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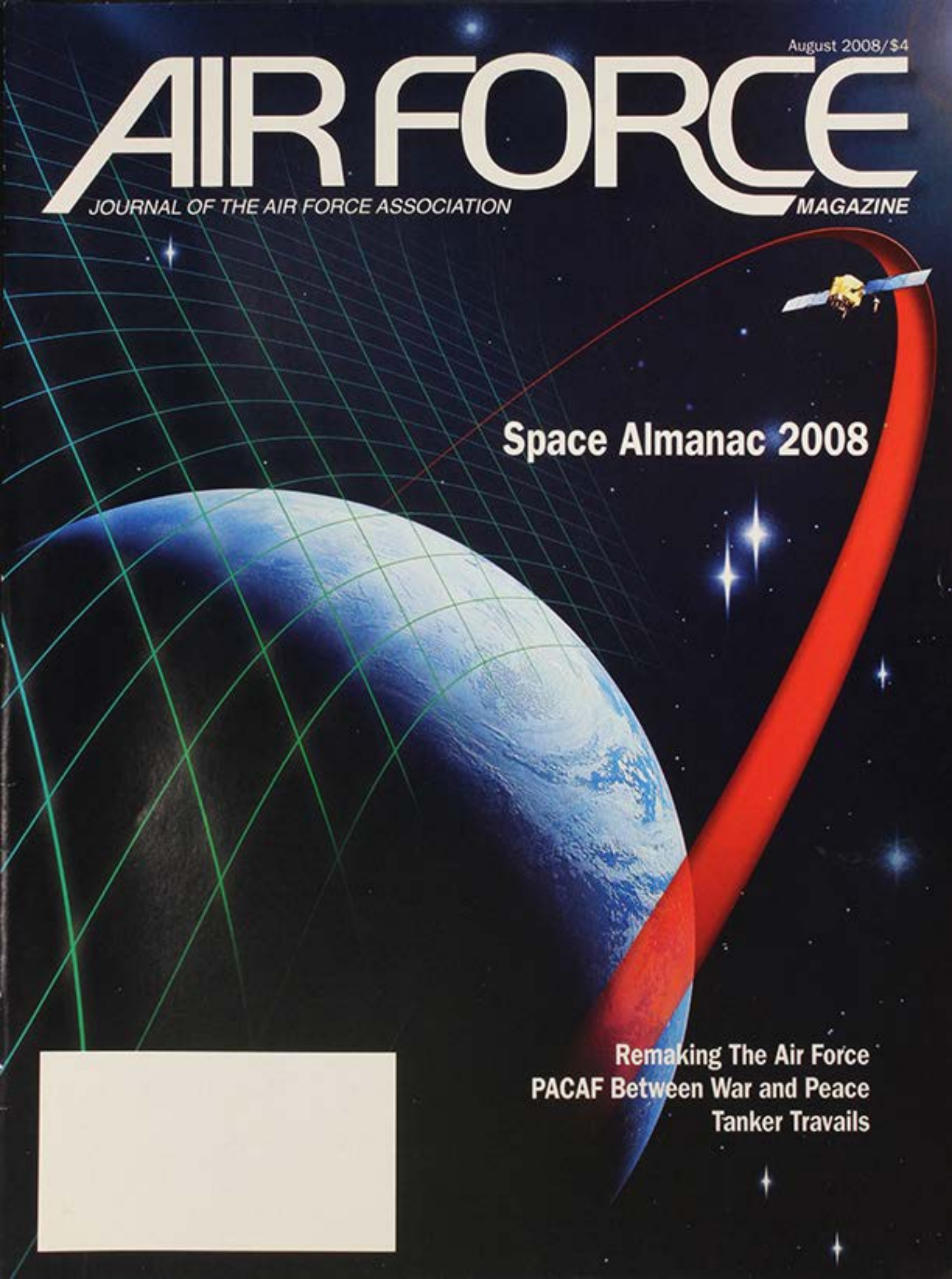
AIR FORCE MAGAZINE

JOURNAL OF THE AIR FORCE ASSOCIATION



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August 2008, Vol. 91, No. 8

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Editorial

By Robert S. Dudney, Editor in Chief

Failure *Is* an Option

Air forces can fail, as witness the World War II disasters suffered by Japan and Germany as well as those that have befallen Argentina, Egypt, and other states. Most Americans today have no real experience of such unpleasantness.

For decades now, the US Air Force has produced only successes. These range from Linebacker II in Vietnam in 1972 and the Persian Gulf War in 1991 through Southern and Northern Watch and air campaigns in Bosnia and Serbia in the 1990s, and then operations in Iraq and Afghanistan. USAF makes it seem easy.

The key word is "seem." Success is hard-won and never assured. And so, in assessing Air Force prospects, we feel constrained to repeat the well-known mutual fund warning: "Past performance is not a guarantee of future returns."

Others also have been thinking along the same lines. An example is the recent book *Why Air Forces Fail: The Anatomy of Defeat,* edited by Robin Higham and Stephen J. Harris. Another is a similar and more recent internal USAF brief, "Why Air Forces Fail: Learning From History's Lessons."

The brief is based on 11 cases, from failure of the Kaiser's fliers in the Great War to defeat of Argentina's in the Falklands War, with side trips to World War II, Vietnam, and the Mideast.

In distilling the case studies, the briefing identifies four root causes of disaster. It claims that failed air forces were:

- *Unable to read the enemy.* In case after case, airmen and national leaders misunderstood or underestimated a foe. Among the sources of this failure were mirror imaging, poor intelligence, failure to use intelligence that existed, and even racism. One offender was the Army Air Forces in the Pacific. Airmen thought their Japanese counterparts incapable of long-distance strikes, and suffered disaster for it. The RAF fell into the same trap.

A classic case was the World War II German Luftwaffe. As the brief points out, German air leaders expected to make quick work of the French and British air forces. They were right about France, but wrong about the RAF. When Germany attacked Russia in 1941, German airmen assumed the Soviet air force would collapse. They did not plan for winter combat, moved no depots forward, and failed to provide for transport of fuel and spares. The Soviet force eventually recovered, the Luftwaffe faltered badly, and the campaign was lost.

- *Unprepared for a long haul.* The USAF brief cites five cases in which training pipelines, support infrastructure, and repair systems were unable to keep up with attrition and provide adequate, timely replacements. This meant that, after initial stages of a war, shortages of air crews and combat-ready aircraft emerged.

Past performance is not a guarantee of future returns.

In the World War of 1914-18, the Kaiser's German air force was overwhelmed by superior British and French industry. In the run-up of World War II, France failed to plan for fighting beyond the initial battles and ran out of aviators and aircraft. As war wore on in the 1940s, German aviation was mismanaged; the Luftwaffe had started with a huge edge, but, by 1942, had lost most of it, and the air arm was in permanent decline.

- *Short on independence.* In several cases, doctrine blocked creation of an independent air arm, casting the air force into a wholly supportive role. This bred disunity of command, confusion about whom to support, and, more critically, robbed the aviation force of the power to wage a true air campaign.

France's air force at the start of World War II was weakened in this way; as the brief puts it, Paris handed its air force a "subservient, reactive, defensive" role. Parceled out to various army commanders, it lacked unity of command and collapsed under German pressure in 1940. Japan's army air force in World War II had a similar experience and proved largely irrelevant.

The textbook case was that of Argentina's air force in the 1982 war with Britain. It existed to give short-range support to naval and ground forces. When it was called on to lead the war, it was neither trained nor equipped to perform long-range operations.

- *Lacking in modern aircraft and weapons.* In all 11 cases of air force failures, a key culprit was lack of quality hardware. Weak-engined German aircraft in World War I were outmuscled by Western types. Outmoded Italian fighters of the interwar years were easily defeated when World War II came. In 1940, French fighters were outnumbered three-to-one by the German Luftwaffe.

The RAF had potent Spitfires in Britain, but it had only old, outclassed fighters in Malaya and Greece. Japanese aircraft late in the war lacked radar and good shortwave radios. Egyptian and Syrian air forces of the 1960s, flying Soviet-made fighters, lagged behind Israel's Western types and were overpowered.

Then there was USAAF in the first year of the Pacific War. For strike, it had mostly obsolete B-10 bombers. Tactical forces were based on old P-26 and P-35 fighters, and even they were available in inadequate numbers. USAAF was, in 1942, outclassed by Japan.

