today.

The shift, if it comes to fruition, will

be welcomed by theater commanders, among others, because it would pay immediate dividends in the form of greater information sharing.

The change has been going on for some time. Already, USAF has come a long way toward openness since the 1991 Persian Gulf War, when commanders were often frustrated that they could not get their hands on data from intelligence satellites. At that time, Lt. Gen. Charles A. Horner, the commander of air operations in both Desert Shield and Desert Storm, charged that overclassification of data made it difficult to share important

information with American and coalition forces.

Despite improvements, the vital work of combat staffs is frequently complicated by difficulty in obtaining or distributing classified data, according to current and former Air Force officers.

Satellites should not be viewed in isolation, cautioned Col. George V. Eichelberger, Air Force Space Command's director of intelligence. On-orbit systems are just one component of the ISR equation, which involves multiple types of data from a variety of sources, he said.



An artist's conception of a Space Radar satellite, a program that is said to be fraught with technical challenges.

Illustration by Erik Simonsen

Compared to more traditional aerial ISR assets, satellites don't have much "dwell time" over areas of interest or high image resolution, Eichelberger said. However, satellites do have one awesome advantage: They can pass over any spot on the globe, even areas denied to friendly aircraft due to overflight restrictions or air defense systems. Space systems can also offer critical coverage while aerial assets are still arriving on-scene during the initial phases of an operation.

Because of the extreme advantages offered by this combination of aerial

and space-based surveillance platforms, it is not likely that either will dominate the mission any time soon, according to service officials.

The primary unclassified Air Force space system in the ISR arena today is the Defense Support Program (DSP) constellation of satellites. DSP was conceived primarily for strategic early warning of ballistic missiles fired at the United States, and was built by Northrop Grumman.

In the years since 1970, when the Air Force launched the first DSP spacecraft, the service has found the satellites

increasingly useful to support tactical users and the Intelligence Community. The last of the DSP satellites launched in November 2007.

One example of the tactical use of DSP satellites was during Operation Iraqi Freedom, when they were used to spot mobile Scud missile launchers, Eichelberger said. The DSP satellites' infrared sensors served as the initial indication of a missile firing; the information was used to cue other assets that homed in on the launchers.

Information in 10 Seconds

The Air Force's capabilities in this area will improve significantly as it replaces the DSP satellites with the Space Based Infrared System (SBIRS) constellation, which is built by Lockheed Martin Space Systems. The Air Force currently operates a SBIRS sensor aboard a classified satellite in a highly elliptical orbit, and plans to begin launching dedicated SBIRS satellites in late 2009.

The DSP satellites rotate to provide full hemisphere coverage, which means that they can deliver information about a "heat generating event" on the battlefield or elsewhere every 10 seconds.

While this capability has been useful, the SBIRS satellites will be able to deliver more frequent updates. This is because only a portion of the SBIRS scanning sensor moves while the spacecraft platform itself remains stationary.

The SBIRS satellites also feature a staring sensor not found on the DSP constellation that can focus on a particular area of interest to provide even more frequent updates.

The improved sensitivity and more frequent updates from the SBIRS satellites are expected to help US forces spot mobile launchers faster, improving the likelihood that they can be destroyed before speeding away. Targeting mobile launchers—always a difficult task—has become increasingly challenging as enemies work to develop missiles with shorter burn times and dimmer heat signatures.

The SBIRS satellites will also be far more capable of spotting tanks and other ground vehicles, according to Air Force officials. The SBIRS birds may also be useful for bomb damage assessments of targets such as ammunition dumps, as munitions that struck such targets would likely trigger secondary explosions that could be picked up by the satellites.

If the United States were to come under missile or rocket attack, the SBIRS satellites should also help intelligence

officials learn more about the nature of the attack. Longer looks at the incoming missile, made possible by SBIRS' staring sensor, could help characterize what type it is, which better enables intelligence officials to determine the missile's range and possible impact point.

Beyond DSP and SBIRS, most other unclassified space-based ISR capability comes from the commercial satellite imagery industry.

The Air Force and other military services generally acquire commercial satellite pictures through the National Geospatial-Intelligence Agency (NGA) in Bethesda, Md., which buys it from companies such as Digital Globe of Longmont, Colo., and GeoEye of Dulles, Va.

Users of commercial ISR data are often willing to sacrifice the unparalleled resolution of classified satellites for imagery that can be easily shared among US and coalition forces, as well as civil government agencies and nongovernmental organizations during relief efforts.

In some cases, as in the development of broad area maps of a battlefield—or views of zones affected by hurricanes, floods, or other natural disasters—commercial satellites can do the jobs just fine. In many of these cases, the high resolution that classified intelligence satellites provide is simply not necessary.

While commercial imagery has become increasingly valuable to the US military, there is an obvious drawback to its availability. Some enemies that previously did not have the money or

expertise to develop their own spy satellites now have access to their own eyes in space, Eichelberger said.

Even applications available without charge on the Internet, such as Google Earth, can provide valuable ISR data both to the US and its adversaries.

Smaller Sats For Smaller Jobs

The quest for quickly available ISR capability also led to the Operationally Responsive Space mission. One way of speeding this up is through the construction of small satellites that can be built quickly and relatively cheaply compared to the satellites used to support most military operations today.

Though the potential has been untapped to date, through ORS the Air Force could increase its use of unclassified space assets and bring new capabilities on-line much faster. The current development cycle—from requirements generation to satellite launch—can take more than 10 years in cases like SBIRS.

Even advocates for the ORS concept say that small satellites will not replace the larger satellites such as DSP that the Air Force uses today, but advocates believe ORS can offer a valuable new capability. The small satellites would likely be used to augment existing systems or replenish constellations that have been disrupted or destroyed by events such as solar flares—or enemy attack.

ORS appears to have recently taken on a higher priority within the Air Force. (The year 2007 saw the creation of an

ORS program office at Kirtland Air Force Base in New Mexico.)

Increased priority is supported by the service's planned budget between 2009 and 2013. Though ORS funding is less than most satellite efforts, it still saw a significant increase from the plan a year ago, as planned five-year funding increased to \$549.3 million from \$322.3 million.

While ORS is intended to address a variety of missions, Eichelberger said the vast majority of users polled have said that they would like to see ISR payloads aboard the small satellites.

In addition to delivering ISR capabilities quickly, ORS aims to put the small satellites directly under control of theater commanders, rather than forcing them to go through middlemen to task the sensors and relay the information. Even without the resolution of classified systems, small ORS satellites may be able to offer valuable additional views of an area of interest, according to Col. Kevin McLaughlin, director of the ORS program office.

The Air Force is still moving ORS from the realm of experimentation to operations. The service took a first step in this direction in December 2006 with the launch of TacSat-2, which featured an imaging sensor and a signals intelligence payload.

McLaughlin said work on projects such as TacSat-2 has been "very successful" thus far, but the military still has "a long way to go in terms of building satellites faster and launching faster, especially on a routine basis."

The work with TacSat-2, which wrapped up in December 2007, has raised important issues. These lie outside of merely developing the technology needed to address future military ORS missions.

"Responsively delivering ORS capabilities is as much about [concepts of operations], processes, policies, procedures, authorities, and relationships as about technology," McLaughlin said. "The TacSat series of satellites is paving the way toward operational capabilities," by developing "all of the enablers needed to make ORS operational satellites successful, both technical and nontechnical. While ORS will be building small satellites, that is just one facet of ORS' overarching focus" on quickly delivering robust capabilities to the field.

One incident that ORS advocates cited as a significant frustration, but that ultimately became a valuable learning experience, was the Air Force's inability



Many satellite images are easy for the public to access, such as this one provided by Google Earth.



An artist's conception of a satellite in the Defense Support Program constellation. DSP is the primary unclassified USAF space system in the ISR arena today.

ity to turn on the main sensors aboard TacSat-2 for several months following its launch. The problem began with a debate between the service and the Intelligence Community about tasking authority—who had the right to turn the sensors on?

ORS proponents were not pleased by the delay because it cut into the time available to experiment with TacSat-2. Officials added, however, that the process highlighted the tasking issue so that it could be resolved before similar satellites are launched for military operations.

The next ORS satellite to launch is expected to be TacSat-3, currently scheduled for launch this summer. TacSat-3 features a hyperspectral imager built by Raytheon Space and Airborne Systems, which will give military officials the chance to experiment with the ability to use a small satellite to see through enemy attempts to camouflage buildings and vehicles.

In addition to future use aboard ORS satellites, sensors demonstrated through the TacSat program, such as hyperspectral imagers, could also find themselves deployed on new unmanned aerial vehicles, McLaughlin said.

The ORS office is hoping to initiate work this year on another satellite called ORSSat-1, which will have electro-optical and infrared sensors, McLaughlin said. An industry official said that the satellite's combination TV/heat sensing payload may essentially be a version of the sensors used on the U-2 aircraft, modified to fly in space.

The ORSSats, funded by the ORS

program office, are built with the intention of serving as prototypes for future operational spacecraft, McLaughlin said, while the TacSats reflect more of the research and development focus of the military laboratories that build and fund them.

ORSSat-2s and TSAT, Too

The labs will likely continue to build TacSats, as they may feature technology that is not ready for use in operational settings, he said.

Depending on its budget and workload, the ORS office may also begin work on ORSSat-2 this year, McLaughlin said. One option for the spacecraft's payload is a hyperspectral imager.

"The immediate contribution of any one small satellite would be small," relative to the entire portfolio of ISR capabilities, McLaughlin said. "The larger impact will be gradual and evolutionary as ORS capabilities are proven" over the next decade.

One way that the Air Force could boost its ISR coverage with operationally responsive satellites is by working with its allies, said Col. Thomas A. Doyne, a space advisor in the Office of the Secretary of Defense.

By collaborating on block buys of small satellites, as USAF has done with allies on a variety of fighter aircraft programs, the service could bring down the cost of buying the satellites. The US could also participate in an arrangement

where each nation could take advantage of the information gathered by others' assets, he said.

Another significant source of ISR data from space could come from Space Radar satellites—assuming that program ever gets off the ground. The Space Radar budget and many of the details about the effort are classified, but the Air Force-National Reconnaissance Office partnership is struggling for funding on Capitol Hill.

Space Radar was initially conceived as offering continuous tracking of mobile targets around the world, regardless of time of day or weather conditions. However, the cost of developing a constellation with enough satellites to maintain continuous tracks became prohibitive. The current Space Radar concept of operations is more integrated with aerial assets.

The House Appropriations Committee described the effort scathingly in a report accompanying 2008 defense budget legislation. Space Radar, according to the committee, is fraught with technical challenges, is potentially duplicative of the moving target tracking capability conducted by aircraft, is "not affordable," and is "a lower priority than other defense requirements."

The Space Radar satellites are also intended to serve the Intelligence Community by offering high-resolution imagery of ground areas. In addition to the difficulty finding support on Capitol Hill, the program has been hampered by disagreements between the Air Force and the NRO over some familiar issues—including who should have operational control of the satellites.

To properly take advantage of the data from new systems such as Space Radar, the Air Force will need to find ways to handle the enormous flow of data that they will provide. This will entail the development of new communications satellites like the Transformational Satellite Communications System to pass the data from space to Earth, as well as ground systems for the tasking, processing, exploitation, and dissemination of the data.

Without addressing those issues, the Air Force risks gathering a tremendous amount of ISR data, and then having it "fall on the floor of a ground station," Eichelberger said. ■

Jeremy Singer is a Boston-based staff writer for Space News. He covers the Pentagon and is the editor for special projects. His most recent article for Air Force Magazine, "Laser Links in Space," appeared in the January issue.

Defense Budget at a Glance

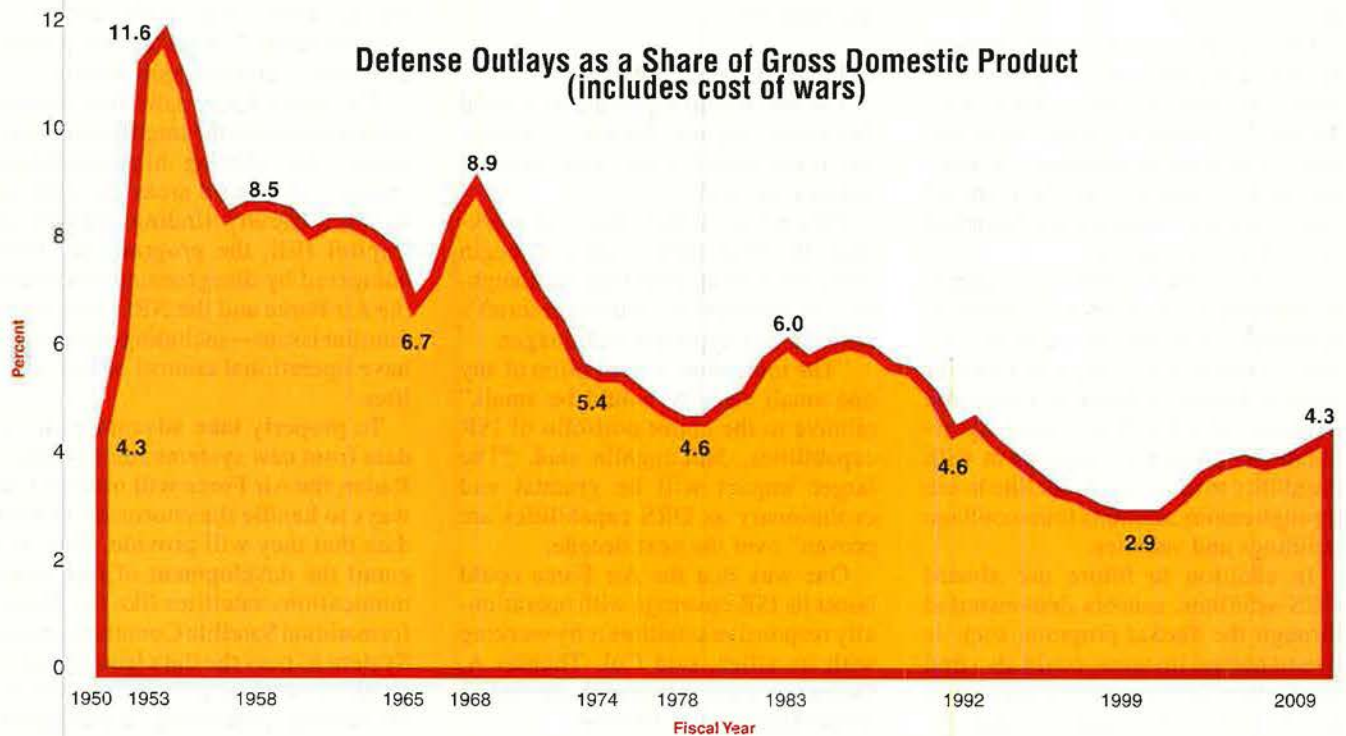
President Bush on Feb. 4 presented a DOD budget request for Fiscal 2009. It seeks \$515.4 billion in budget authority less war costs and \$585.4 billion in BA counting war costs. Funding most often is stated in BA—the value of new obligations DOD can incur. (Some are paid in future

years.) Figures can also be expressed in outlays—actual checks written in a given year. “Current dollars” contain no adjustment for inflation. With “constant dollars,” inflation has been factored out. Charts address only the Defense Department program.