The obvious question for Air Force partisans is this: Are any of these potentially serious weaknesses in evidence now?

Today's Air Force shows no obvious signs that it is suffering the effects of No. 1 or No. 2. No. 3 gives some pause, in light of the fact that some in the Joint community judge USAF's worth solely by the degree to which it "supports" surface forces, and would be happy to lash Air Force units tightly to them.

The real danger is No. 4. The past three Administrations all have failed to sufficiently support the vital recapitalization of USAF bombers, fighters, airlifters, and support aircraft. Defense Secretary Robert M. Gates calls preoccupation with this need "next-war-itis."

Within the US military, there is a presumption of success, expressed in the words, "Failure is not an option." The reality, as history makes only too plain, is that failure is indeed an option, and an ever-present one at that.

Surely, recognition of that fact is the first and indispensable step toward avoiding a failure of arms some time in the future. ■

Letters

letters@afa.org

Bad Medicine

After the embarrassing firings of [Secretary of the Air Force Michael W. Wynne and Air Force Chief of Staff Gen. T. Michael Moseley] it should be clear to all that some serious changes are needed in our Air Force. Your editorial, "Bad Medicine" *[June, p. 2]* is illustrative of the problem.

You suggest that the Air Force should be equipped to fight some illusory "threats" from China and Russia, when the evidence at hand suggests they are minimal. Let me offer some information for you to consider.

Regarding China, somewhere between 30 and 50 percent of that nation's GNP is dependent on foreign investment. There are more than 300,000 foreign-owned factories providing millions of jobs for China's workers. Given that, are they likely to pick a fight with the US or otherwise throw their weight around in the Pacific Rim area? No.

Secondly, don't overstate their capabilities. Recently a Taiwanese defense official said, "We need F-16s in order to maintain our technological superiority over the Chinese Air Force." Yet we continue to buy F-22s whose unit cost is such that we could buy five F-16s.

Regarding Russia, that nation still does not have an indigenous science and technology system, and that deficiency was behind its inability to integrate economically with Europe, a circumstance that consigned it to nonplayer status. [Russian leader Vladimir] Putin's only playable card was to rattle his worthless nukes, and that will continue. The MiGs and Sus are good for air shows, but are "hangar queens" that cannot be sustained in combat.

The War on Terror will likely be with us for some time and could expand beyond the Middle East and Afghanistan. USAF systems should be modeled after the Navy's littoral warfare scenario. It needs airlifters, tankers, and UCAVs, along with missile and satellite defenses. These are not the things that gladden a fighter jock's heart, and there is the root of the problem.

Finally, the Air Force must realize that it works for the American taxpayer, not the other way around. If its leaders continue to try to put the service first, it will incur the wrath of the citizenry.

Richard Thomas
Dayton, Ohio

If Secretary [Robert M.] Gates is concerned that our Air Force leadership is too focused on what he calls "next-war-itis," he should be aware that many American civilians are comforted that they are. We in business, education, agriculture, and other endeavors always have to be forward looking if we expect to compete efficiently in our respective fields. Perhaps we can be accused of having "next-market-itis." Those who are not so infected will eventually fail in their missions. That goes for the leaders of our Air Force as well. Please allow them to remain "sick."

Philip Davis
North Little Rock, Ark.

I don't pretend to have any significant knowledge of the goings on in the Pentagon or the corridors of power in Washington, D.C. I do note the firing of the Air Force Chief of Staff and the Secretary of the Air Force for their purported "lack of vision" and for questionable influence in the awarding of a multimillion dollar contract.

If the Air Force Chief of Staff and Secretary of the Air Force were lacking in vision, what can we say of the Secretary of Defense? He constantly badgered the Air Force for looking too far into the future, while not participating wholeheartedly in the wars we are fighting today. Perhaps, but what of his apparent willingness to mortgage our future to finance today's fighting?

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

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Perhaps he has not noticed we have slipped very quietly into a new Cold War with a surging China and a resurgent Russia. Perhaps he has been so busy looking at the immediate struggle that he has failed to recognize that China and Russia are investing their treasure in future weapon capabilities, while financing those responsible for the considerable spending of American blood and treasure in Iraq and Afghanistan through intermediaries in Iran and North Korea. Perhaps the Secretary of Defense should stand back for a moment and examine his own performance of duty with the same lens he focused on the Air Force Chief of Staff and the Secretary of the Air Force. Perhaps if he did, he might see fit to remove himself from office.

Lt. Col. George F. Turner II,
USAF (Ret.)
Warner Robins, Ga.

Tanker Endgame?

The decision to award the tanker to a consortium using a foreign built aircraft is flawed from a strategic military viewpoint *["The Tanker Endgame?," June, p. 30].* We must have total control of all our weapons systems and the tanker is a weapons system, because without refueling capability, our fighters and bombers will have an impaired operational capability. Today, this country does not know what our relationships with foreign countries will be 10 years from today. We must however be absolutely assured of the continuity of future support, spare parts, and replacement aircraft for the tanker fleet. The reliance of this support cannot be assured if we select a tanker primarily controlled by foreign interests. This strategic requirement overrides any economic analysis which might favor a foreign built aircraft. That it will be assembled in the United States is not sufficient. It must be controlled by our defense establishment which it is not under the contract as presently awarded. A second consideration is that given our country's problem in job loss and economic status today and projected, we cannot afford to export yet another major project. Third, and finally, if the Air Force leadership believes our own technology is inferior to [that of] a foreign nation, we must reallocate our priorities to restore that leadership. It is unacceptable for the United States to have military technological leadership less than the best.

Gunther Karger
Palmetto Bay, Fla.

Maverick Miscue

I have worked with or around the Maverick missile for over 30 years. The photo on p. 42 of the June issue *["Not Fade Away"]* does not show an AGM-65D IR Maverick, but, most likely, an AGM-65E Laser Maverick. The yellow band behind the guidance unit indicates the heavyweight (300-pound) warhead, and the red plastic nose cover is seen only on the "E" Maverick.

Sam Matthews
Eglin AFB, Fla.

The Robin Olds Factor

As a proud former member of the 8th Fighter Wing, "Wolfpack," while stationed at Kunsan, South Korea, I read your Robin Olds article *["The Robin Olds Factor," June, p. 44]* with great interest. I had a chance to meet "Wolf 1" in 2003, and though somewhat up in years, he still had that "spit and vinegar" that made him a legend, especially amongst Air Force fighter pilots.

I felt you were a little remiss in printing that great photo (p. 47) of Olds on the occasion of his final flight at Ubon, without identifying all his supporting cast that were pictured. You did recognize Maj. William Kirk, who went on to attain

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four-star rank and commanded 9th Air Force, and later USAFE, but you failed to identify Maj. Joe Moore (far right) and Maj. Bill MacAdoo (far left). Moore later served as commander-leader of the USAF Thunderbirds, retired as a major general in 1986, and lost a tough battle with Lou Gehrig's disease in 2001. MacAdoo retired as a colonel and passed away around the same time as Moore from lung cancer.

Col. William A. Malec, USAF
O'Fallon, Ill.

It was a thrill to see my father, Robin Olds, on the cover of June's issue of *Air Force* Magazine.

For the sake of accuracy, I have one small correction to make to my dad's biographical information. Although Walter Boyne's information came from a seemingly impeccable source, my father was indeed separated from my mother, Ella Raines, in 1975, but they were divorced the next year. He did not remain married to her until her death in 1988. He married Morgan Barnett Olds in 1978 and they were married for the following 15 years. Morgan is a lovely lady and we are very close and we'd like to have her correctly acknowledged.

Christina Olds
Steamboat Springs, Colo.

Nuclear Fallout

I can only hope that the recent humiliation visited on the Air Force by the removal of its senior leadership marks the final turning point in the long trend toward erosion of the service's most important custodial responsibility *["The Nuclear Wake-Up Call," June, p. 50].* Thirty years ago, in Congressional executive sessions in which I participated, the Air Force's leadership in nuclear security and safeguards was touted as the standard by which other service activities in this area should be measured. The focus on that responsibility within Strategic Air Command was the genesis of that standard. The system of no-notice inspections at both the wing level and in a separate but complementary security test program, helped maintain not only war readiness, but a constantly reinforced effort on preventing deterioration in the nuclear security and safety mission. I always thought of it as staying a step ahead of the relentless law of averages that could lead to disaster.

While the dissolution of SAC may have been fundamentally proper from an overall organizational and functional perspective, the impact on distributing the nuclear responsibility should have been foreseen. Restoring, and retaining, the process and procedures that served so well under SAC in this func-

tional area should receive the highest priority the service can impose. If not, the implications today, perhaps even more so than before, are too horrendous to contemplate.

Maj. John E. Siedlarz,
USAF (Ret.)
Easton, Md.

From what I've read, it seems that the Defense Logistics Agency was the basic culprit here in the four classified nuclear warheads being misrouted *["Air Force World: ICBM Parts Mistakenly Sent to Taiwan," June, p. 15].* How about canning some of the civilians at the top in DLA that packaged the four as unclassified and labeled them batteries? That was a gross error. Are their civilian heads rolling too?

Lt. Col. Neil McGuinness,
USAF (Ret.)
San Diego

Hail and Farewell

I am the commander of the 43rd Flying Training Squadron here at Columbus AFB, Miss. I noticed in your article that you missed mentioning my squadron as one of the squadrons who trains student pilots here *["Hail and Farewell," June, p. 54].* I currently have 103 instructors—by far the largest squadron of instructor pilots on the base. My IPs fly the T-37, T-6, T-1, T-38C, and Identification of Friend and Foe. They are all reserve officers, a combination of AGRs and traditional Reservists. As referenced in "Hail and Farewell," Maj. Phil Stoll was the T-6 project officer for the transition. Maj. Dave Vipperman was the first evaluator. Maj. Kevin Wolfe designed the pattern operation. Maj. Phil Trahan was the last T-37 OGV side chief. We, the Firebirds, have a proud tradition of supporting the SUPT mission here at Columbus for over 10 years. We are the Total Force integrated into every Air Force mission. Hometown Patriots, Worldwide Force. Air Force Reserve.

Lt. Col. Michael J. Gibbons,
Columbus AFB, Miss.

Classics

Few pilots today know that the Lancaster had no autopilot and was flown by just one pilot *["Airpower Classics: Lancaster," June, p. 80].* I knew such a pilot; he was a fellow flight instructor with the RCAF in 1955. He looked younger than I did and sported a Distinguished Flying Cross. I quipped to him, "They don't give those away and you are too young to have been in WWII, how did you earn it?"

His modest answer: "We were in a thousand night-bomber raid over Germany in 1944, and the biggest fear I had was colliding with another Lanc. Halfway to Berlin, I had an explosion on the port side and thought it was flak. I had to use full aileron and rudder to keep it straight and level, and as I was already halfway there, I proceeded to target and back home.

"When I landed at dawn, I stepped out to check the damage and found that the whole left wing, past the outboard engine, was missing—like gone! I later found out that another Lanc had collided with me and he returned to base. It was a 10-hour flight and my arms and right leg were locked into position for days afterwards. My squadron leader thought I did a bang-up job, though I told him my flight engineer took spells with me, but he didn't get anything."

He showed me his logbook. He was then 19 years old and had 330 hours in it.

George Fulford
Mill Valley, Calif.

Washington Watch

By John A. Tirpak, Executive Editor

Now you know; Pay no attention to China; Lights go on in the Army ....

Wynne Goes On Record

Well, surprise. Former Air Force Secretary Michael W. Wynne's sudden resignation June 5 was not just a matter of accountability for USAF slipups with nuclear weapons and parts, but also the result of serious disagreements with his Pentagon superiors.

That word came from Wynne himself. In an hour-long June 20 press conference—his last day on the job—Wynne noted that, over the last year, he had become "more strident and challenging" to Defense Secretary Robert M. Gates and to Gates' deputy, Gordon England.

Gates simultaneously accepted the resignation of Gen. T. Michael Moseley, Air Force Chief of Staff.

The key points of friction were Wynne's insistence that the Air Force be allowed to prepare for future wars, and field enough personnel to avoid breaking the force.

"I advised the Secretary I was not with him on the F-22 budget," Wynne said. "I advised the deputy secretary I was not with him on joint basing. And we kind of told everybody that we needed to change the ... number of people" on active duty from a planned 316,000 back up to 330,000, Wynne reported. "So there were differences that accrued."

There were, Wynne said, "a lot of things" on which he and Gates didn't see eye to eye.

"I would say that getting ready for a future war is a responsibility that I've been talking about since the very first day," Wynne noted. Gates has in recent months complained publicly that some of his departments were suffering from "next-war-itis" instead of putting all their energies against winning the two ongoing conflicts in Southwest Asia.

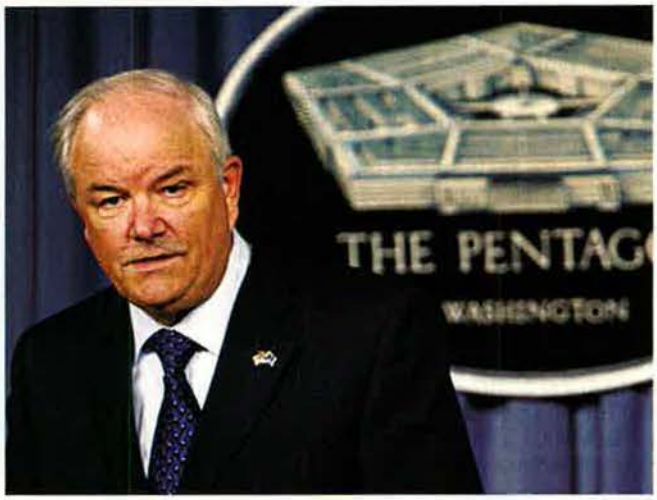
Wynne said he felt no regrets about the situation. "This is not personal, it's business," he observed, adding that Gates has the right to have as his top Air Force leaders people who "are more aligned" with Gates' and England's policies, "if that's what they want."

There were other disagreements. Wynne said he had been "told early on to knock this stuff off about the Air Force buying synthetic fuel, because 'we can always get fuel.'" Wynne believed the Air Force could be the launch customer for a new industry that could help ease the nation's energy crisis. He saw it as no different than seeking to buy an advanced missile or other technology which then has commercial spin-off possibilities.

"I remember that when ARPANET arrived, ... the government was a big investor in ARPANET," said Wynne. "[It] made the market, and then boom, the rest is history." The ARPANET, an early computer communications system for the defense community, was a forerunner of today's Internet.

F-22 Dispute Aired

Wynne said he had been told to consider it unlikely that the US would get into a war with a "peer competitor"—such as China or a resurgent Russia—and that therefore the Air Force shouldn't place too much emphasis on preparing for major theater war-type threats. However, for Wynne, the issue was personal.



AP photo by Lawrence Jackson

Wynne finally lays it all out.

"My response to Secretary Gates during that interchange," said Wynne, "was, 'My brother was shot down in Vietnam by a Russian surface-to-air-missile that was sold to the North Vietnamese.' I said I never considered Vietnam to be a peer competitor, but I lost my brother to the fact that some peer sold them the weapon that killed him."

Wynne flatly contradicted the claims of Gates, England, and John J. Young Jr., the Pentagon's acquisition, technology, and logistics chief, that USAF does not need more F-22s because it is roughly similar in capability to the cheaper F-35, now entering initial production.

"The notion of the F-22 as being ... similar to the F-35, we need to get rid of that," Wynne asserted. The F-35, he said, "complements the F-22, but the F-22 is clearly an air superiority and air dominance weapon. The F-35 is a multinational, multirole, [air-to-ground] versatile airplane."

Asked if he thought the US has already lost its edge to the point where a foreign power could "take us," Wynne said, "No. I have to say that categorically." However, he said that US pilots, as the best-trained in the world, could "do better than we would like them to do" if equipped with top "foreign airplanes" now in service overseas.

Wynne also ran afoul of the Pentagon by making some intelligence-surveillance-reconnaissance equipment available to "first responders" in the US who were dealing with wildfires and floods. Wynne said, "There are some people that might say, 'Why do we have anything to give to the first responders here? Why isn't everything in Iraq?' My response to that is, this government is responsible for all things for our people."

He said Pentagon higher-ups "became real nervous" when the Air Force offered to go "all in" and close its Predator unmanned aerial vehicle schoolhouse in order to put every possible asset to work in Iraq or Afghanistan.

"That would mean you've actually topped out," Wynne said. "That meant there were no assets to draw on for

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NORTHCOM or SOUTHCOM. We know there's a requirement down on the border for some of these things. There's a requirement now to use it for first responders."