Defense Budget Authority

(\$ billions)

	2007	2008	2009	Planned 2010	2011	2012	2013
No War Costs, Current dollars	\$433.1	\$479.5	\$515.4	\$523.5	\$529.5	\$538.4	\$548.5
No War Costs, Constant FY 2009 dollars	\$455.9	\$490.5	\$515.4	\$511.5	\$505.9	\$503.1	\$501.3
With War Costs, Current dollars	\$597.1	\$669.5	\$585.4	\$523.5	\$529.5	\$538.4	\$548.5
With War Costs, Constant FY 2009 dollars	\$628.5	\$684.9	\$585.4	\$511.5	\$505.9	\$503.1	\$501.3



Defense Outlays

(\$ billions)

	2007	2008	2009	Planned 2010	2011	2012	2013
With War Costs, Current dollars	\$529.8	\$583.0	\$651.1	\$511.1	\$524.6	\$524.7	\$542.1
With War Costs, Constant FY 2009 dollars	\$557.7	\$596.4	\$651.1	\$499.3	\$501.3	\$490.3	\$495.4

Service Shares

(Budget authority in billions of constant FY 2009 dollars)

Dollars	2007	2008	2009	2010	2011	2012	2013
Air Force	\$135.1	\$137.4	\$143.9	\$141.1	\$140.9	\$140.4	\$139.1
Army	114.2	131.4	140.7	138.9	135.0	133.4	130.3
Navy/Marine Corps	132.7	142.3	149.3	149.1	148.9	147.7	146.4
Defense agencies	73.8	79.5	81.6	82.3	81.2	81.7	85.5
Total	455.9	490.5	515.4	511.5	505.9	503.1	501.3
Percentages							
Air Force	29.6%	28.0%	27.9%	27.6%	27.9%	27.9%	27.7%
Army	25.1%	26.8%	27.3%	27.2%	26.7%	26.5%	26.0%
Navy	29.1%	29.0%	29.0%	29.1%	29.4%	29.4%	29.2%
Defense agencies	16.2%	16.2%	15.8%	16.1%	16.1%	16.2%	17.1%

Cutting the Pie: Who Gets What

(Budget authority in billions of constant FY 2009 dollars)

	2007	2008	2009	2010	2011	2012	2013
Military personnel	\$116.2	\$119.2	\$125.2	\$127.4	\$129.5	\$131.3	\$132.7
O&M	155.6	168.0	179.8	176.4	176.4	177.3	179.1
Procurement	88.1	101.3	104.2	112.2	112.5	115.7	114.4
RDT&E	79.8	78.3	79.6	75.3	69.4	66.1	62.2
Military construction	9.7	18.2	21.2	15.9	13.4	10.7	9.5
Family housing	4.2	3.0	3.2	2.4	1.9	1.9	1.7
Other	2.4	2.8	2.2	1.9	3.0	0.4	1.5
Total	455.9	490.5	515.4	511.5	505.9	503.1	501.3

Manpower

(End strength in thousands)

	1990	2006	2007	Est. 2008	Est. 2009	Change 1990-2007
Total active duty	2,065	1,385	1,380	1,371	1,368	-685
Air Force	535	349	334	329	317	-201
Army	751	505	522	525	532	-229
Navy	582	350	338	328	325	-244
Marine Corps	197	180	187	189	194	-10
Selected reserves	1,128	826	829	831	838	-299
Civilians (FTE)	997	662	659	671	677	-338

Operational Training Rates

	1990	2000	2006	2007	Est. 2008	Est. 2009
Air Force						
Flying hours per crew per month, fighter/attack aircraft	19.5	17.2	16.0	15.9	14.4	13.9
Army						
Flying hours per tactical crew per month	14.2	12.7	11.6	11.1	11.6	12.3
Annual tank miles	800.0	669.0	615.0	729.0	459.0	608.0
Navy						
Flying hours per tactical crew per month	23.9	20.9	23.0	23.7	18.3	18.5
Ship steaming days per quarter						
Deployed fleet	54.2	50.5	39.0	59.0	45.0	45.0
Nondeployed fleet	28.1	28.0	24.0	27.0	20.0	22.0

Acronyms

AEHF	Advanced Extremely High Frequency
AFRC	Air Force Reserve Command
AMRAAM	Advanced Medium-Range Air-to-Air Missile
ANG	Air National Guard
AWACS	Airborne Warning and Control System
BUR	Bottom-Up Review
DSP	Defense Support Program
EELV	Evolved Expendable Launch Vehicle
FTE	Full-Time Equivalent
GPS	Global Positioning System
JASSM	Joint Air-to-Surface Standoff Missile
JDAM	Joint Direct Attack Munition
JPATS	Joint Primary Aircraft Training System
JSF	Joint Strike Fighter
MLV	Medium Launch Vehicle
NPOESS	National Polar-orbiting Operational Environmental Satellite System
O&M	operation and maintenance
ORS	Operationally Responsive Space
QDR	Quadrennial Defense Review
RDT&E	research, development, test, and evaluation
SBIRS	Space Based Infrared System
STARS	Surveillance Target Attack Radar System
TSAT	Transformational Satellite
UAV	unmanned aerial vehicle

Major USAF Programs RDT&E

(Current million dollars)

Program	2007	2008	2009
A-10	42.5	2.0	0.0
B-1B bomber	153.8	152.2	128.9
B-2 bomber	214.6	295.9	351.4
B-52	88.4	42.1	38.7
Next Generation Bomber	37.5	0.0	0.0
C-5 transport	137.6	179.0	125.1
C-17 transport	170.5	180.6	236.0
C-130 transport	185.6	250.0	172.6
C-130J transport	34.8	73.8	52.4
CSAR-X	103.7	94.4	305.1
CV-22 transport	12.8	16.6	18.6
E-3 AWACS	157.8	151.6	126.3
E-8 Joint STARS	171.6	82.0	97.6
E-10 Multisensor C2	351.9	39.0	42.2
F-15E fighter	134.3	114.5	184.2
F-16C/D fighter	124.8	70.2	124.0
F-22A fighter	459.5	607.5	700.3
F-35 fighter (JSF)	2,074.0	1,991.5	1,524.0
KC-X tanker	68.3	113.7	831.8
T-6 JPATS	0.0	0.0	0.0
AIM-120 AMRAAM	33.4	33.4	54.2
JASSM	33.0	12.1	13.0
JDAM	21.0	0.0	0.0
Sensor Fused Weapon	0.0	0.0	0.0
Small Diameter Bomb	122.3	144.3	125.1
AEHF satellite	617.3	599.4	388.0
Counterspace systems	44.6	63.8	74.9
DSP satellite	0.0	0.0	0.0
GPS satellite	452.1	601.9	819.0
MilSatCom	257.2	384.7	337.1
NPOESS	343.3	332.5	289.5
SBIRS High satellite	677.9	583.3	529.8
Space Radar satellite	183.2	n/a	n/a
TSAT	700.4	804.7	843.0
Wideband Global SATCOM	44.0	19.1	12.4
EELV booster	19.1	0.0	33.7
MLV booster	0.0	0.0	0.0
ORS booster	42.1	96.5	110.0
Minuteman III ICBM	0.0	0.0	0.0
Global Hawk UAV	224.1	274.7	284.3
Predator UAV	77.9	33.8	24.8
Reaper UAV	0.0	63.9	43.6

Major USAF Programs Procurement

(Current million dollars)

Program	2007	2008	2009
A-10	276.2	168.0	144.1
B-1B bomber	79.1	34.4	71.8
B-2 bomber	62.7	212.1	330.4
B-52	63.9	33.1	41.7
Next Generation Bomber	0.0	0.0	0.0
C-5 transport	202.9	320.6	583.1
C-17 transport	4,721.7	438.8	699.1
C-130 transport	448.1	212.6	422.8
C-130J transport	1,182.0	743.2	155.4
CSAR-X	0.0	0.0	15.0
CV-22 transport	339.0	491.7	423.3
E-3 AWACS	66.3	53.8	86.5
E-8 Joint STARS	100.5	79.2	30.7
E-10 Multisensor C2	0.0	0.0	0.0
F-15E fighter	277.0	58.7	12.3
F-16C/D fighter	367.9	332.9	273.7
F-22A fighter	3,540.5	3,810.4	3,381.2
F-35 fighter (JSF)	571.7	1,412.1	1,810.7
KC-X tanker	0.0	0.0	61.7
T-6 JPATS	302.5	244.2	33.2
AIM-120 AMRAAM	114.2	193.3	294.7
JASSM	156.5	160.0	240.3
JDAM	194.1	112.0	105.7
Sensor Fused Weapon	118.4	0.0	0.0
Small Diameter Bomb	114.7	94.7	133.2
AEHF satellite	0.0	132.1	16.6
Counterspace systems	30.2	22.7	29.2
DSP satellite	75.8	0.0	0.0
GPS satellite	95.7	219.4	135.6
MilSatCom	75.3	117.6	106.3
NPOESS	0.0	0.0	0.0
SBIRS High satellite	6.5	399.3	1,798.4
Space Radar satellite	0.0	n/a	n/a
TSAT	0.0	0.0	0.0
Wideband Global SATCOM	412.5	322.9	22.5
EELV booster	852.1	1,091.8	1,205.3
MLV booster	91.3	116.9	5.8
ORS booster	0.0	0.0	0.0
Minuteman III ICBM	674.4	538.7	323.1
Global Hawk UAV	442.6	580.9	712.2
Predator UAV	428.5	276.1	378.2
Reaper UAV	247.6	58.1	161.4

Selected Force Structure

	Cold War Base 1990	1990 Base Force	1993 BUR Plan	1997 QDR Goal	Most Recent Published Plan 2003	2009
Air Force						
Active fighter wings	24	15	13	12+	12+	—
AFRC/ANG fighter wings	12	11	7	8	7+	—
Combat Wings (all types)	—	—	—	—	—	86
Army						
Active divisions	18	12	10	10	10 ^c	—
Army National Guard/Reserve	10	8 ^a	8	8	8 ^c	—
Active Brigade Combat Teams	—	—	—	—	—	48
ARNG BCTs	—	—	—	—	—	28
Navy						
Active Aircraft Carriers	15	12	11	11	10	10
Reserve Aircraft Carriers	1	1	1	1	1	1
Active Air Wings	13	11	10	10	10	10
Reserve Air Wings	2	2	1	1	1	1
Marine Corps						
Active Marine Expeditionary Forces	3	3	3	3	3	3
Marine Forces Reserve	1	1	1	1	1	1

^a Comprising 34 brigades.

^b Plus two armored cavalry regiments.

^c Plus 16 separate brigades (15 of which are at enhanced readiness levels).

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EMA

The Air Force has pushed airpower education higher on the list of service priorities.

Toward the Totally Educated Airman

By Rebecca Grant

“It takes much longer to train upper officers in an air force than it does in a ground army or navy.” Such were the sober words of Maj. Gen. William Mitchell, the famous airman, in his seminal 1925 book, *Winged Defense*.

Were he alive today, Mitchell would see that the job has, if anything, only gotten harder.

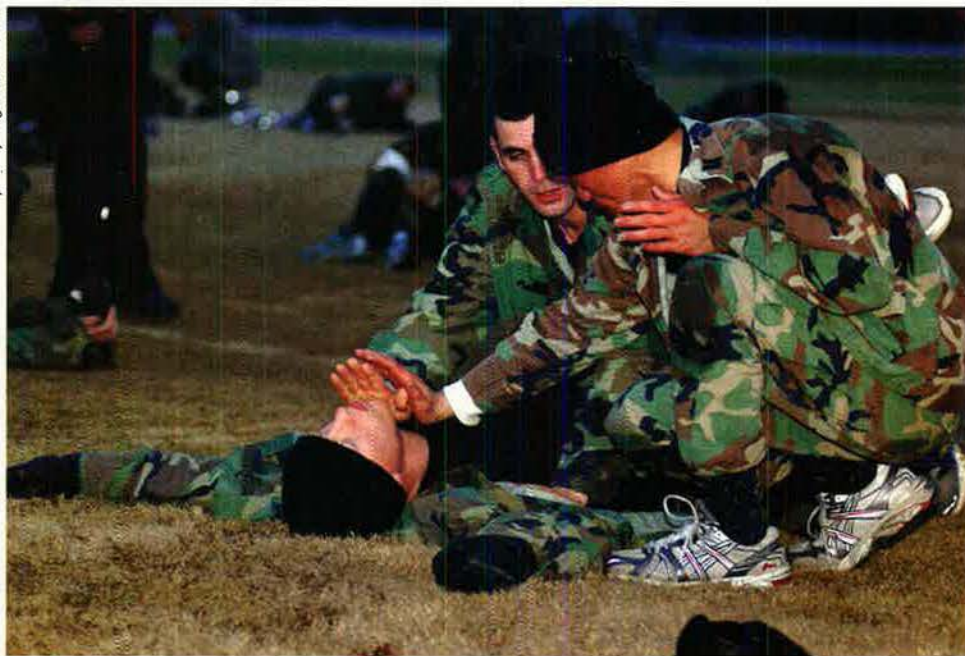
Today’s “upper officers” are now required to learn foreign languages, cultures, joint warfighting, strategy, leadership—and squeeze in the art of airpower, too. Indeed, senior USAF leaders are formulating major changes to the curriculum and expanding the resources for education at all levels. The effort ranges from Junior Reserve Officer Training Corps programs in high schools to doctoral work at the Air Force Institute of Technology.