The Army Wakes Up

Wynne noted that when Army Gen. David H. Petraeus wrote a new manual for counterinsurgency two years ago, he found little room to mention the role of airpower. In last year's "surge" in Iraq, however, "we surged 400 percent in the number of sorties and a thousand percent in the pounds of ordnance dropped. What happened ... that suddenly the airpower became a vital part of the counterinsurgency and surge? I would tell you that what happened was the realization that we could get connectivity between the ground commanders and the air component, that there was true situation awareness available. ...

"Suddenly, as a customer—and the Army is our customer—they woke up. ... And now, all of a sudden the confidence that they could predict the collateral damage, the confidence [that] they could save lives just soared."

That was a hard pill for the Army to swallow, culturally, Wynne said. In the past, if a captain wanted artillery, he had to go through the chain of command—it "was a headquarters event"—but now, he could simply ask the fighter orbiting overhead.

"They didn't have to tell corps," said Wynne. "They could just tell the pilot, 'Drop it here.' A big cultural change. [They] had to go through, I think, a revolution in thought in the Army."

However, once the Army realized the value of things such as real-time, full-motion video, "the demand signal ... went nuts on us," and the Air Force was not prepared for the sudden spike.

"The demand for ISR went ... up so bad," Wynne added, "that I became a huge advocate for compressed data and trying to figure out how to pack more data, because we're truly bandwidth-limited anyway."

He said he worked for two years to "convince people" of the need for greater connectivity between the ground commander and the air commander, and pointed with pride to the success of the ROVER system that does that.

"I coined the term 'spherical situation awareness' to try to get people ... to look up [overhead] for data," said Wynne. "I was for five years the leading edge of interoperability and connectivity. I'm an advocate for 'need to share,' not 'need to know.'"

Before becoming Air Force Secretary, Wynne was the No. 2 man in the Pentagon's undersecretariat for acquisition, technology, and logistics.

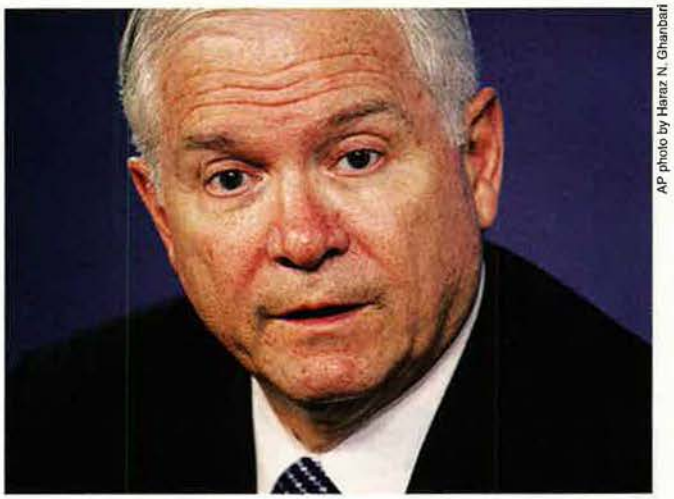
Nuclear Paths Diverge

Seventeen years ago, Air Force and Navy took different paths in handling "nuclear collateral" parts, meaning those that are part of a nuclear system but that aren't themselves inherently dangerous, Wynne said.

When Gates asked Adm. Kirkland H. Donald, the Navy's top nuclear officer, to review the Air Force's methods, Wynne pointed out, he "brought a different eye ... [and] evaluated us against [a standard] within the Navy and found some of the ways we do it wanting. I can appreciate that." The Air Force's methods, said Wynne, were judged to be "a little bit less careful" on inventory control because it had many secure locations at which to store items.

Wynne said he instructed personnel involved in the handling of nuclear collateral parts that they needed to be "a lot more crisp," and "that means that while a part is still in the shop, they needed to track it."

"Whether or not" the fuse assembly shipment to Taiwan—marked by the Defense Logistics Agency as helicopter batteries—was the "catalytic event" in Wynne's relationship with Gates, Wynne will leave "to people who can more fairly evaluate it and [who are] probably not as biased as I am right now." In any case, Wynne said, the "seeds were sown" for the incident 17 years ago, when the Cold War ended and the mission was changed.



AP photo by Haraz N. Ghanbari

Gates: There was more to it.

It would be too simplistic, Wynne observed, to lay the blame for his and Moseley's ouster on the people directly responsible for the inadvertent shipment of ICBM fuses to Taiwan, which Gates described as the "trigger" for removing the two top USAF leaders. "I don't think the burden of our replacement should be placed on the guys at Ogden [Air Logistics Center] or the people at F. E. Warren [Air Force Base]."

"When I expressed accountability, it was on a range of events, as it should be."

KC-X Yields Lessons

The day before Wynne's last day on the job, the Government Accountability Office rendered its verdict that the Air Force had made "significant errors" in awarding the KC-X contract to Northrop Grumman, and upheld a protest of the contract by Boeing.

Wynne said his first reaction was to conclude that the Air Force had made the selection process "overly complex," and that "we needed to make the decision process simpler." However, the heavy public and Congressional scrutiny of the contest forced the complexity on the Air Force, he added.

He offered his hope that USAF would be able to "take full advantage" of the reams of information obtained on the KC-30 and KC-767 in order to refine the KC-X award, and not have to start over. Given that some of the "soft" areas of the contractor choice were areas requiring subjective judgments about likely future costs, he said it might not be unrealistic to conduct some sort of "fly-off" between the two types, toward obtaining harder information on their performance and cost of ownership.

The two airplanes in the KC-X contest could each succeed in the mission, Wynne said, adding that either way, the next tanker will "totally revolutionize the way we do war." That's because either tanker will be able to receive fuel as well as offload it, meaning they can take off "light"—with less than a full load of fuel aboard, and thus able to take off from shorter airstrips—and take fuel on from a tanker whose crew is due to come down for a rest. That also means tankers would never have to land "heavy," further broadening the number of fields they could operate from.

Wynne regrets that he won't have a chance to implement the idea of using tankers as network nodes. Since fighters have to hook up with tankers, often several times during a mission, "it's a perfect opportunity to unload the data set and get it back while they're going back to war." ■

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Air Force World

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

Guardsmen Pull Disaster Duty

Thousands of Air and Army National Guardsmen assisted local communities in June to deal with severe flooding that devastated large areas of the Midwest. On June 19 alone, more than 5,700 National Guard members were engaged in relief efforts in Illinois, Indiana, Iowa, Missouri, and Wisconsin.

Further, Air National Guard RC-26 surveillance aircraft provided real-time overhead video and high-quality still photos to help local and state officials assess the flood damage.

Two North Carolina Air National Guard C-130 transport aircraft equipped with modular airborne firefighting systems also flew to California on June 23 to assist other National Guard forces from within and outside the state fight raging wildfires.

Updated CSAR-X Bids In

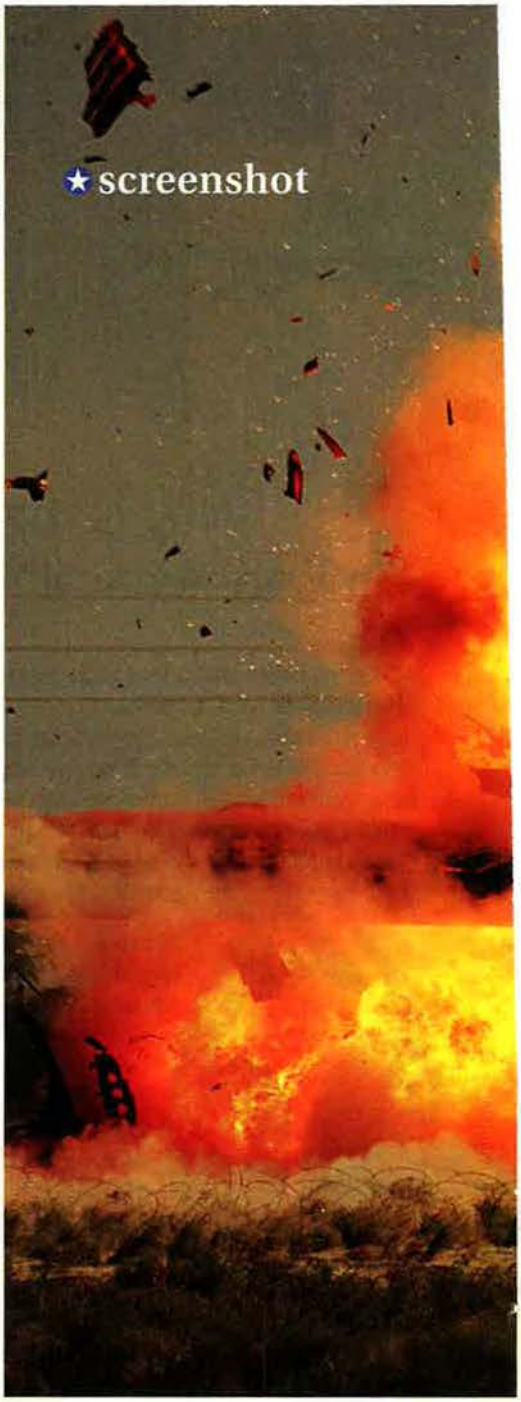
Boeing, Lockheed Martin-led Team US101, and Sikorsky turned in their updated bids for the combat search and rescue replacement vehicle, or CSAR-X, helicopter competition in late May.

USAF is now in the midst of evaluating the revised proposals and will determine, for the second time, whether Boeing's HH-47, Lockheed's US101, or Sikorsky's HH-92 is the best-suited rescue platform to replace aging HH-60G Pave Hawk helicopters. Boeing is the reigning champ, winning the original competition in November 2006. But two subsequent successful protests with the Government Accountability Office by Lockheed and Sikorsky prompted the Air Force to accept the revised bids and pick again.

USAF didn't say specifically by when it expects to announce the winner, but outside observers predict it will be around October. The Air Force wants to field the first CSAR-X squadron between early Fiscal 2013 and late Fiscal 2014, a potential slip over the original schedule.

Missile Wings, Badges Return

Effective July 1, the Air Force's three Minuteman III intercontinental ballistic



USAF photo by TSgt. Jolfrey Allen

Gates Halts Planned Drawdown of USAF Personnel

Secretary of Defense Robert M. Gates announced on June 9 an immediate stop to further reductions in Air Force personnel, thereby reversing a drawdown to 316,000 active duty personnel and enabling the service to increase to a desired end strength level of 330,000 in Fiscal 2010.

Gates announced the change while speaking to hundreds of assembled airmen at Langley AFB, Va., in the wake of USAF's leadership shakeup. "While most public attention" has been focused on the strain on the Army, "the reality is that our airmen" are "under strain as well," and Air Force families have also "borne this burden," he said. "We know this and we are working to ease the burden."

The following day, Deputy Defense Secretary Gordon England sent a memo to USAF's leadership authorizing the new end strength level and pledging that the Office of the Secretary of Defense would work with the Air Force to develop the funding profile to support it in the Pentagon's Fiscal 2010 budget proposal.

The Air Force was on track to reach the 316,000 plateau by the end of Fiscal 2009 based on a plan crafted years ago to cut end strength to free up much-needed funds for modernization initiatives, such as a new tanker aircraft. But since the time of the original plan, the Air Force leadership began to realize that a force of 316,000 would be too small, due to growing demands on airmen with new missions such as US Africa Command and support for a burgeoning Army and Marine Corps. However, the service didn't have the funds to pay for the buy-back of airmen to a more reasonable level, leaving an increase in end strength on the service's list of unfunded requirements for Fiscal 2009. As of April 30, USAF had 323,889 active duty airmen.

missile wings reverted from space wings back to their pre-1997 designation as missile wings.

Then-Chief of Staff Gen. T. Michael Moseley announced the decision on June 6, along with a second change to re-emphasize the "absolute importance" of the strategic nuclear mission within USAF: the return of the missile badge with operations designator for ICBM crews.

Air Force Space Command, which oversees the ICBM units, curtailed use of the "Pocket Rocket" missile badge in 2005, replacing it with a single all-encompassing Space Badge for all space operators, similar to the wings worn by pilots, whether they fly fighters, bombers, or mobility aircraft.

More T-Bird Contracts Slammed

Air Force officials violated federal acquisition regulations in seven of eight contracts worth $57.2 million awarded between October 2003 and October 2005 to support the Thunderbirds aerial demonstration team, the Pentagon's inspector general reported May 20.

The eight contracts included the now-defunct $49.9 million Thunderbirds Air Show Production Services deal. The transgressions ranged from awarding contracts without seeking competition to not establishing a fair and reasonable price, the IG said. Underlying the issues was the perception that senior

07.07.2008

Controlled explosions blast apart a mortally wounded C-130 transport in Iraq. The Hercules was disabled on June 27 when its crew executed an emergency landing in a field north of Baghdad shortly after takeoff. The airlifter could not be moved intact, and so an explosive ordnance disposal team of the 447th Air Expeditionary Group placed explosive charges around the wings of the airplane and broke it up.

Donley Assumes Role of Acting Air Force Secretary

Michael B. Donley took over as Acting Secretary of the Air Force on June 21, filling the void left by Michael W. Wynne's departure. Four days later, the White House sent Donley's formal nomination to the Senate to become the Secretary.

Donley, who came from a senior Department of Defense position, is no stranger to the Air Force, having served as Acting Secretary for six months in 1993. Prior to that, he was USAF's assistant secretary for financial management-comptroller from 1989 to 1993.

Secretary of Defense Robert M. Gates recommended Donley to the White House as Wynne's successor on June 9, four days after he ousted Wynne and then-Chief of Staff Gen. T. Michael Moseley from their posts to reinforce the need for accountability for a perceived "lack of effective oversight" in the service's stewardship of nuclear weapons.

Gates said his decision was prompted by the receipt of a purportedly scathing classified report by Navy Adm. Kirkland H. Donald on the investigation into the errant shipment of Minuteman III ICBM components to Taiwan in 2006. This case only came to light in March, following the mistaken transfer of cruise missile nuclear warheads on a B-52 bomber last August.

While Gates emphasized that only the nuclear issue prompted his decision, Wynne acknowledged June 20 during a final meeting with reporters that he and Gates disagreed on a variety of issues, including buying more F-22s and actions for maintaining the nation's technological edge, that contributed to prompting the firings.

Wynne said during his farewell ceremony that same day that during his two-and-a-half-year tenure, "I believe we've laid a convincing argument" for recapitalizing the Air Force's aging fleet of aircraft.

Moseley's last work day was July 2. On July 11, he began terminal leave until Aug. 1, the date on which his retirement takes effect. Gates on June 9 identified Gen. Norton A. Schwartz, head of US Transportation Command, as his choice to succeed Moseley.

Air Force military officers "had used the powers of their positions to impose their preferences" on contracting officers, the IG wrote.

In response, a USAF spokesman said the service has acted on every IG recommendation and was committed to "contracting processes that are fair, lawful, and provide the American people the best value for their tax dollar."

USAF Orders Special C-130Js

The Air Force on June 13 ordered the first six of what could be more than 100 new modified C-130J aircraft to recapitalize aging HC-130 and MC-130 fleets in roles as tankers for the service's combat search and rescue and special operations forces.

Lockheed Martin will provide the aircraft based on a modified version of the KC-130J tanker used by the Marine Corps. Toward that end, USAF awarded $470 million to procure the six airframes in Fiscal 2009 and long-lead materiel.

F-35 STOVL Flies in Test

BF-1, the first F-35B short takeoff/vertical landing test aircraft, took to the skies for the first time June 11, logging a historic inaugural flight of 44 minutes from Lockheed's F-35 assembly facility in Fort Worth, Tex.

The aircraft's propulsion system oper-

USAF photo by SSgt. Jacob N. Bailey

An Air Force C-17 Globemaster III drops Army paratroopers from the 82nd Airborne Division during a Joint Forcible Entry Exercise on June 18 at Ft. Bragg, N.C. The exercise gave both services an opportunity to practice a joint airdrop and a large scale movement of heavy equipment and troops.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USAF photo by MSgt. Andy Dunaway

An F-15E holds up for his wingman after refueling during a mission over Afghanistan. The Strike Eagles had used GBU-31 and GBU-38s to deter anti-Afghan forces.

ated only in conventional mode, as flights including transitions to short takeoffs, hovers, and vertical landings will not begin until early 2009. BF-1 joins AA-1, the first F-35A conventional takeoff and landing test aircraft that already had more than 40 flights under its belt as of mid-June.