At the core of the new effort is Air University at Maxwell AFB, Ala. The historic campus in Montgomery, Ala., is abuzz with change. Much is internal, as the institution adapts curriculum and structures to meet needs of an expeditionary force. There is also an outward focus: The Air Force seeks to make AU the world’s center of air, space, and cyberspace thought.

Said AU’s commander, Lt. Gen. Stephen R. Lorenz: “You have to stir the passions to get people to believe. We need to have a thick skin to push [understanding of] air, space, and cyberspace around the world.”

The first wave of change crested in June 2004, when AU gained accreditation of the Southern Association of Col-

USAF photo by MSgt. Scott Meorman



Capt. Jay Phomavong (r) instructs an unidentified officer trainee as part of the new Air Force Combative Program at Maxwell AFB, Ala.

leges and Schools. Congress already had granted AU the right to confer master’s degrees, and both the Community College of the Air Force and the School of Advanced Air and Space Studies had achieved full accreditation. However, AU’s success in the formal and rigorous accreditation process made AU a true academic institution.

An Air, Ground, Space Fight

Then, Air Force senior leaders set in motion a wholesale re-examination of what it takes to educate airmen. The rethink was overdue. “The airman of today is vastly different from five or

10 years ago,” noted Gen. William R. Looney III, commander of Air Education and Training Command, which oversees AU.

Looney explained that, in former times, “most of the fighting was done by the folks who got into airplanes, because we fought from sanctuaries,” but that, now, airmen fight equally in the air, on the ground, or in cyberspace. Education—both the type and the timing—needs to reflect the needs of a force committed to diverse, global operations.

Example: Instead of waiting for years to attend Squadron Officer

School, the youngest officers meet and work with officers outside their specialties much earlier than used to be the case. This change reflects the fact that deployed airmen must work with everyone from security forces and engineers to communicators and aircrews. The education process aims to give them a leg up by adding that cross-tribal exposure early in their careers.

For Lorenz, another crucial step was tightening the organizational structure of AU to implement course and curriculum changes quickly and consistently. The original structure mimicked universities, with separate colleges for distinct educational missions. The World War II generals who took over AU looked at the missions and saw Harvard or Oxford.

"I saw squadron and wing command," said Lorenz, who has been nominated for a fourth star and to succeed Looney.

Thus, AU is now organized like a flying wing. The Air War College, School of Advanced Air and Space Studies, Air Command and Staff College, Squadron Officer School, and Air and Space Basic Course center come under an umbrella organization which leaders hope will be called the Carl A. Spaatz Center for Officer Education.

Today, officer professional education falls under a single commander. The point was to link faculty and administration in a way that made the curriculum more flexible and adaptable. Each school still has a distinct faculty and focus, but the process of adding new topics and evaluating changes is much more tightly linked to keep pace with real-world demands on airmen.

"Now everybody is a warrior-airman," said Looney. "We focus more on teaching warrior skills. It's more of a combat-focused curriculum."

The flying wing structure comprises all facets of education, from accessions through senior service school. Perhaps the single most dramatic change was the insertion of language and culture into the curriculum. In the garrison force of the 1970s and 1980s, most officers had little need for language and culture skills.

The formation of the Expeditionary Aerospace Force in the 1990s and then the onset of the Global War on Terrorism after September 2001 changed all that. In 2006, USAF's Chief of Staff, Gen. T. Michael Moseley, mandated Air Command and Staff College students receive

Air University photo



An aerial shot of the sprawling Air University campus. AU provides education for airmen from precommissioning to degree granting and professional continuing education for officers, enlisted, and civilian USAF personnel.

language instruction in French, Spanish, Arabic, or Mandarin Chinese.

Cultural Literacy

Adding language instruction was a serious undertaking, and there were complaints from students ranging from the quality of the instruction to the relative importance of language and other core topics. (A two-year pilot

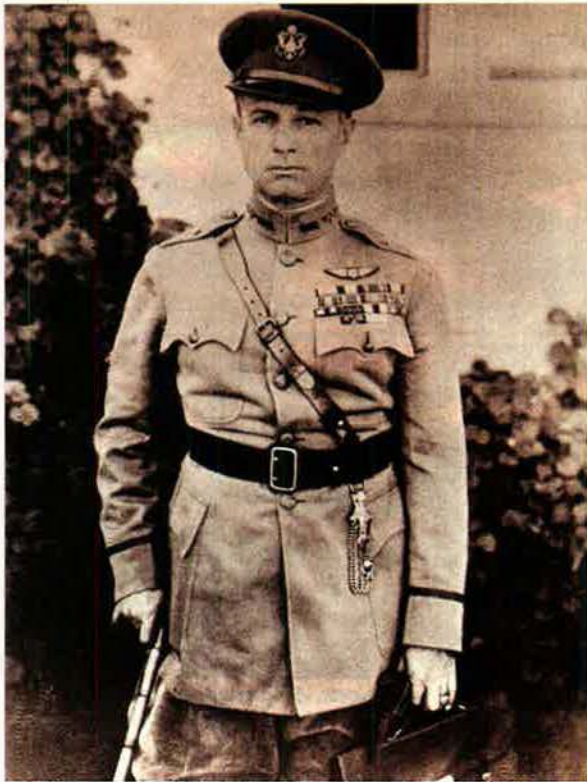
program testing different methods of instruction will undergo an assessment this summer.)

Cultural training is set to spread throughout the AU curriculum. The top academic leadership sees the issue as bigger than merely learning how to read street signs or ask directions in the chosen language. Take, for example, the case of Brian R. Selmeski. A new

USAF photo by MSgt. Lee Roberts



Gen. William Looney III, then-commander of Air Education and Training Command, is applauded by airmen as he leaves the Air Force Senior NCO Academy auditorium.



William Mitchell quickly recognized that it takes much longer to effectively train airmen compared to ground or Navy officers.

addition to the faculty, Selmeski holds a Ph.D. in anthropology and served on active duty with the Army. His task at AU is to help build the curriculum to improve cross-cultural competence for airmen. That includes not just language training but also exposure to cultural anthropology concepts. The goal: Help airmen learn to ask the right questions, size up indigenous social factors, and understand the local power realities.

A better grasp of tribe politics may also assist in yet another big endeavor: educating airmen for the war of ideas. AU is unabashedly pushing to become an intellectual powerhouse on airpower, space, and cyberspace matters. AU leaders believe the ongoing worldwide clash has underscored the need to compete in the world of ideas. That includes sharpening the abilities of airmen to speak for airpower.

"We should be the resident experts when it comes to air, space, and cyber," said Looney.

Lorenz would like to see AU increase its "intellectual throw weight" and cement an international reputation as the main source for leading airpower ideas.

A major part of that effort is the reinvigoration of AU faculty research activities. In a recent journal article, Lorenz pointed out that AU instructors often had greater incentives to research topics unrelated to the Air Force than

to examine questions pertaining to air, space, and cyberspace. He noted that one study found that for every book on airpower, four or five were written about landpower.

Lorenz also pointed out that AU faculty tended to receive greater rewards for research aimed at academic peers than they did for work delivered to policy-maker audiences.

Not Just Lessons Learned

Today, the AU leadership seeks to expand the production of airpower studies—ranging from "lessons learned" to sustained and scholarly research products. In aid of that effort, elements of legacy research organizations at AU have been reconstituted as the brand-new Air Force Research Institute. Retired Gen. John A. Shaud, a former executive director of the Air Force Association, will serve as the first director of the new institute.

The institute houses AU's only full-time research staff. It is also home to AU's *Air and Space Power Journal* and AU Press.

Research will be performed by regular staff, faculty on sabbatical, and teaching faculty. Outside scholars will have the opportunity to work under contract to produce significant works on air, space, and cyberspace topics.

According to Col. Mike Davis, AFRI's deputy director, the institute's charter

calls for providing studies to the Air Staff and USAF's major commands. The group has recently been assisting the Chief of Staff with evaluating Air Force strategy.

The research institute staff will be associated with doctrine analysts working within the newly named Curtis E. LeMay Center for Doctrine Development and Education. The development of doctrine has been centralized at Maxwell since 1997. USAF's first dedicated doctrine center put doctrine development in the fast lane and improved the presence of Air Force doctrine in joint doctrine development. The center's commander, Maj. Gen. Allen G. Peck, serves also as vice commander of AU.

Doctrine developers keep core publications up-to-date. They've also taken the lead in developing the newest Air Force doctrine, such as that for cyberspace operations. The process of distilling doctrine from practice, experience, and theory taps many of AU's resources.

For most officers, when and how to get a master's degree is a big challenge. Ten years ago, it was received wisdom that captains needed a master's degree to compete for promotion to major.

Back then, AU didn't grant academic degrees, so most completed the degree by working part-time, usually with a civilian university whose program was adapted to the needs of the military officer. Over the last several years, policy has fluctuated. In some years, board procedures "reveal" whether the competing captains have the degree—and in other years, they don't.

Today's airmen want education options and Lorenz specifically set out to give airmen a wider menu of choices. With accreditation in hand, AU now offers master's degrees for resident students and nonresidents who complete their work via distance learning. The distance learning program is so popular that the biggest challenges have been recruiting enough faculty for the Web-based courses, making sure base servers don't crash out during instruction, and revising curriculum fast enough to meet the growing demands.

The goal is to give all airmen the opportunity to earn a master's degree by the 12-year point of their careers.

Educating airmen does not stop with the officer schools of the Spaatz Center: USAF's airmen constitute the best-educated enlisted force in the world.

Last year, 17,456 enlisted airmen earned associate degrees from the Com-

The Long Saga of Airpower Education

Education of American airmen has been a fixture around Montgomery, Ala., for quite some time, going all the way back to when the Wright brothers, in 1910, briefly leased Maxwell Field as a flying school to teach takeoffs, turns, and landings.

When the Air Corps Tactical School moved from Langley Field, Va., to Maxwell Field in 1931, educating airmen was about developing and proving the competencies of airpower. The Air Corps Tactical School functioned much as any other Army school of its day. It developed advanced tactics, and schooled and cultivated officers. Instruction ceased in 1940 and Maxwell Field became a training center for thousands of cadet airmen.

Yet there was something unique, too. The core work of ACTS laid the foundations for operational and strategic application of airpower in World War II and for the independence of the Air Force. According to historian Walter J. Boyne, 261 of the 320 Army Air Forces general officers who were on duty at the end of World War II were ACTS graduates.

The new AU stood up in March 1946. Students first enrolled in Air Command and Staff School and Air War College that autumn.

Educating airmen—or at least a select group of them—was widely recognized as an essential function for an independent Air Force. The model of the day was copied from august civilian institutions. AU formed a board of visitors composed of top civilian academic officials to ensure that the curriculum would maintain academic excellence. AU in those days gave airmen a way to develop into more capable officers and it also added a gloss for many whose educational opportunities had been limited.

The model suited the educational needs of the early Cold War period. Few officers had completed four-year degrees. Enlisted education was barely on the horizon. Leadership, the operational art of warfare, strategy, and skills for staff work were at the heart of the curriculum. Most of all, AU sought to fill gaps in professional education for officers.

Winning a student slot was prestigious, but the school experience itself gained a reputation as less than challenging. Many students took advantage of the time for rigorous research, and making acquaintances with international officers was a big feature of the AU experience, but gentlemen's education and the midcentury university model still dominated.

Several important changes took place in the 1990s. After Operation Desert Storm, joint warfighting and the study of advanced airpower took on new importance. It was during this time that the elite School of Advanced Airpower Studies was added to hone the skills of a select group of about 40 majors at the top of their peer group. (The school was renamed the School of Advanced Air and Space Studies in 2002.)

By far the broadest change in the education of airmen was the creation of the Air and Space Basic Course.

The first class was held in 1999, and by 2002 all new officers were attending the course. It has become a shared experience for the force and its curriculum has adapted to emphasize expeditionary operations. The blend of classroom learning and team-building exercises successfully “blues” airmen within 18 months of joining the Air Force.

AU also stepped up to new requirements levied by the Joint Staff. Officers now must earn Joint Professional Military Education (JPME) credit at two levels. Officers must now learn basic joint warfighting in Joint Professional Military Education I to qualify for admission to senior service schools that teach JPME II. Top officers need JPME credit to qualify for promotion.

The Joint Staff's J-7 branch sets course work requirements for all service schools and inspects curriculum on a regular basis.

The JPME requirement essentially means that the schools must make room for joint topics as they educate airmen.

the resource pool is down,” said Col. Thomas D. Klincar, commander of the College for Enlisted Professional Military Education.

Just as important is the transition from two-year to four-year degree. AU seeks to make the process as smooth as possible. About 2,200 students are currently enrolled in a program that leads to a four-year degree. Twenty-four civilian colleges have partnered with AU to accept 100 percent of credit hours students bring from the Community College of the Air Force.

Not Willing To Move Backward

A Web-based enrollment system transfers credits and registers students. Lorenz described the process as “12 clicks and you’re a junior.”

With the Air Force facing constant budget and manpower cuts, can the emphasis on educating airmen be sustained?

For Looney, the answer is yes. “Even in challenging times, the corporate Air Force has made the commitment to fund education initiatives. If we don’t do it, we lose the opportunity forever.”

Lorenz and the AU staff pushed back hard against proposed manpower cuts that the Pentagon sought to impose on AU. That cut action would have stripped AU of hundreds of manpower positions, which would have crippled the institution. The output of students is directly related to faculty size. Air War College, for example, must sustain a ratio of one faculty member for every 3.5 students if it is to maintain high quality. What’s more, the faculty-to-student ratio is also mandated under the terms of joint professional military education. Hence, even small cuts in faculty size can have a huge negative effect.

AU went back to Moseley with a different proposal. USAF was “not willing to accept a less educated force,” said Looney.