The Department of Defense awarded Lockheed Martin $2.2 billion in May for the purchase of the six F-35As and six F-35Bs that will be built during the program's second production lot. Authorization for construction of the six F-35Bs was contingent upon a successful flight of BF-1.

Pave Low Pilot Wins Safety Award

Lt. Col. Eugene V. Becker, an MH-53M Pave Low helicopter pilot with the 20th Special Operations Squadron at Hurlburt Field, Fla., in June received the 2008 Koren Kolligian Jr. Trophy, the Air Force's top safety award.

Becker received the award for saving the lives of his seven crew members by successfully bringing his Pave Low down under extremely difficult circumstances after it experienced a catastrophic mechanical failure during a nighttime tactical training mission on Sept. 7, 2007. The helicopter was heavily damaged in the crash.

Orbital SBIRS Payload Checks Out

The second highly elliptical orbit payload in the Space Based Infrared System early warning satellite constellation passed its on-orbit checkout successfully, the Air Force and prime contractor Lockheed Martin announced in June.

HEO-2, as it is known, "meets or exceeds specifications," the company said June 20. Officials at the Space and Missile Systems Center at Los Angeles AFB, Calif., said HEO-2 is delivering about 10 times better sensitivity and up to five times faster revisit capability as legacy Defense Support Program early warning satellites.

HEO-2 was scheduled to undergo months of additional testing. Meanwhile, missile warning alerts from the first SBIRS payload on orbit, HEO-1, were expected to join the DSP messaging system provided to warfighters by September, USAF said.

Missouri Guard Begins B-2 Flights

Airmen of the Missouri Air National Guard's 131st Bomb Wing (formerly the 131st Fighter Wing) performed their first solo B-2A stealth bomber sortie on June 18. Air Guard crew chiefs launched the aircraft flown by Air Guard pilots in the first all-ANG mission under a new classic associate arrangement between the 131st BW and the active duty 509th BW at Whiteman AFB, Mo.

In 2006, USAF decided to pair the Air Guardsmen with the Whiteman B-2 bomber force after BRAC 2005 directed the demise of the 131st's fighter mission. The Air Guard hadn't flown bombers since 2001 when the Air Force reorganized its B-1B force, eliminating two ANG bomb wings.

Currently, the 131st has seven pilots qualified for the B-2A and expects to have 25 pilots and nearly 500 maintenance, operations, and support staff at Whiteman.

Judge Rejects Illinois BRAC Suit

A federal judge in June once again rejected Illinois Governor Rod R. Blago-

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jevich's lawsuit to prevent the Illinois Air National Guard's 183rd Fighter Wing from losing its F-16s under BRAC 2005.

US District Judge Richard Mills on June 13 dismissed the state's last-ditch attempt to thwart the transfer of the wing's 15 F-16s from Abraham Lincoln Capital Airport in Springfield to the Indiana ANG's 122nd FW at Fort Wayne Airport. Blagojevich has argued that, as governor, only he and not the Department of Defense has the authority to order such a move.

Twice before, a federal judge dismissed Blagojevich's suit on procedural grounds. But in March, the governor won an appeal that moved the case back to court to be measured on its merit. Without a turn of events, all of the wing's F-16s aircraft are expected to be gone in September.

2018 Bomber Plan Progresses

The Air Force has concluded that "more money and possibly a little more time is required" to field its next bomber aircraft, John J. Young Jr., undersecretary of defense for acquisition, technology, and logistics, told the Senate Armed Services Committee June 3.

This doesn't mean that the 2018 fielding goal is unobtainable, but it does

Minot Unit Struggling To Meet Nuclear Standards

The 5th Bomb Wing at Minot AFB, N.D., which has been under increased scrutiny since its role in the unauthorized transfer of six nuclear cruise missile warheads from the base last August, received an overall unsatisfactory rating in an inspection of its nuclear readiness in May.

"Although the wing excelled in numerous areas, deficiencies were observed in the areas of security and logistics movement," Air Combat Command wrote of the inspection's findings May 31. Defense Threat Reduction Agency and USAF inspectors visited the base for 10 days, starting May 16, for the defense nuclear surety inspection, the unit's first since June 2006.

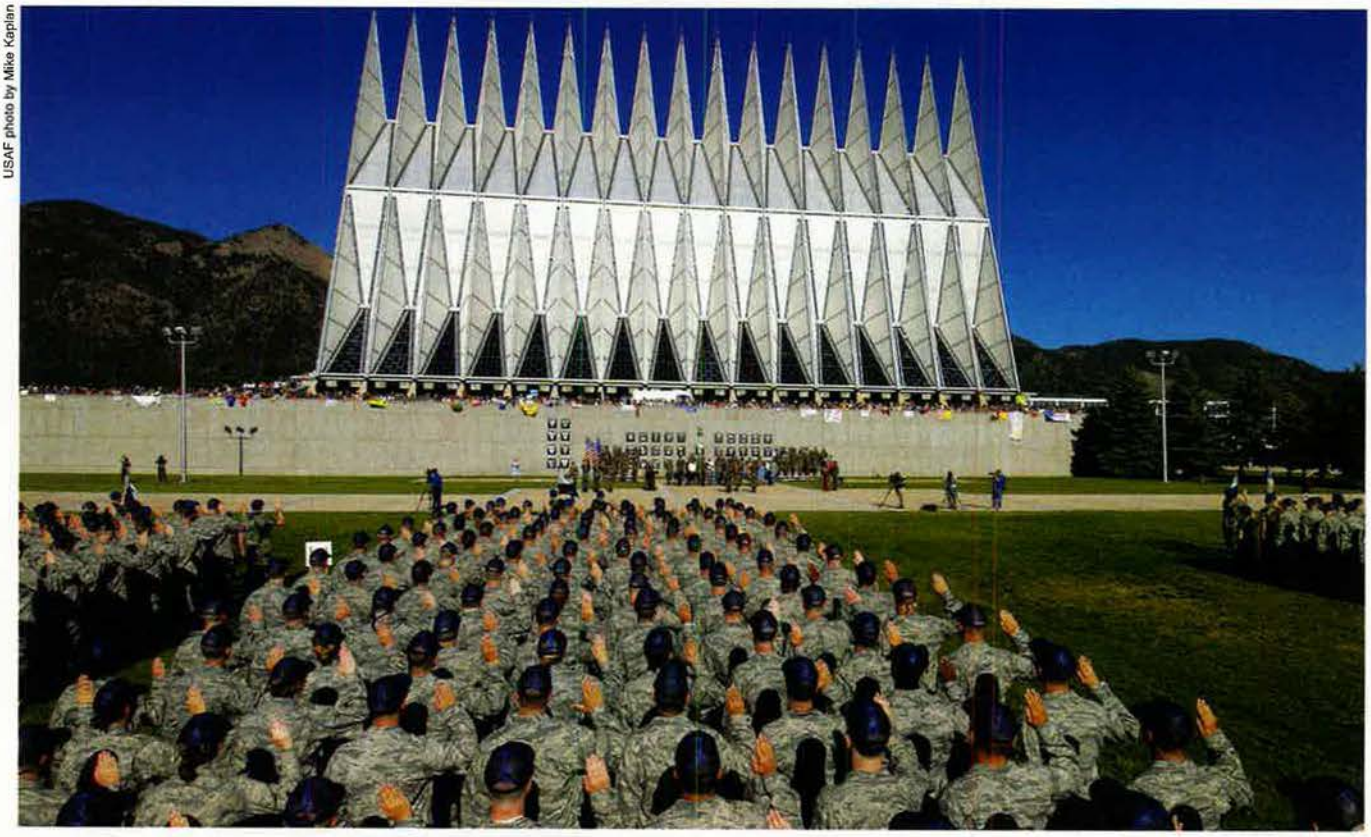
The disappointing performance left the nuclear-capable B-52 bomber unit short of restoring its tainted reputation, but the wing was scheduled to be retested within 90 days of the ruling, giving it the chance to redeem itself. ACC headquarters said it was providing expertise to assist the unit in preparing.

"It is important to note that these inspections are extremely detailed and demand the highest standards of performance," said Brig. Gen. Joseph Reynes Jr., ACC's inspector general. Indeed even something as seemingly minute as improper tire pressure on a transport vehicle could result in an overall unsatisfactory grade, the command said. Regardless, Reynes said, "There is no room for error" and "anything less than full compliance is unacceptable."

The IG did recognize 86 individuals and 30 teams for their superior performance during the inspection, ACC noted.

In the interim, the wing continues to have "the full confidence, trust, and support of Air Force leadership" and "remains capable and certified to continue operations and training for its strategic mission," said Gen. John D. W. Corley, ACC commander. After the cruise missile incident last year, the wing lost its nuclear certification for about seven months.

USAF photo by Mike Kaplan



The Air Force Academy's Class of 2012 recites the Oath of Allegiance on June 27, its second day of Basic Cadet Training. The 38 days of BCT prepare basic cadet trainees for entry into the cadet wing.

The War on Terrorism

Operation Iraqi Freedom—Iraq

Casualties

By July 11, a total of 4,119 Americans had died in Operation Iraqi Freedom. The total includes 4,108 troops and 11 Department of Defense civilians. Of these deaths, 3,355 were killed in action with the enemy while 764 died in noncombat incidents.

There have been 30,349 troops wounded in action during Operation Iraqi Freedom. This number includes 16,866 who were wounded and returned to duty within 72 hours and 13,483 who were unable to return to duty quickly.

Air Strike Targets Enemy Bunkers in Tal Afar

Air Force F-16Cs targeted an enemy building in Tal Afar, Iraq, on June 9, dropping GBU-12s and 500-pound bombs, according to coalition officials. The building was linked to al Qaeda elements and had an underground bunker complex attached. A joint terminal attack controller said the strike was successful.

The air strike came on the same day that two Sunni Arab tribal leaders linked to anti-al Qaeda efforts were killed in nearby Mosul by gunmen. Both Mosul and Tal Afar are in Nineveh Province, which had been the site of a large coalition-backed offensive by Iraqi security forces against al Qaeda and extremist elements since early May.

Operation Enduring Freedom—Afghanistan

Casualties

By July 5, a total of 539 Americans had died in Operation Enduring Freedom. The total includes 538 troops and one Department of Defense civilian. Of these deaths, 335 were killed in action with the enemy while 204 died in noncombat incidents.

There have been 2,190 troops wounded in action during OEF. This number includes 822 who were wounded and returned to duty within 72 hours and 1,368 who were unable to return to duty quickly.

Air Strikes Pummel Taliban Near Pakistan Border

US and coalition forces pounded Taliban elements with air attacks for two days in mid-June, following a skirmish in the east of Afghanistan near the country's border with Pakistan. According to coalition officials, fighting in Paktika Province began on June 20 and wrapped up June 22. Approximately 55 militants were killed, 25 wounded, and three were detained, according to US officials.

The battle in Paktika started when Taliban militants attacked coalition troops patrolling the Ziruk District with rockets and indirect fire, spurring troops to engage and call in air strikes. An Air Force B-1B and A-10 responded by unleashing a variety of bombs on the ambush and rocket team positions. June 20 saw 50 close air support missions flown to aid activities of the International Security Assistance Force and Afghan security forces.

On June 21, F-15Es dropped GBU-31s onto a militant rocket team in the vicinity of Lwara and conducted a show of force to deter activities against coalition ground forces in the area. Also in the vicinity of Qaryan Ba, a B-1B and F-15Es dropped a GBU-38 and GBU-31s onto enemy forces and an enemy vehicle. An on-scene joint terminal attack controller reported both strikes as being successful.

No coalition troops were killed in the operation.

mean that some changes in programming are necessary to keep the program on track, Young said, adding that he is committed to presenting Congress with an achievable program that is properly resourced.

Speaking with reporters on June 6, Young said he found the service's initial cost estimates for the bomber to be too low. But since then, USAF has made good progress and developed "more reasonable cost estimates," he said.

Vietnam War Airmen Identified

The Department of Defense announced in May that it identified the remains of four airmen who were part of a 14-man AC-130 gunship crew that went missing when their aircraft was shot down in March 1972 over southern Laos.

Two of the airmen are Maj. Barclay B. Young of Hartford, Conn., and SMSgt. James K. Caniford of Brunswick, Md. DOD withheld the names of the two others at the request of their families.

In addition, remains of the other AC-130 crewmen that could not be individually identified were included in a group for burial together at Arlington National Cemetery. Among the group remains is Lt. Col. Henry P. Brauner of Franklin Park, N.J., whose identification tag was recovered at the crash site in Savannakhet Province, Laos.

Bronze Stars Awarded

Lt. Col. Peter Ridilla, who commanded the 36th Civil Engineer Squadron at Andersen AFB, Guam, until July, has received the Bronze Star for his actions in Iraq in 2004, overseeing a construction detachment working with the Army, the Air Force announced in June.

CMSgt. David Nelson, superintendent of the 47th Mission Support Group at Laughlin AFB, Tex., was awarded a Bronze Star in May for "meritorious achievement" as an expeditionary group superintendent during deployment to Iraq in 2007.

SSgt. Dennis Davis of the 67th Network Warfare Wing at Brooks City-Base, Tex., also received a Bronze Star in May for his work with explosive ordnance disposal personnel in Iraq.

Hill Gains F-35 Depot Work

The Air Force has formally designated Ogden Air Logistics Center at Hill AFB, Utah, as the site of depot-level maintenance work for the F-35 Lightning II stealth fighter aircraft, Rep. Rob Bishop (R-Utah) announced June 20, citing the service's notification to him.

Ogden currently handles depot maintenance for the F-16, which the F-35 is destined to replace. Bishop speculated, too, that it's "pretty likely that Ogden will provide worldwide support and expertise" for F-35 partner nations.

He also said USAF has named Oklahoma City Air Logistics Center at Tinker AFB, Okla., as the depot for F-35 engine work.

Next-Gen UAS Sought

The Air Force announced in May its interest in learning more about industry concepts for a next-generation unmanned aerial system that would be more capable than current MQ-1 Predators and MQ-9 Reapers for finding and attacking fleeting ground targets.

The service said its interest lies with proven and emerging technologies that could be at a level of maturity in 2010

Senior Staff Changes

RETIREMENTS: Lt. Gen. Robert D. **Bishop Jr.,** Maj. Gen. Michael A. **Collings,** Lt. Gen. Christopher A. **Kelly,** Gen. William R. **Looney III,** Gen. T. Michael **Moseley.**

NOMINATIONS: To be Lieutenant General: Jeffrey A. **Remington,** Jack L. **Rives.**

CHANGES: Brig. Gen. Edward L. **Bolton Jr.,** from Principal Dep., Chief Operating Officer, Natl. Recon. Office, Chantilly, Va., to Cmdr., 45th Space Wg. & Dir., Eastern Range, AFSPC, Patrick AFB, Fla. ... Maj. Gen. (sel.) Randal D. **Fullhart,** from Dep. Chief, Central Security Service, NSA, Ft. Meade, Md., to Vice Cmdr., AF Cyber Command (Provisional), Barksdale AFB, La. ... Brig. Gen. Susan J. **Helms,** from Cmdr., 45th Space Wg., AFSPC, Patrick AFB, Fla., to Dir., Plans & Policy, STRATCOM, Offutt AFB, Neb. ... Brig. Gen. Jan Marc **Jouas,** from Spec. Asst. to the Cmdr., PACAF, Hickam AFB, Hawaii, to Dir., Ops, Plans, Rqmts., & Prgms., PACAF, Hickam AFB, Hawaii ... Brig. Gen. Michael A. **Keltz,** from Cmdr., 607th Air & Space Ops. Ctr., PACAF, Osan AB, South Korea, to Vice Cmdr., 7th AF, PACAF, Osan AB, South Korea ... Maj. Gen. (sel.) Harold W. **Moulton II,** from Vice Cmdr., 7th AF, PACAF, to Dir., Ops., EUCOM, Stuttgart-Vaihingen, Germany ... Brig. Gen. Bradley R. **Pray,** from Spec. Asst. to the Cmdr., AMC, Scott AFB, Ill., to Dep. Dir., Air, Space, & Info. Ops., AMC, Scott AFB, Ill. ... Maj. Gen. Marc E. **Rogers,** from Vice Cmdr., USAFE, Ramstein AB, Germany, to Chief of Safety, USAF, Pentagon ... Brig. Gen. (sel.) Scott D. **West,** from Cmdr., 613th Air & Space Ops. Ctr., PACAF, Hickam AFB, Hawaii, to C/S, Jt. Warfare Ctr., Supreme Allied Command for Transformation, Stavanger, Norway.