This was a key decision, because education continues to increase in importance for both Air Force and national defense needs. The mission constantly evolves, but it has a long tradition. It is clear that the mission has entered a new and far more active phase. ■

munity College of the Air Force. That is three times the number in the other services, combined. New enlisted airmen are automatically enrolled when they join the Air Force. Courses cover many topics, with aircraft maintenance, criminal justice, and health sciences among the most popular.

Education is a big draw for en-

listed airmen. “We’re seeing education numbers up dramatically even as

Rebecca Grant is a contributing editor of Air Force Magazine. She is president of IRIS Independent Research in Washington, D.C., and has worked for RAND, the Secretary of the Air Force, and the Chief of Staff of the Air Force. Grant is a fellow of the Eaker Institute for Aerospace Concepts, the public policy and research arm of the Air Force Association. Her most recent article, “Why Airmen Don’t Command,” appeared in the March issue.

When the Draft Calls Ended

The all-volunteer force was a return to—not a departure from—the nation's tradition of military service.

By John T. Correll

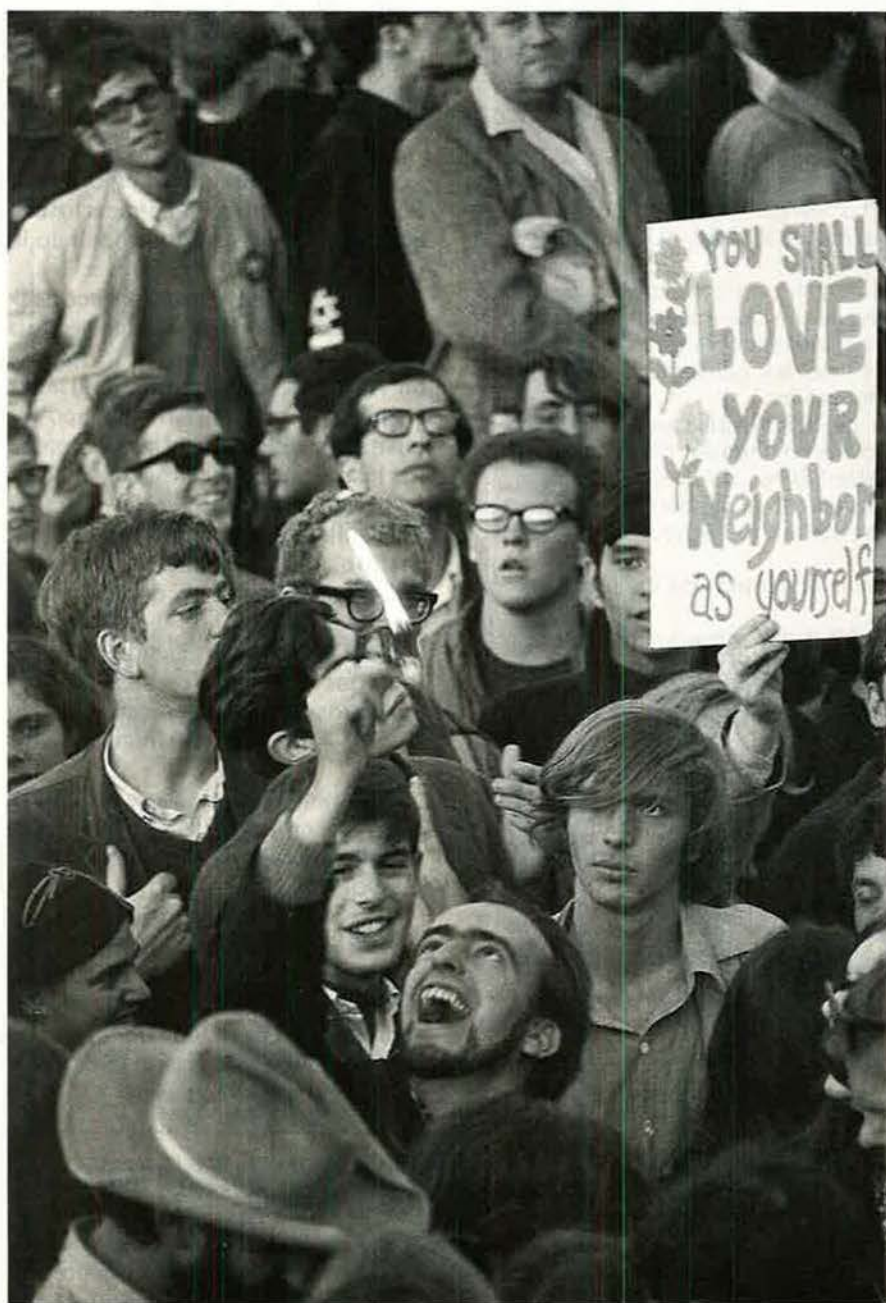


Photo by Wally McNamee via Corbis

At 6:35 a.m. on March 24, 1958, Elvis Presley reported to his draft board in Memphis, Tenn., and was inducted into the Army. He was at the peak of his singing and movie career, but that made no difference. Like many young American men of that day, he had a military obligation to meet.

Elvis took pride in his military service. By all accounts, he was an excellent soldier. After basic training, he served in tank battalions at Ft. Hood, Tex., and in Germany. He was discharged at Ft. Dix, N.J., in 1960 and received a mustering-out check for \$109.54.

Draft induction numbers in the late 1950s were down considerably from the level they had reached in the Korean War in the early years of that decade. Nevertheless, a hitch in the armed forces, either as a draftee or a recruit, was still regarded by many as a rite of passage. Young men went when called and served with a generally positive attitude. The day of hard-core draft resistance had not yet arrived.

The generation that came of age in the 1950s and 1960s had never known a time when there was no draft. However, the draft that lasted from World War II through the Vietnam War was not in the basic American tradition of military service.

An anti-war demonstrator burns his draft card at a Vietnam War protest outside the Pentagon in October 1967.



Elvis Presley (right) reports with other inductees (Nathaniel Wigginton, center, and Presley's childhood friend Farley Guy, left) in Memphis on March 24, 1958.

The United States certainly had used the draft at various times in its history; large numbers of soldiers were drafted in the Civil War and in World War I. Still, conscription had always ended when the war did. The draft that began with World War II was different. It lasted for close to 33 years.

Today, conditions could not be more different. The nation has not drafted a single airman, soldier, sailor, or marine in 35 years. Nor is it likely to do so any time soon, for reasons having to do with that last experience with conscription.

In 1936, an obscure Army major, Lewis B. Hershey, was appointed the

executive officer of the Joint Army-Navy Selective Service Committee, set up to prepare for possible mobilization. The panel consisted of two officers and two clerks. Hershey was a former schoolteacher who joined the National Guard in 1911 and transferred to the regular Army after World War I. Nobody, least of all Hershey, dreamed the job would last for decades.

No Volunteering Allowed

When Germany in 1940 invaded the Low Countries and France, Congress authorized the first peacetime draft in American history. Inductions began in November 1940. The following year, Hershey was promoted to brigadier

general and named director of the Selective Service.

A total of 10.1 million men were drafted during World War II. At the beginning of the war, men rushed to enlist, but, from Hershey's perspective, that ruined orderly conscription. He persuaded President Roosevelt in December 1942 to end voluntary enlistments except for men under 18 and over 38.

The draft authority expired in 1947, but, even though the Army's manpower requirements that year were low, recruiters could not meet them. Thus the draft was reinstated in 1948. Draft calls surged at the onset of the Korean War in mid-1950.

The postwar draft restored the option to enlist. Men who could meet the qualification standards could join the service of their choice and get a shot at better training and preferred duty assignments. Draftees had a service obligation of two years, but volunteers served longer tours—four years in the case of the Air Force. Another alternative was to join the National Guard or the Reserve, go to basic training, and then serve out one's military obligation on training weekends and short active duty tours.

Even in times of conscription, the US military was predominantly a volunteer force. All of the draftees were in that segment of the force with two years' service or less, and some of the troops in the under-two segment were recruits instead of draftees.

"Historically, inductions accounted for only 30 percent of enlisted manpower," said Janice H. Laurence in a study for RAND. "The remaining enlisted men were split evenly between true volunteers and those who were motivated to enlist because of the presence of the draft."

Most draftees went into the Army. A Presidential panel studying the military manpower issue reported in 1970, "The Navy and Marine Corps have occasionally issued draft calls to meet temporary shortfalls, but the Air Force has never used the draft."

This was sometimes a cause for complaint. In 1951, Sen. Lyndon B. Johnson (D-Tex.) accused the Air Force of attempting to "skim the cream" off the population of potential recruits. "Men of high intelligence who might have made invaluable officers for the Army are now consigned to the ranks of the Air Force as privates," Johnson charged.



AP photo

Richard Nixon proposed ending the draft during the 1968 Presidential campaign. Upon taking office, he immediately moved to eliminate the draft entirely.

For its part, the Army came to regard military manpower as a cheap source of labor and wasted it freely on menial tasks such as cutting the grass and painting buildings.

Draft authority was renewed by Congress in 1955, 1959, and 1963 with virtually no debate or opposition. Meanwhile, Hershey and the Selective Service had a new problem on their hands: too many potential draftees. The Army could not possibly use all of them.

Between 1954 and 1964, the number of men eligible for the draft increased by 50 percent while draft inductions dropped from 250,000 to 112,000, respectively, in those years. "We deferred practically everybody," Hershey said. "If they had a reason, we preferred it, but if they didn't, we made them hunt one."

From 1955 on, Hershey and the Selective Service were active in "channeling" men, via deferments, into vocations of national interest. These included science, engineering, medical professions, and teaching. Hershey described channeling as a new major task for the Selective Service.

In 1956, Hershey was promoted to lieutenant general as a result of Congressional pressure and against

the wishes of the Army. Although he was officially an Army officer, he had not been responsive to Army control for years. Nor did he defer very much to officials of the various Presidential Administrations. Congressional support gave him an independence similar to that enjoyed by longtime FBI director J. Edgar Hoover or Navy Adm. Hyman G. Rickover.

An Inherently Unfair System

The worst single problem with the draft was that it was inherently unfair. In 1960, the US armed forces' total strength, counting both draftees and volunteers, was only 7.9 percent of the US male population between the

ages of 18 and 45. No matter what, only a fraction of the eligibles were drafted. Furthermore, there was great variation among local draft boards in how they applied the deferment and exemption rules. There was nothing equitable about the system for the minority of the manpower pool who did not escape the draft.

Washington in the mid-1960s made several attempts to establish a draft lottery to spread the risk of induction equally among those eligible for selection. Hershey was staunchly opposed, arguing that decisions by local boards were preferable to "blind chance" with a lottery. Johnson (by then President) and Congress agreed, and the lottery initiatives failed. Also rejected was the idea of setting national standards for local draft boards to follow.

The draft was far from ideal as a source of military manpower. Because draftees served only for two years, it was not worthwhile putting them through long training programs. The technical specialties had to be filled with volunteers.

The Armed Forces Qualification Test (AFQT) ranked scores into five categories, with Category IV—scores in percentiles 10 through 30—being the lowest acceptable for military service. Cat IVs had difficulty absorbing instruction or performing complex tasks, but the draft brought many of them into service.

The number of Cat IVs increased between 1966 and 1971 as a result of Project 100,000, a program introduced by Secretary of Defense Robert S. McNamara. His aim was to open military service to 100,000 men a year who were otherwise unqualified. By 1969, Cat IVs accounted for 23 percent of inductions.

The draft also brought in a larger number of high school dropouts who,

Armed Forces as Percentage of Military Age Population

	Total Active Duty Forces	Male Population, 18 through 45
1950	1.46 million	4.8%
1953	3.56 million	11.6%
1955	2.94 million	9.6%
1960	2.48 million	7.9%
1965	2.66 million	8.0%
1969	3.49 million	9.8%

Source: Gates Commission Report.

Inductions in Major Conflicts

World War I (September 1917 through November 1918)	2,810,296
World War II (November 1940 through October 1946)	10,110,104
Korean War (June 1950 through June 1953)	1,529,539
Vietnam War (August 1954 through February 1973)	1,857,304

Source: *Selective Service Web site.*

compared to graduates, were only half as likely to complete enlistments. In 1969, dropouts accounted for 27 percent of the enlisted force, ranging from a high of 42 percent in the Marine Corps and a low of eight percent in the Air Force.

More than anything else, it was the Vietnam War that ended the draft. Inductions had fallen to 82,060 in 1962, but then soared to 382,010 in 1966. As draft calls increased, so did the probability that draftees would be sent to combat. Anti-draft sentiment grew, both among military age men and in the public at large. Performances by folksinger Joan Baez featured a banner that read, "Girls Say Yes to Boys Who Say No."

In time, the burning of draft cards as a form of protest became so widespread that Congress made it a felony. Some draft evaders went to Canada, but the more common way to avoid service was through deferments, exemptions, and disqualifications. Minorities and the poor were the least successful at beating the system this way.

During the 1968 Presidential campaign, Richard M. Nixon proposed ending the draft, and, within days of taking office in January 1969, he took action to reduce the inequities. Secretary of Defense Melvin R. Laird told Nixon that the current requirement was to draft only about a quarter of the eligible men in the manpower pool, and that it would drop to one in seven when the services reverted to pre-Vietnam strength levels.

Laird proposed a lottery. Hershey was opposed but Nixon agreed with Laird and obtained the concurrence of Congress. The draft lottery was implemented in 1969. At the same time, Nixon appointed the Commission on an All-Volunteer Armed Force with a charter to develop a plan to eliminate conscription. He chose as head of the panel former Secretary of Defense Thomas S. Gates.

"We have lived with the draft [for] so long that too many of us accept it as normal and necessary," Nixon said.

Hershey, who was opposed to the all-volunteer force (AVF) as well as the other reforms, was clearly part of the problem. Nixon did not hesitate to move against him. He promoted Hershey to four-star general, made him a Presidential advisor, and replaced him as head of the Selective Service. Nixon paid no attention to the advice he then got from Hershey, who eventually was retired involuntarily in 1973 at age 79 and after 62 years of military service.

The Gates Commission made its report in February 1970 and offered three main recommendations as the nation moved toward a volunteer force:

- A major increase in military pay.

- "Comprehensive improvements" in conditions of military service and recruiting.

- Establishment of a standby draft system.

A Hidden Tax-in-Kind

It was clear to everyone that using the AVF would not be cheap, but the commission said that taxpayers at large had gotten a free ride with the draft force. There was a hidden "tax in kind" paid only by draftees and draft-induced volunteers, who were forced to serve for low pay. In 1970, pay for new recruits and draftees was about 60 percent of comparable civilian pay.

The services had differing experiences. For the most part, Air Force recruiters met their quotas without difficulty through the Vietnam War, although as many as half of the Air Force's enlistments were induced by pressures of the draft. The Army, though, would have more difficulty with an AVF than the other services.

The services put more recruiters in the field and hired advertising agencies to support their efforts. To the disgust of many old-timers, a new way of thinking took hold. A 1971 report from the Army's advertising agency, N.W. Ayer, referred to potential recruits as "the market" and the



Lt. Gen. Lewis Hershey is razzed by a small group of demonstrators outside the Selective Service headquarters in 1969.



Beltmann/Corbis photo

The members of the 1972 Joint Chiefs of Staff (l-r): Adm. Elmo Zumwalt Jr., USN; Gen. William Westmoreland, USA; Gen. Robert Cushman, USMC; Gen. John Ryan, USAF; and Adm. Thomas Moorer, USN, Chairman. The services took different approaches to recruit an all-volunteer force.

Army as “the product.” A spotlight fell on Adm. Elmo R. Zumwalt Jr., the Chief of Naval Operations, who achieved fame and notoriety with his programs to (as *Time* magazine put it) “scuttle those customs and traditions that no longer seem to have a point—if indeed they ever did.”

For becoming CNO in July 1970, Zumwalt began sending out directives known as “Z-Grams.” Over four years, he issued 121 of them. An early one eliminated restrictions on the wear of civilian clothes on base when off duty. Another permitted beer-vending machines in enlisted and officer quarters. The most famous Z-Gram was No. 57, issued in November 1970. It said that the “demeaning or abrasive regulations generally referred to in the fleet as ‘Mickey Mouse’ or ‘chicken’ regs had to go.

“We must learn to adapt to changing fashions,” Zumwalt said. “I will not countenance the rights or privileges of any officers or enlisted men being abrogated in any way because they choose to grow sideburns or neatly trimmed beards or moustaches or because preferences in neat clothing styles are at variance with the taste of their seniors.”

Z-Gram 57 allowed sailors who lived off base to travel to and from work in duty uniforms, including

čungarees. (Previously they had to wear the uniform of the day or better to travel, change into work uniforms at work, then change again to go home.) It also eliminated the “unreasonable” requirement, for line handlers, refueling parties, topside watch officers in inclement weather, and others, to perform their jobs in white or blue uniforms when “engaged in work which would unduly soil or damage such uniforms.”

Zumwalt encountered opposition mainly from two sources: hard-line admirals and angry chief petty officers. They thought his reforms undermined discipline, and the chiefs did not like it that perquisites it took them years to earn were awarded immediately to junior sailors.

The news media ate it up and made Zumwalt a star. *Time* magazine said the other services were behind the

Navy in getting rid of Mickey Mouse and making “life in the service more bearable and attractive.” The Army reacted with changes that could be made quickly. Among these were an end to unnecessary troop formations, such as assembly at reveille “except for special occasions” and doing away with nighttime bed checks except in disciplinary cases. Ft. Carson, Colo., opened the “Inscape Coffee House” with a black light and a peace symbol on display. Officers dropped by to “rap with the troops.”

Not So Much To Fix

The Air Force, with little Mickey Mouse to eliminate, was at a disadvantage in finding things to fix. At a press briefing in December 1970, Lt. Gen. Robert J. Dixon, the deputy chief of staff for personnel, announced that the Air Force was reducing inspections and giving airmen more time off to settle their families when reassigned.

The Marine Corps wasn’t having any of it. The marines said they were going to keep their traditions and their short haircuts and that those who regarded it as Mickey Mouse need not apply.

Incredible though it may seem in retrospect, the burning issue was haircuts. By sheer chance, the coming of the volunteer force issue coincided with the shaggiest men’s hairstyles of the 20th century.

Recruiting ads went as far as they could to appeal to the “market.” When traditionalists complained that the models in the advertising photos violated haircut standards, an Army spokesman explained somewhat lamely that for the soldiers depicted in ads, it was the day before a haircut, not the day after.

Before 1970, Air Force grooming standards had been vague. They said that hair had to be neat and trim, which was sufficient definition for previous generations. In the era of Z-Grams, specificity was required.

Voluntary Enlistments, Percentage of High School Graduates

Service	1959	1969
Army	63%	69%
Navy	60%	80%
USMC	54%	57%
Air Force	73%	76%

Source: Gates Commission.

The new Air Force standards that appeared in 1970 said that hair could not “exceed one-and-one-quarter inches (1 1/4”) in bulk, regardless of length.” It went on to explain, “Bulk refers to thickness or depth of hair—the distance the mass of hair protrudes from the scalp when groomed.”

The Air Force ruled that mustaches could not extend any farther than the “vermillion part of the lip” and that sideburns could not “extend below the lowest part of the exterior ear opening.” The other services had sideburn rules, too. Zumwalt wore his own sideburns to the longest length permitted.

Barbers from the base barber shop at Naval Air Station Miramar in San Diego were sent to hair-styling school so they could give a more stylish result with their \$1 haircuts.

The uproar about hair and mustaches finally faded away as long hair went out of fashion and hard-liners who insisted on buzz cuts retired from the services. The advertising agency dream of a permissive military gave way to more reasonable goals.

In 1971, Congress approved Nixon’s proposal to “zero out” the military draft but leave the Selective Service machinery in place as a safeguard. Young men would still be required to register with their draft boards.

As the final days of the draft approached, many expressed worry that the AVF would not attract sufficient recruits or that it would pull in only those who could not get a job elsewhere. The National Guard and the reserves, about 75 percent of whose membership stemmed from the pressure of the draft, were of particular concern.

The most frequent problem anticipated, though, was that the volunteer force would not be representative of society at large. It was feared that minorities would bear a disproportionate share of the risk in wartime, with economic incentives to enlist being “tantamount to luring the poor to their deaths.”

The last draft call went out in December 1972. On June 30, 1973, Dwight Elliott Stone, a 24-year-old apprentice plumber from Sacramento, Calif., became the last person to be inducted into the armed forces as a result of the draft.

In July 1973, just eight days after Stone’s induction, Gen. William C.

Westmoreland, the former Army Chief of Staff, said, “As a nation, we moved too fast in eliminating the draft.” His 1976 memoir, *A Soldier Reports*, advanced the view that, without the draft, “the Army might become the province of the less affluent and the less skilled.”

Another opponent of the volunteer force was Sen. Sam Nunn (D-Ga.), who was elected to Congress 1972. Though Nunn’s power in the 1970s was not yet great, the Georgian would eventually become the powerful chairman of the Senate Armed Services Committee.

Some loose ends soon were tied up. President Ford in 1974 gave conditional amnesty to American draft evaders. In 1975, Ford also issued an executive order ending standby draft registration. In 1977, President Carter declared a new broader amnesty for draft evaders and war resisters.

(In 1980, Carter and Congress approved resumption of draft registration in response to the Soviet invasion of Afghanistan. It continues in effect today. Young men are required to register with their draft boards within 30 days of turning 18.)

Proposals to reinstitute the draft have never vanished completely. When repeated cutting of the defense budget in the Carter years led to the “hollow force” of the late 1970s, Gen. Bernard W. Rogers, Army Chief of Staff, and Adm. Thomas B. Hayward, the Navy CNO, called for a return to conscription. The Hollow Force problems were solved instead by the Reagan rearmament programs of the 1980s.

A Professional Force

The calamities predicted by critics of the AVF did not occur. Between 1970 and 1973, the number of recruits increased by 65 percent. Recruits were given better pay, bonuses, and education benefits as well as more latitude in choosing their military jobs. Base pay for the most junior service members almost doubled, bringing it into line with compensation in the civilian sector.

Under the AVF concept, military manpower costs increased by about 11 percent a year, but this never became

an affordability problem. The impact diminished as the economy grew and the armed forces decreased in size.

Despite some ups and downs, the services were able to recruit and retain sufficient numbers of high-quality troops. One reason for success was that the number of women in the active duty enlisted force increased from less than two percent when the draft ended to about 15 percent today.

The quality of the force improved, as measured by AFQT scores and educational achievement. The share of the total force holding high school diplomas rose to its highest level ever; at the same time, the number of Cat IV recruits fell nearly to zero.

The Guard and Reserve made the transition well. Selected Reserve strength dropped in the 1970s (nearly all of the fluctuation was in the Army Guard and Reserve) but recovered and reached an all-time high by 1985. With the factor of draft-induced enlistments gone, the Guard and Reserve became more professional and more experienced, at least equal to and often better than active duty forces.

The end of the draft did not lead to a force of the black and the poor. Blacks presently constitute 13 percent of active duty recruits, closely reflecting the US military age population, which is 14 percent black. Blacks are 19 percent of the active duty enlisted force, the exact percentage predicted in 1970 by the Gates panel. Neither minorities or the poor have been over-represented in the combat arms or in the fatality rates in combat.

The clamor to bring back the draft rose again in 2003. However, this time it was led by a staunch liberal, Rep. Charles B. Rangel (D-N.Y.). Rangel particularly deployed the allegation—refuted with strong evidence by the Pentagon—that the volunteer force puts too much of the burden on minorities and the poor.

The circumstances under which the nation would accept a revival of conscription after a hiatus of 35 years are unknown. What is clear, however, is that recent circumstances have not been sufficient. Rangel’s proposal went essentially nowhere. In October 2004, the House rejected it by a vote of 402 to two. ■

John T. Correll was editor in chief of Air Force Magazine for 18 years and is now a contributing editor. His most recent article, “The Air Mail Fiasco,” appeared in the March issue.

Flashback

Aim High



In 1918, the US Air Service adopted procedures originally issued by the French army to aid in air-ground liaison. The US General Headquarters published its version of air liaison instructions in June 1918. This document included recommen-

ations for "means of transmission," some of which were odd. Here is one example: These ground troops are firing Very guns, which shot flares, to signal a pilot flying overhead.



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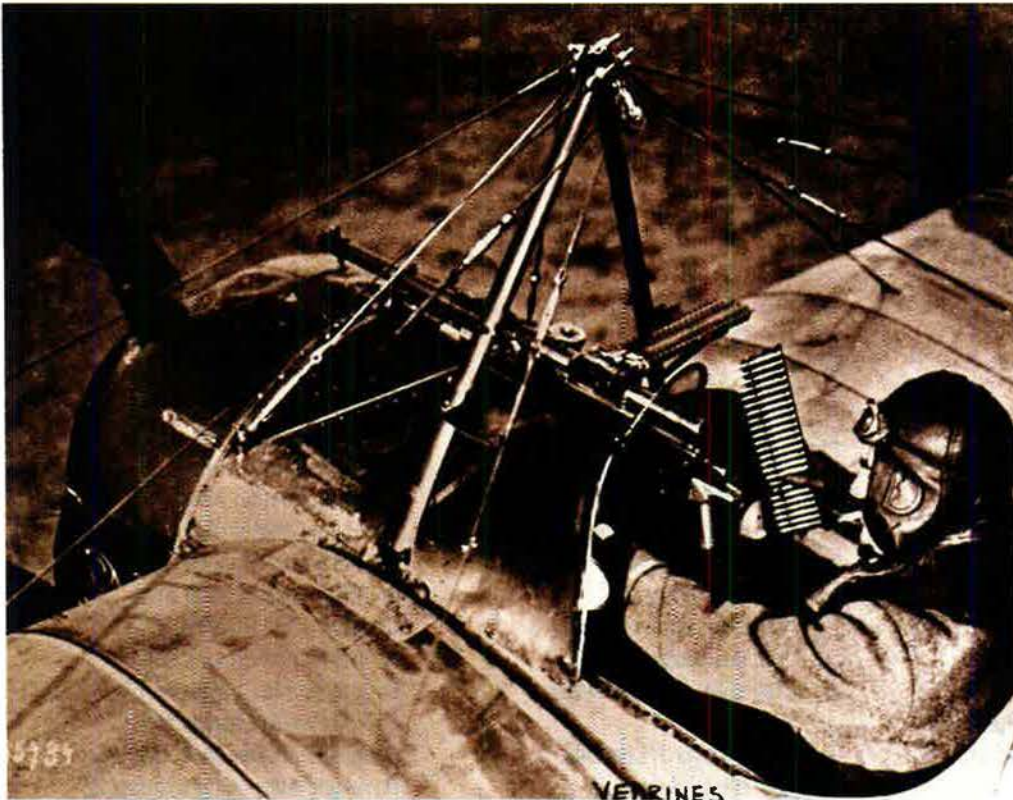
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The fixed, forward-firing aerial machine gun marked the start of true air-to-air combat.

Bullets Between the Blades

By Dik A. Daso



Photos courtesy of the National Air and Space Museum, Smithsonian Institution

in their thinking—and flying. The earliest Wright aircraft flew only straight ahead. It was not until the fall of 1904 that the first aerial turns were routinely attempted.

During the first decade of manned and powered flight—although it was possible to maneuver in a three-dimensional sky—actually engaging and destroying another maneuvering aircraft in the air remained nearly impossible for pilots and gunners.

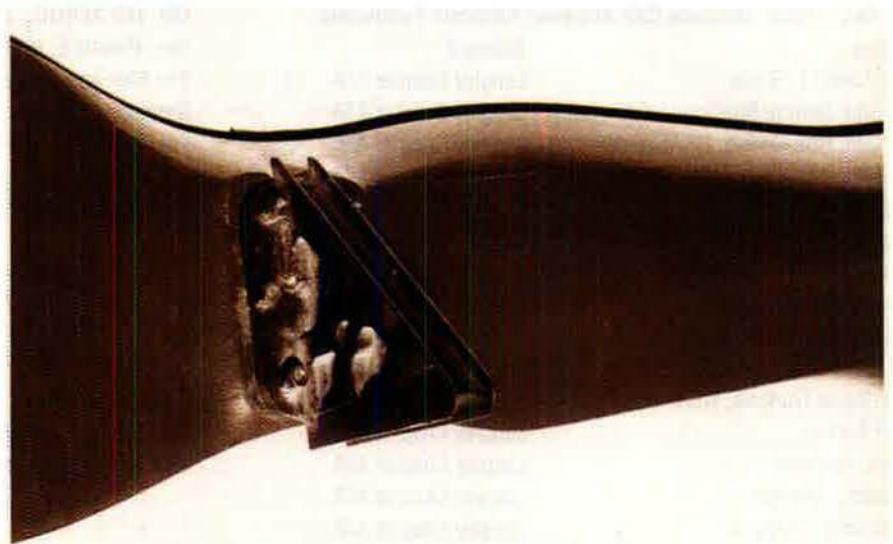
Perhaps this explains why the earliest attempts to use cloth, wood, and wire aeroplanes as weapons were linked directly to the Earth. The ground was easily viewed and observed, and so World War I aircraft were first used to observe enemy troop movements and concentrations, then to direct artillery fire against enemy targets, and finally to strafe and bomb the battlefield.

Initially, opposing pilots carried out their missions without interfering with their adversary's objectives—some-

For virtually all of human history, the species has been land-bound, genetically coded to think and act with feet planted firmly on solid ground. Then, in December 1903, two bicycle-makers from Ohio expanded the human paradigm for all time when they left the Earth and entered the vertical dimension.

Yet initially, even Orville and Wilbur Wright remained unidirectional

Above, Roland Garros at the controls of his Morane-Saulnier, which included metal deflectors on the propeller. Right, a close-up of the bullet deflector.



times even acknowledging each other in passing with a chivalrous air-to-air salute. Soon, the reality of effectively aimed artillery fire and resultant casualties to friendly forces ended the bonhomie between enemy aviators.

Early, feeble attempts to fight back against aerial onslaughts were seldom successful. From the ground, trying to hit a small target unpredictably flying above the combat zone was like a duck hunter armed with a BB gun trying to shoot a mallard maneuvering wildly so as to avoid being struck.

Hitting an airplane that flew straight and level was easier, but still a huge

challenge. A variety of pistols and rifles, grenades, even grappling devices were used to attack those attempting to determine the location of, or direct attacks on, troops or supplies.

Machine Guns

Less than three months after World War I began in August 1914, the first aerial victory was scored by a two-seat French Voisin III pusher-type biplane against a German Aviatik B.1 biplane.

The aerial victory resulted after the French gunner fired his Hotchkiss ma-

chine gun into the paralyzed Aviatik, igniting the flammable craft which then crashed in a ball of fire, killing the crew. Airmen wore no parachutes in these early days and always went down with their ship.

As the invention of the machine gun would mold the battlefields of Europe into a network of trenches and underground bunkers, so too did the machine gun shape the conduct of the air war above the blood and muck below.

By spring 1915, although there had been some success at shooting down enemy aircraft with hand-fired weapons, the performance of early aircraft was drastically reduced when additional crewmen were required to fire such weapons. Early duels between

crew-type aircraft were frequently two-dimensional because the craft had limited capability to maneuver without stalling and falling out of the sky.

The resultant attacks were fought more like heroic naval battles at Trafalgar—one broadside after another—while the airplanes flew in level, nonmaneuvering flight.

Improvements in engine power and maneuverability quickly complicated the survival equation for lumbering craft. Yet even superior speed and maneuverability did not solve the inherent problem of striking another flying craft with bullets in midair.

Pursuit aircraft that were flown with only the pilot aboard created an entirely new set of problems. Even though the reduced weight improved performance, operating the weapon while flying the airplane into a position to attack an enemy was often dangerous.

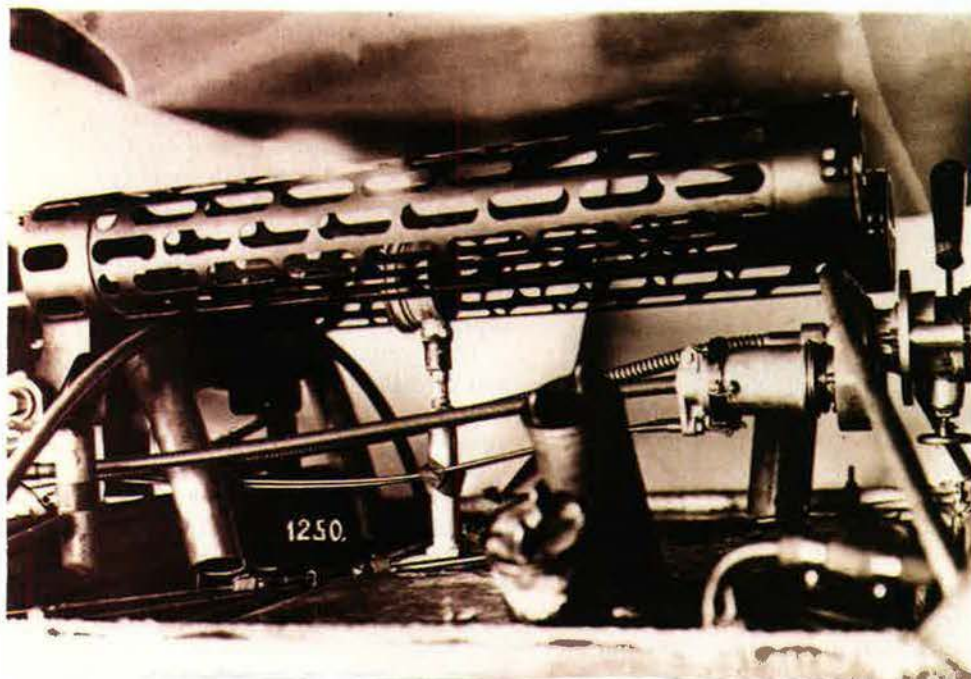
A variety of gun placement solutions had been attempted: on top of the wing, angled from the fuselage slightly outward to miss the propeller, as well as inside the cockpit, and none was completely efficient or routinely successful.

There remained two significant issues to resolve.

First, and most problematic, was how to target an enemy from a moving airplane without the ability to determine with any certainty at least one specific geometric plane of motion. Man's inability to understand and immediately react to the complexity of intertwined three-dimensional aerial battles without some kind of fixed plane of reference made any successful attack much more a stroke of coincidence than aerial skill.

Second, the technical reliability of the aerial machine gun required that the pilot have easy access to the firing and loading mechanisms to deal with the inevitable jamming or failure of the gun. At least one hapless aviator was tossed unceremoniously from his airplane while attempting to reload or repair an over-wing mounted machine gun.

The solution seemed simple: to locate the machine gun within the pilot's reach for loading and repairing while still offering an easy method of aiming at the enemy airplane. For an aircraft powered by a rear-mounted propeller, the weight of the gun located in the nose of the airplane displaced the craft's center of gravity, making control extremely difficult.



The synchronizer from a Fokker D-VII. German designer Anthony Fokker perfected the synchronizing system that Roland Garros had begun.

challenge. A better method was needed to shoot down enemy aircraft before they could reconnoiter or attack friendly positions. During those days, only another "aeroplane" could intercept and destroy an adversary aircraft before it reached the combat zone.

Such attacks on enemy aircraft were often clumsy and futile, but there were some early successes.

A few pilots were able to force their adversary to the ground simply by intimidation. The assailant flew so close to the enemy airplane that, fearing a midair collision, the enemy crash-landed to avoid uncontrolled certain death.

Logically, either for defense against attacks or for the purpose of offensive action, pilots began carrying weapons



Dutch-born German airplane designer Fokker at the controls of one of his biplanes.

For the majority of aircraft, powered with front-mounted “tractor” propulsion systems, the propeller remained an impenetrable barrier to engaging the enemy.

Although prewar work had been done on the concept of firing a machine gun through the arc of an airplane propeller, including at least two patents for such a “synchronizer mechanism,” no system had been perfected. This included one such mechanism designed and built by Raymond Saulnier, co-owner with Leon Morane of a newly established French aviation company.

Morane-Saulnier built a high-performance monoplane, unusual for that time, in which a young Frenchman named Roland Garros (who was taught to fly by the legendary Brazilian Alberto Santos-Dumont) crossed the Mediterranean Sea—a first for an aeroplane. As war erupted, Garros was flying Morane monoplanes in a French aerial squadron.

During a meeting between Garros and Saulnier in Paris during the first

bleak winter of the Great War, they discussed the development of the synchronized aerial machine gun. It seemed that Saulnier’s firing regulator worked perfectly but it was the imperfections inherent in firing the machine gun itself that yielded less than desirable results. Inconsistencies in projectile shape and quantity and quality of gunpowder charges resulted in inconsistent firing sequences.

Shooting Through the Arc

Sometimes the variances were so great that the bullets struck the propellers and splintered them like dry twigs.

Garros—who took military leave to be a test pilot for Saulnier until March 1915—had recognized early during his wartime military flying that a fixed forward-firing machine gun was the best way to eliminate some of the variables inherent in multidimensional aerial combat. At least one axis of motion needed to be stable or controllable.

A fixed forward-firing gun could provide a relatively predictable firing plane of motion. The propensity to wreck propellers, however, was a weakness that could not be tolerated. Knowing this, Saulnier attempted to protect the prop—literally. He affixed to its surface metal wedges that acted to deflect bullets fired into the prop.

Garros’ mechanic, Jules Hue, had bolstered the deflectors, which had failed catastrophically in a test flight. After these improvements, Garros felt confident enough to attempt combat in the newly modified Morane-Saulnier Type L Parasol monoplane.

On April 1, 1915, Garros successfully attacked and shot down a German biplane south of Dixmude, near Dunkirk. He approached from the rear and fired his Hotchkiss gun through the propeller’s arc until the enemy airplane was destroyed. Garros tallied two more gun kills over the next few weeks, but on April 18 was forced to crash-land in enemy territory after his Morane was hit by ground fire during a low-altitude surface attack, rupturing his fuel line.

This “golden BB” killed the engine and brought down the airplane, and Garros spent the next three years as a prisoner of war.

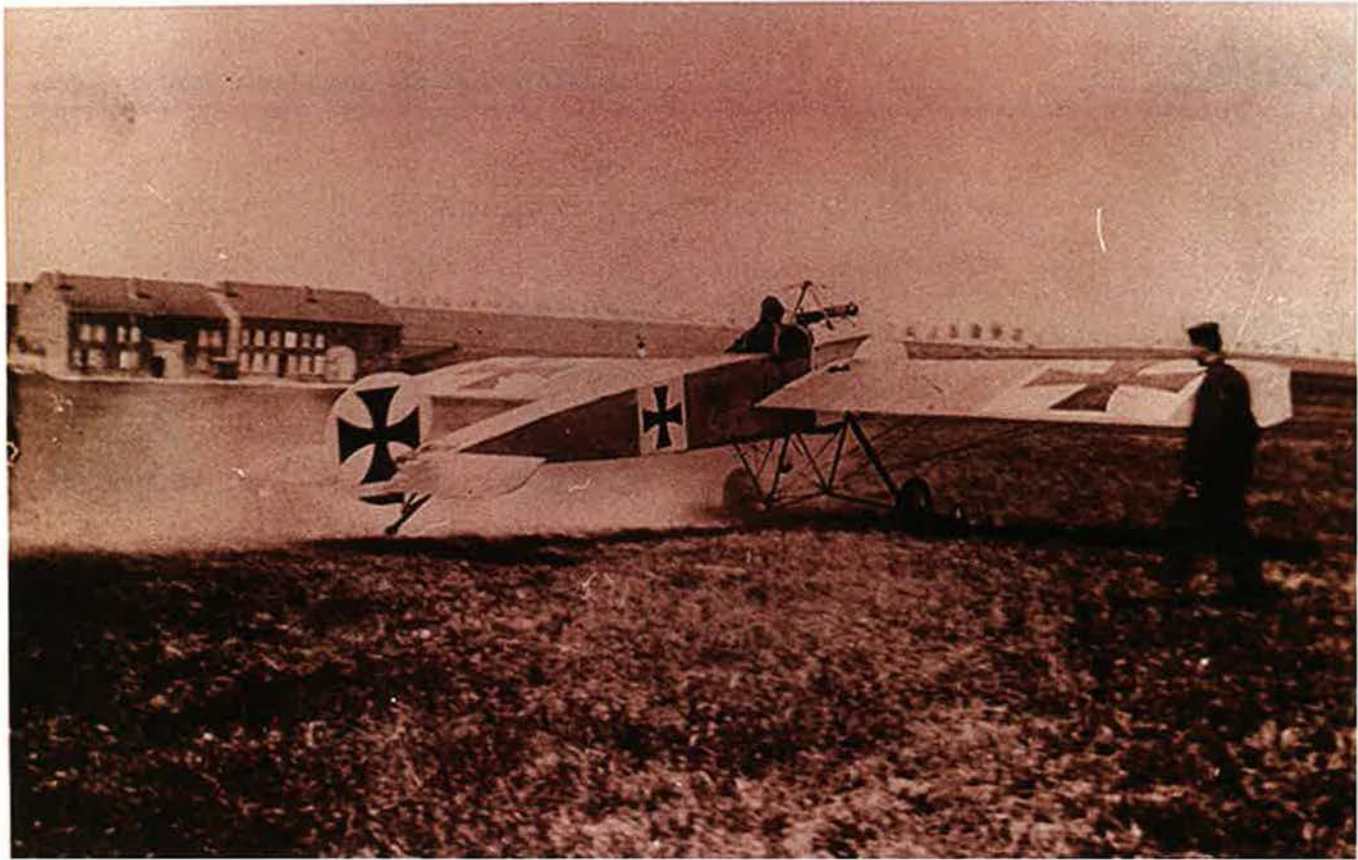
German technicians captured the gun and the propeller, which still had the metal deflectors installed, and made several tests of the system. Even with access to Garros’ previously functioning gun and deflector set, however, they could not get the system to work properly.

German machine gun muzzle velocities were somewhat greater than those of the French Hotchkiss gun, and when the big German steel-coated bullets were fired into the propeller arc—even one protected by metal deflectors—the power of the weapon fractured the prop.

The tests demonstrated conclusively that, if a pilot were going to fire through a propeller, it was essential that the bullet not strike the propeller at all.

It took little time for German designer Anthony Fokker, a Dutchman by birth, to perfect the system that Garros had begun. Fokker’s team likely used information from a 1913 synchronizer mechanism patented by Swiss engineer Franz Schneider, to bring the invention to practicality.

They designed a cam wheel to regulate the precise times when the gun could fire. This cam was attached to



A Fokker Eindecker E.I, which many consider to be the world's first true fighter aircraft, taxis on a rough landing strip.

the same shaft that rotated the propeller and enabled the firing mechanism at precise moments when the known location of the propeller blade could easily be avoided.

Fokker selected the German Parabellum machine gun and fitted it to an airplane of his own design—the Eindecker (meaning “one-decker” or monoplane). The Fokker E.I/15 (military designation) then became the first practical fighter aircraft in history.

The synchronizer, which eliminated the need for deflectors, immediately provided a nearly insurmountable advantage for German pilots such as Max Immelman and Oswald Boelcke, who also enjoyed improved engine performance found in the follow-on Eindecker E.II and E.III aircraft.

The “X” and “Y” Axis

Immelmann is officially credited with scoring the first victory with the Fokker synchronizer gear on Aug. 1, 1915. Even so, there remain unconfirmed claims that another German pilot, Lt. Kurt Wintgens, shot down a Morane-Saulnier Type L, like the one Garros had flown, in July.

Regardless of who actually scored

that first kill, the essential firing problem had been solved. These early victories marked the beginning of almost a year of German air dominance that came to be known as “the Fokker Scourge,” as Germany alone had the advantage of firing forward, directly through the arc of the airplane’s propeller.

Not until the Allies could develop their own synchronizer mechanism would they pose a serious threat to German pilots such as Boelcke, Immelman, and the most famous of all, Manfred von Richthofen—the “Red Baron.”

The development of the fixed forward-firing aerial machine gun was a natural attempt to approximate man’s two-dimensional nature—a comfortable “X and Y axis” world easily understood and manipulated. Since the Fokker Eindecker’s introduction, most fighter aircraft have sported fixed forward-firing guns.

The solution to firing through the arc became moot—actually, obso-

lete—with the invention of turbine-powered jet fighters.

With the introduction of lead-computing gunsights and radar, which successfully quantified one of the most difficult variables in aerial combat—distance to target—the fixed forward-firing gun has remained the seldom used close-in weapon of choice for fighter pilots. Yet, even today’s head-up display and avionics solutions do little to truly immerse modern aviators in the actual three-dimensional world.

Flat HUD screens and “steer to fire” technology used in modern fighters essentially relieve pilots from envisioning three-dimensional combat and instead place them squarely into a two-dimensional environment. Even while flying a highly maneuverable airplane in three dimensions, the preponderance of piloting remains based on two-dimensional inputs rather than three-dimensional spatial orientation cues.

This, after all, was the basic idea behind firing through the arc in the first place. ■

Dik A. Daso, a retired Air Force RF-4 and F-15 pilot and T-38 instructor, is the curator of modern military aircraft at the Smithsonian’s National Air and Space Museum. His most recent book, US Air Force: A Complete History, was published last year. This is his first article for Air Force Magazine.

Air National Guard at 60: A History. Susan Rosenfeld and Charles J. Gross. GPO, Supt. of Documents, Washington, DC (866-512-1800). 73 pages. \$11.00.



Civil Air Patrol: Missions for America ... For 65 Years. Drew Steketeer. Turner Publishing, Paducah, KY (800-788-3350). 160 pages. \$42.95.



Nancy Love and the WASP Ferry Pilots of World War II. Sarah Byrn Rickman. University of North Texas Press, Denton, TX (800-826-8911). 332 pages. \$24.95.



Battle Colors, Vol. III: Insignia and Tactical Markings of the Tenth Air Force in World War Two. Robert A. Watkins. Schiffer Publishing, Atglen, PA (610-593-1777). 167 pages. \$45.00.



Combat Pair: The Evolution of Air Force-Navy Integration in Strike Warfare. Benjamin S. Lambeth. RAND, Santa Monica, CA (877-584-8642). 105 pages. \$22.00 (download at http://www.rand.org/pubs/monographs/2007/RAND_MG655.pdf).



The Rescue of Streetcar 304: A Navy Pilot's Forty Hours on the Run in Laos. Kenny Wayne Fields. Naval Institute Press, Annapolis, MD (800-233-8764). 311 pages. \$29.95.

Beyond the Black Box: The Forensics of Airplane Crashes. George Bibel. Johns Hopkins University Press, Baltimore (800-537-5487). 393 pages. \$30.00.



Combat RECON: 5th Air Force Images From the SW Pacific 1943-45. Robert J. Stava. Schiffer Publishing, Atglen, PA (610-593-1777). 126 pages. \$39.95.



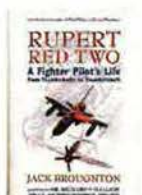
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Black Wings: Courageous Stories of African Americans in Aviation and Space History. Von Hardesty. Smithsonian Books, New York (800-242-7737). 180 pages. \$21.95.



Contrails Over the Mojave: The Golden Age of Jet Flight Testing at Edwards Air Force Base. George J. Marrett. Naval Institute Press, Annapolis, MD (800-233-8764). 230 pages. \$29.95.



Rupert Red Two: A Fighter Pilot's Life From Thunderbolts to Thunderchiefs. Jack Broughton. Zenith Press, St. Paul, MN (800-766-2388). 352 pages. \$26.95.

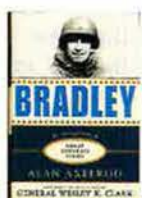
Blind Glory: Colonel Bo's Middle East Spy Assignment. Col. Heath Bottomly, USAF (Ret.). Vantage Press, New York (212-736-1767). 257 pages. \$12.95.



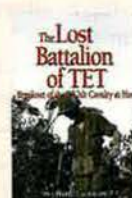
Darkroom Soldier: Photographs and Letters From the South Pacific Theater World War II. Frederick H. Hill with George Venn. Order from: Photosmith Books, 400 Sunset Dr., La Grande, OR 97850. 287 pages. \$49.95.



Transforming an Army at War: Designing the Modular Force, 1991-2005. William M. Donnelly. GPO, Supt. of Documents, Washington, DC (866-512-1800). 90 pages. \$8.50.



Bradley. Alan Axelrod. Palgrave Macmillan, New York (888-330-8477). 204 pages. \$21.95.



The Lost Battalion of Tet: Breakout of the 2/12th Cavalry at Hue. Charles A. Krohn. Naval Institute Press, Annapolis, MD (800-233-8764). 168 pages. \$23.95.



Velocity, Speed With Direction: The Professional Career of Gen. Jerome F. O'Malley. Aloysius G. Casey and Patrick A. Casey. Air University Press, Maxwell AFB, AL (334-953-6281). 286 pages. \$28.00.



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Promoting Air Force AIRPOWER.

By Frances McKenney, Assistant Managing Editor

Gala in Florida

The Air Force Association's and Air Combat Command's Air Warfare Symposium culminated with the 24th annual Air Force Gala, hosted by the **Central Florida Chapter** in Orlando, Fla., in February.

The black-tie evening paid tribute to 50 years of service by the ICBM force—"the silent warriors," as James E. Callahan, chapter president and master of ceremonies, described them. "These men and women—from industry, to operator, to maintainer, to support personnel—continue to meet the challenges with extreme dedication and professionalism," he told the gala audience.

During ceremonies that evening, the chapter named retired Gen. Lance W. Lord as an AFA H.H. Arnold Fellow, noting that he had begun his career as a Minuteman combat crewmember. Lord retired in 2006 as commander of Air Force Space Command.

The chapter also named four AFA Gen. Bernard A. Schriever Fellows: all ICBM personnel (represented by Maj. Gen. Roger W. Burg, commander of 20th Air Force); the weapon and space systems company ATK, selected for its contributions in the solid-propulsion field; Lockheed Martin, chosen for its work on re-entry vehicles; and the Minuteman III Guidance Replacement Program team, for updating the reliability and accuracy of the only USAF ICBM launch vehicle on daily alert status.

US Rep. Jim Marshall (D-Ga.), the co-chairman of the Air Force Caucus and a member of the Armed Services Committee, and British Air Commodore Phil Goodman, dean of the foreign air attaché corps, were among the gala's honored guests.

During 24 years of support for AFA's aerospace education programs, the Central Florida Chapter has raised more than \$650,000.

Weather Report

Through an AFA Chapter Matching Grant, the **Richmond Chapter** in Virginia co-sponsored a series of lessons at an elementary school in their city. The topic was meteorology—air masses, density, fronts, temperature, barometric pressure. In short: weather.



At the Air Force Gala in Orlando, Fla., Tommy Harrison (far left) and James Callahan (far right) present the Central Florida Chapter's donation for aerospace education activities to (l-r) Michael Dunn, Sandy Schlitt, and AFA Board Chairman Bob Largent. Harrison was gala chairman, while Callahan was master of ceremonies. Dunn is AFA's President-CEO. Schlitt is Vice Chairman of the Board for Aerospace Education. The chapter also presented \$10,000 to the Air Force Memorial Foundation.

Chapter President Dave Reisenwitz, an educator-marketing director from the Virginia Aviation Museum in Richmond, spent two days teaching students at Reams Road Elementary School. He worked with all 174 fourth- and fifth-graders, conducting 50-minute sessions with groups of about 25 at a time. Reisenwitz used a combination of lectures, interactive discussions, and attention-grabbing demonstrations to keep the kids interested.

All students received a ticket to the aviation museum, so they could later on see the vintage military and civilian aircraft on display, including an SR-71 Blackbird Mach 3, high-altitude reconnaissance airplane.

The educational outreach effort received coverage in a local newspaper, including mention of AFA's sponsorship role.

An AFSOC Workshop

The **Hurlburt Chapter (Fla.)** organized a teachers' workshop, held at Hurlburt Field in January. The "field trip" portion involved tours of aircraft

on static display, an introduction to Air Force Special Operations Command squadrons, and even some aircraft simulator time. The classroom portion covered AFA educational programs and grants, as well as programs of other organizations such as the Civil Air Patrol and Experimental Aircraft Association.

The day began at the flight line, where visitors—among them several chapter members—toured an MH-53M Pave Low IV from the 20th Special Operations Squadron; an AC-130U Gunship of the 4th SOS; a CV-22 Osprey of the 8th SOS; and a "Hurricane Hunter" WC-130J flown by the 53rd Weather Reconnaissance Squadron, Keesler AFB, Miss.

The Hurlburt guests visited the 19th SOS, an AFSOC training and mission rehearsal "school." They tried out a few training devices and "flew" MC-130 Combat Talon I and II simulators.

During a working lunch at Hurlburt's club, the teachers met the Hurricane Hunter crew and listened to presentations on aerospace education opportuni-

ties and on paper airplane construction by Ken Blackburn. An engineer with Jacobs-Sverdrup at Eglin AFB, Fla., Blackburn holds the Guinness record for time aloft for paper airplanes (27.6 seconds, set in October 1998 in the Georgia Dome in Atlanta).

In the afternoon, chapter members Casey Oliver, Glenn S. Rutland, and Ricardo V. Soria conducted workshops, along with Blackburn. Hurlburt Chapter President Dann D. Mattiza said that the teachers at this workshop came from northwest Florida and Alabama. AFA leaders on hand included Florida State VP Richard Schaller and Chapter VP Thomas E. Hull.

Community Impact

It comes down to who you know. In Owasso, Okla., the mayor chatted with **Tulsa Chapter** member Alfredo Ontiveros Jr. In turn, Ontiveros contacted Chapter President Lee E. Hayes. Next, Hayes called the 138th Fighter Wing at Tulsa Airport.

The result? Mayor Stephen Cataudella got a comprehensive briefing on the ANG wing and learned how Owasso could benefit from supporting it.

Although Cataudella is an Air Force veteran, for most in his town of some 34,000 residents, "contact with the ANG is the sound of F-16s taking off and landing at nearby Tulsa International Airport during training flights," as the local newspaper put it.

Cataudella toured the Guard facility with Hayes and Ontiveros in January. He met Brig. Gen. Robert D. Ireton, the Oklahoma ANG chief of staff, and, for the past seven years, the chapter's VP. He also met Col. Brewster Butters, wing vice commander.

Butters presented a video on the 138th FW and explained the unit's mission and how it affects Owasso. Butters said the wing's operations and personnel have a \$162 million impact on the Tulsa area. He noted that nearly 200 more people will be added to the base rolls and that Owasso—located northeast of Tulsa—should consider planning how to house them.

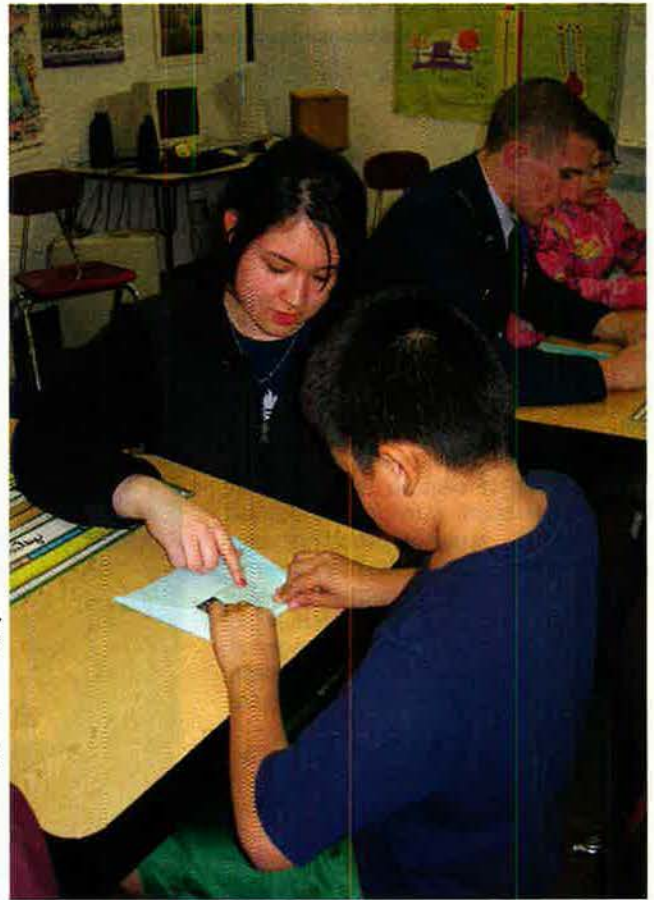
Cataudella told the *Owasso Reporter* newspaper that meeting with the ANG leaders was a tremendous opportunity for him and that Owasso could provide wing personnel with "housing, meals, and places to work out."

"We want to be an active community partner," he said.

Tuskegee Airmen in Pennsylvania

AFJROTC cadets rounded up through the foresight of AFA leaders in Pennsylvania added special touches to a tribute in Pittsburgh honoring the Tuskegee Airmen.

Samantha Viola helps a Santee Community Schools (Neb.) student fold a paper airplane. Lincoln Chapter aerospace education VP Diane Bartels took University of Nebraska Lincoln AFROTC cadet Vince Koziol (background) and Viola on a Visions of Exploration outreach visit to the Santee Sioux reservation in March. The paper airplane is like the one a Hurlburt Chapter workshop presenter used to set a world record. (See "An AFSOC Workshop.") Koziol is a Lincoln Chapter member, and Viola belongs to Silver Wings, a service organization supporting AFROTC units.



Retired SMSgt. Oreste DiCerbo, aerospace science instructor at West Mifflin Area High School, helped organize the young cadets for this Black History Month salute to America's first black military airmen. DiCerbo is the aerospace education vice president of the **Greater Pittsburgh Chapter**. However, the idea to take part in the event really originated with Robert C. Rutledge, chapter secretary for the **Lt. Col. B.D. "Buzz" Wagner Chapter** of Johnstown.

Back in January, Rutledge read a newspaper article about an upcoming

ceremony to spotlight the fact that an unusually large number of Tuskegee Airmen—at least 50—hailed from the Pittsburgh area of the Keystone State. Rutledge e-mailed a copy of the newspaper article to several AFA members and suggested that the Pittsburgh Chapter get involved.

Only three days later, DiCerbo responded that he had contacted the event organizers. "They were excited when we called to help," he told Rutledge. DiCerbo's saber team was invited to perform an opening ceremony.

At the Tuskegee Airmen tribute lun-

AFA Conventions

May 9-10	South Carolina State Convention , Shaw AFB, S.C.
May 9-10	Tennessee State Convention , Nashville, Tenn.
July 11-12	Florida State Convention , Cape Canaveral, Fla.
July 11-12	Texas-Oklahoma State Convention , Oklahoma City
July 19	North Carolina State Convention , Fayetteville, N.C.
July 25-26	California State Convention , Edwards AFB, Calif.
Aug. 2	Massachusetts State Convention , Boston
Aug. 9	Georgia State Convention , Robins AFB, Ga.
Aug. 9	Pennsylvania State Convention , State College, Pa.
Sept. 13-14	AFA National Convention , Washington, D.C.
Sept. 14-17	AFA Air & Space Conference , Washington, D.C.

cheon on Feb. 2, eight AFJROTC cadets of the saber team formed an arch of swords, and the Tuskegee Airmen walked under it as their names were announced to the audience gathered at the Sen. John Heinz History Center. Cadet Mikenna Manspeaker sang the National Anthem with a Civil Air Patrol cadet.

The AFJROTC cadets were proud of their part in this event, DiCerbo reported. He said they left the luncheon having learned more about the Tuskegee Airmen and having received positive comments from the audience "for helping honor our nation's best."

The Delaware 33

In February, the **Delaware Galaxy Chapter** held its annual awards reception, highlighting the accomplishments of 33 top performers from the Air Force community.

Held at Dover Air Force Base, the event honored personnel from the active duty 436th Airlift Wing, among them, Capt. Quoc-nam T. Nguyen, senior company grade officer of the year, and 1st Lt. Megan N. Schmid, junior CGO of the year. Reservists from the 512th Airlift Wing who earned awards included Capt. Lonnie Schmidt, CGO of the year, and MSgt. Veronica Aceveda, Senior NCO of the Year.

Cadets from the University of Delaware, Det. 128, in Newark; top junior and senior AFJROTC cadets from each of the seven high schools in the state; Civil Air Patrol cadets; and outstanding civilians rounded out the list of award recipients.

Delaware State President Richard B. Bundy hosted the awards night, which included remarks by Col. Randal L. Bright, 512th AW commander.

More Chapter News

■ A former Air Force intel officer spoke to the **Columbus-Bakalar Chapter** in Columbus, Ind., in February. Mel Lantz had been an engineering student and ROTC cadet at Ohio State University in 1949. On graduation, he was commissioned and assigned to Wright-Patterson AFB, Ohio, to Technical Intelligence Class 54-D. Chapter Secretary James R. Alvis said Lantz had always been closed-mouthed about his intel past, and most of his friends and co-workers from his civilian career at Cummins Engine never knew he had served in the military.

■ More than 60 guests turned out for the **Richard D. Kisling Chapter's** January meeting in Sioux City, Iowa. Col. Brian Miller, 185th Air Refueling Wing (ANG) commander, was guest speaker and provided an update on the unit's deployments and transition from KC135E to R models. ■

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4th Emergency Rescue Sq Assn. Oct. 15-19 at the Radisson Hotel at Opryland, Nashville, TN. **Contact:** Chet Gunn (781-944-6616) (tightboot@msn.com).

8th AF, 457th BG, including 748th, 749th, 750th, and 751st BSs. May 24-28 in Peterborough, England. **Contact:** Will Fluman, 120 South Ridge Rd., Boiling Springs, PA 17007 (phone: 717-258-3090 or fax: 717-258-0560) (oakgrove35@aol.com).

39th, 40th, 41st FSs of the 35th FG. Oct. 22-25 at the Country Inn & Suites in Montgomery, AL. **Contact:** Roger Rehn (530-644-7346) (olo7346@sbcglobal.net).

50th TFW officers. Aug. 12-15 at the AF Museum in Dayton, OH. **Contact:** Skip Sedgwick, 41916 N. Emerald Lake Dr., Anthem, AZ 85086 (602-315-9208) (skipsedg@aol.com).

98th BG, 98th BW, veterans. Oct. 14-19 in Cincinnati. **Contact:** Billy Seals, 2526 Plumfield Ln., Katy, TX (281-395-3005) (cbseals@consolidated.net).

483rd BG Assn. Sept. 8-14 in St. Peters-St. Charles, MO. **Contact:** George Stovall, 825 NE Lawndale Pl., Corvallis, OR 97330 (541-758-0009) (gstovall@peak.org).

Army Air Corps Pilot Classes of WWII. Sept. 18-21 in Virginia Beach, VA. **Contact:** Stan Yost, 13671 Ovenbird Dr., Fort Myers, FL 33908 (239-466-1473).

B-58 Hustler Assn. June 3-6 at the Gold Coast Hotel, Las Vegas, NV. **Contact:** Bill Shunney, 7249 Adobe Hills Ave., Las Vegas, NV 89113-3040 (bshunney@cox.net).

Pilot Tng Class 52-F. Oct. 22-25. **Contact:** W.R. Dusenbury, 9063 Northpoint Dr., Beach City, TX 77520-8350 (281-303-0085) (billduse@teleshare.net).

Pilot Tng Class 60-F. Spring 2010, in Dayton, OH. **Contact:** Robert Suhrheinrich, 2135 Dovefield Dr., Pensacola, FL 32534 (850-478-1316) (bobsir@cox.net).

SAC Airborne Cmd Control Assn. Oct. 15-19 at the Doubletree Hotel in Dayton, OH. **Contact:** Wilton Curtis (804-740-2290) (wcurtis135@aol.com).

Seeking **Berlin Airlift veterans** in TX, NM, AR, OK, LA for a reunion. **Contacts:** Kai-Uwe Spicher, Deputy Consul General, 1320 Post Oak Blvd., Ste. 1850, Houston, TX 77056 (phone: 713-627-7770 or fax: 713-627-0506) (vw-1@hous.diplo.de) or Meyer Minchen, 1753 North Blvd., Houston, TX 77098 (phone: 713-528-6967 or fax: 713-528-6979). ■

E-mail unit reunion notices four months ahead of the event to reunions@afa.org, or mail notices to "Unit Reunions," *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information. We reserve the right to condense notices.

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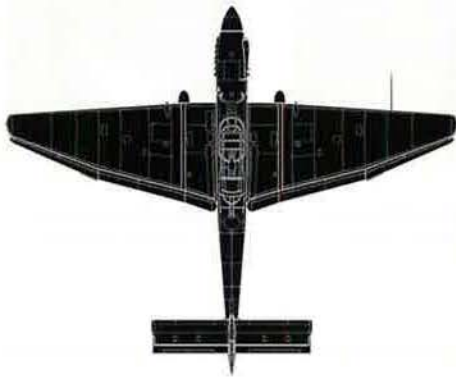
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Ju 87 Stuka



No aircraft better combined psychological and physical effect than the sinister-looking Junkers Ju 87 Stuka of World War II, an airplane that wreaked havoc whenever and wherever the Luftwaffe had air superiority. The inverted-gull wing dive-bomber was key to the success of German ground campaigns in Poland, Norway, and France. It was also critical in the early stages of the Nazi campaigns in North Africa and, especially, the Soviet Union.

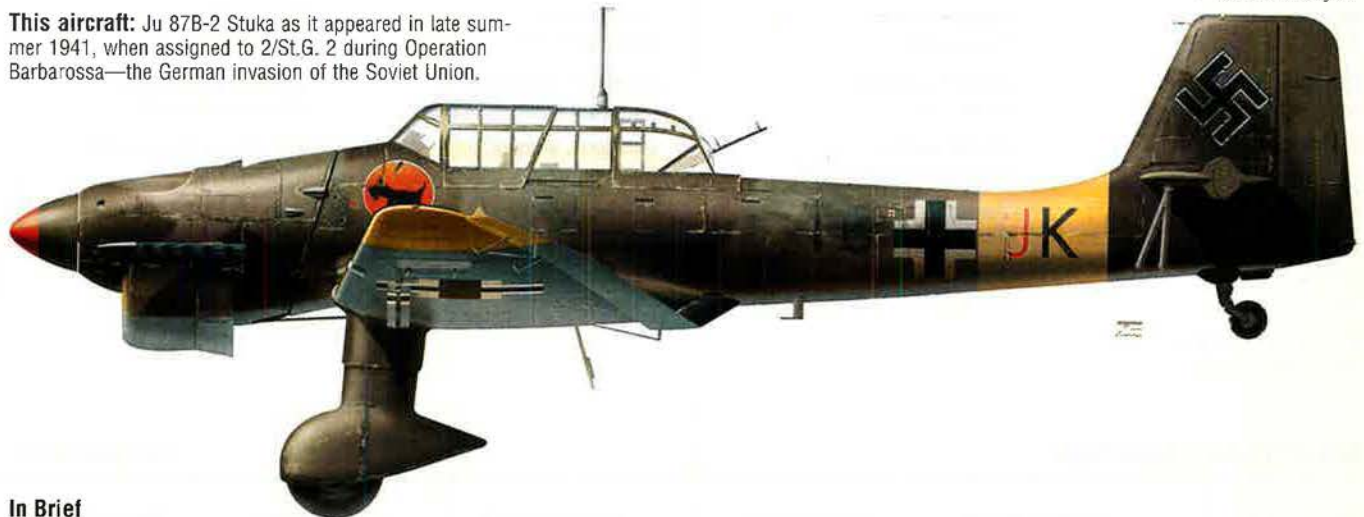
The name "Stuka" came from the generic term *Sturzkampfflugzeug*—roughly, "steep-diving-bomber." Its design began in 1933. Famous World War I ace and aerobatic pilot Ernst Udet was inspired by the US Navy's Curtiss F6C and BF2C Hawks and fostered the development of the Ju 87. The fixed-gear Ju 87 was of modern all-metal stress-skin construction, and was strong,

if not swift. Its rugged frame and landing gear allowed it to operate close to the front lines from improvised fields. The Stuka quickly responded to ground-based forward air controllers, and its pinpoint accuracy allowed the German Army to use it as a kind of airborne artillery.

A small number of Stukas were tested in the Kondor Legion during the Spanish Civil War of 1936-39. The much-feared Stuka delivered its bomb load in an 85 degree angle dive. The danger of the pilot blacking out from G-forces was great, but was offset by an auto-pull-out device installed on each aircraft. For all its strengths, the Stuka suffered from low speed and poor maneuverability. It had little defensive armament, making it highly vulnerable to enemy fighters. Once the Allies established air superiority in the West and Soviet Union, the Stuka faded in significance.

—Walter J. Boyne

This aircraft: Ju 87B-2 Stuka as it appeared in late summer 1941, when assigned to 2/St.G. 2 during Operation Barbarossa—the German invasion of the Soviet Union.



In Brief

Designed, built by *Junkers Flugzeugwerke* ★ first flight Sept. 17, 1935 ★ crew of two ★ number built 5,752 ★ **Specific to Ju 87D1:** one Junkers Jumo 211J-1 engine ★ armament (typical) two MG-17 and two MG-81 guns with up to three bombs (one centerline, two on wing) ★ max speed 255 mph ★ cruise speed 193 mph ★ max range 620 m ★ weight (loaded) 14,550 lb ★ span 45 ft 3 in ★ length 37 ft 9 in ★ height 12 ft 9 in.

Famous Fliers

Notable: Hans-Ulrich Rudel ace and most-decorated German serviceman of World War II (flew 2,350 combat missions, was shot down 32 times, and destroyed 800 vehicles, 519 tanks, 150 guns, a destroyer, two cruisers, a battleship, nine aircraft), Helmut Fickel (Rudel's wingman). **Other Notables:** Alwin Boerst, Walter Ennecerus, Alexander Glaser, Franz Kieslich, Kurt Kuhlmeier, Hubert Polz, Werner Roell, Hans-Karl Stepp.

Interesting Facts

Dropped first bomb of World War II (Sept. 1, 1939, Poland) ★ featured Rolls Royce Kestrel engine in prototype ★ used on every battle front in Europe ★ navalized for never-completed carrier *Graf Zeppelin* ★ equipped with the "Jericho Trumpet," a small siren used as a psychological device against infantry and horses.



The Stuka was a menacing sight.

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