SENIOR EXECUTIVE SERVICE RETIREMENTS: William U. **Borger,** Robert E. **Dawes,** Timothy L. **Dues,** Alan B. **Goldstayn,** Kathleen F. **Graham,** Frank P. **Weber.**

SES CHANGES: Wendell D. **Banks,** to Dir., Plans & Prgms., Air Force Research Lab., AFMC, Wright-Patterson AFB, Ohio ... Barbara J. **Barger,** to Dep. Asst. Secy., Force Management Integration, Office of the Asst. SECAF, Manpower & Reserve Affairs, Pentagon ... Douglas L. **Bowers,** to Dir., Propulsion Directorate, Air Force Research Lab., AFMC, Wright-Patterson AFB, Ohio ... Steven F. **Butler,** to Exec. Dir., AFMC, Wright-Patterson AFB, Ohio ... Ross E. **Marshall,** to Dep. Dir., Maintenance, Log. Directorate, AFMC, Wright-Patterson AFB, Ohio ... Daniel F. **McMillin,** to Dep. Dir. of Staff, USAF, Pentagon ... Charles E. **Milam,** to Dep. Dir., Svcs., DCS, Manpower & Personnel, Pentagon ... Cathlynn B. **Novel,** to Dep. Auditor Gen. of the AF, Pentagon ... Michele M. **Rachie,** to Dep. Dir., Resource Integration, DCS, Log., Instl., & Mission Spt., USAF, Pentagon ... Brenda L. **Romine,** to Exec. Dir., Warner Robins ALC, AFMC, Robins AFB, Ga. ... Jeffery R. **Shelton,** to Assoc. Dep. Asst. Secy., Acq. Integration, Office of the Asst. SECAF, Acq., Pentagon ... Bobby W. **Smart,** to Dir., Policy & Resources, Office of Warfighting Integration & Chief Information Officer, OSAF, Pentagon ... Rob C. **Thomas II,** to Spec. Asst., Chief of Warfighting Integration & Chief Info. Officer, OSAF, Pentagon ... Barbara A. **Westgate,** to Asst. DCS, Strat. Plans & Prgms., USAF, Pentagon ... Theodore J. **Williams,** to Auditor Gen. of the AF, OSAF, Pentagon. ■

to make the fielding of the new UAS possible in 2015. Among the desired attributes are: enhanced survivability and maneuverability, high subsonic dash speeds, twice the payload capacity compared to the Reaper, and greater automation for reduced manpower demands.

African Airlift Emphasized

Army Gen. William E. Ward, head of the fledgling US Africa Command, said June 19 that one of his highest priorities is establishing "adequate and predictable" inter- and intratheater airlift support for the organization, which is set to become a full-up unified command in October.

Ward, speaking to a Capitol Hill audience, said he was still determining his lift requirements, but that the Air Force's reach would be "a vital enabler" for AFRICOM. "When a C-17 lands with a load of peacekeepers, humanitarian supplies, and critical equipment, ... the impact is visible, positive, and immediate," he said.

AFRICOM is exploring the potential use of an Africa-centric Air and Space Expeditionary Force to support the command's work on the continent. Ward's chief of staff, Air Force Maj. Gen. Michael A. Snodgrass, told reporters after the same event that the AEF could include a wide range of capabilities, from RED HORSE engineers to contingency response groups to doctors and even finance personnel.

Lawmakers Back B-1B Funds

Members of the Texas and South Dakota Congressional delegations called on the Air Force in May to ensure that the B-1B bomber fleet is properly supported and maintained by providing the necessary funding for it in Fiscal 2010.

"We understand that the B-1s are not receiving sufficient spare parts and are suffering from a shortage of qualified maintenance technicians," wrote Sen. Kay Bailey Hutchison (R-Tex.), Sen. John Cornyn (R-Tex.), Sen. Tim Johnson (D-S.D.), Sen. John Thune (R-S.D.), Rep. Randy Neugebauer (R-Tex.), and Rep. Stephanie Herseth Sandlin (D-S.D.) in a missive to then-Secretary of the Air Force Michael W. Wynne.

The lawmakers, in whose states reside USAF's two B-1 bases, said they didn't want the service to entertain the notion of reducing the size of the B-1B fleet again, as it did in 2002, to free up resources to sustain the remaining aircraft. Instead, they want USAF to commit to providing "the necessary maintenance support" for the remaining 66 B-1s in the fleet. ■

News Notes

■ TSgt. Davide Keaton, a pararescue jumper with the 24th Special Tactics Squadron at Pope AFB, N.C., has won the Air Force Sergeants Association's 2008 Pitsenbarger Award for risking his life to save three Afghan children and two Afghan women being used as human shields during a firefight in 2007.

■ The leadership of 9th Air Force and US Air Forces Central broke ground May 30 at Shaw AFB, S.C., for a planned fallen airman's memorial to honor members of the numbered air force who have served and sacrificed since its inception in June 1942.

■ The 493rd Fighter Squadron at RAF Lakenheath, Britain, an F-15 unit, in June was recognized as USAF's best air superiority squadron with the receipt of the 2007 Raytheon Hughes Achievement Award (formerly the Hughes Trophy).

■ For the first time ever, the Air Force in June picked pilots from the Air National Guard and Air Force Reserve to join the Thunderbirds aerial demonstration team for the 2009 flying season. They are Maj. Derek Routt, a Nevada ANG F-15C pilot, and Maj. Sean Gustafson, a Reserve F-16 flier from Florida.

■ The Air Force awarded Boeing and Lockheed Martin each $75 million contracts in early June to conduct additional risk-reduction work on their Transformational Communications Satellite concepts.

■ KC-135 tankers of the 22nd Expeditionary Air Refueling Squadron at Manas AB, Kyrgyzstan, set a single-day, fuel-offload record for the base on May 24 by passing 804,800 pounds of fuel. The figure bested the previous mark of 722,000 pounds set in August 2007.

■ Accident investigators concluded that an error by a student pilot led to the crash of an F-16 on April 2 at Gila Bend Auxiliary Airfield in Arizona that caused "substantial damage" to the aircraft, USAF said in June. Neither the student pilot nor the instructor pilot was injured. ■

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Issue Brief

By Adam J. Hebert, Executive Editor

The "Four Percent of GDP" Thing

Adm. Michael G. Mullen, Chairman of the Joint Chiefs of Staff, recently told the *New York Times* the US should spend four percent of gross domestic product (GDP) on defense. In 2000, DOD critic Chuck Spinney said spending four percent would be tantamount to a "declaration of total war on Social Security and Medicare" in the future.

Clearly, the "percent-of-GDP" matter sparks controversy. The debate can become pretty arcane. First, some basics:

- *What is GDP?* As defined by the US Bureau of Economic Analysis, it is "the market value of goods and services produced by labor and property in the United States" in a year.
- *How big is it?* BEA says in 2008 it is some $14.2 trillion.
- *Does GDP change?* Yes, significantly over time. When Spinney spoke, it was about $9.8 trillion. Thus, today's US economic output is 45 percent larger.

When Mullen and others (including Gen. T. Michael Moseley, former USAF Chief of Staff) called for a "four percent solution," they were seeking something specific. It was not, however, an exact dollar amount. In Spinney's day, four percent of GDP equaled $400 billion. For Mullen, it's $600 billion.

Yet GDP, as a measure of economic activity, really has very little to do with defense. There is no reason for three percent, four percent, or any other portion of GDP to be considered the right number—without context.

What the four-percenters really want is not a specific amount but a *commitment* to defense. Mullen and others believe funding at the four-percent level is sufficient for a strong DOD program and, even more important, is affordable.

This is the central point. When officials express defense spending as a percent of GDP, it is a shorthand way of describing the financial burden of defense on US taxpayers. It is a measure of the affordability of a given defense budget.

This "burden" has shrunk dramatically over the years. In the World War II year of 1944, arms spending consumed a gargantuan 38 percent of the economy. As economic growth mushroomed, the defense share of GDP has plummeted. For example:

In 1953, the peak year of the Korean War, 14 percent.

In 1968, at the height of Vietnam, 9.5 percent.

In 1986, at the peak of the Reagan rearmament, 6.2 percent.

Then in the early 1990s came the post-Cold War "peace dividend." In GDP terms, defense outlays fell at an accelerated rate, bottoming out at three percent from 1999 through 2001. DOD through this period did not sufficiently invest in new equipment or maintain readiness.

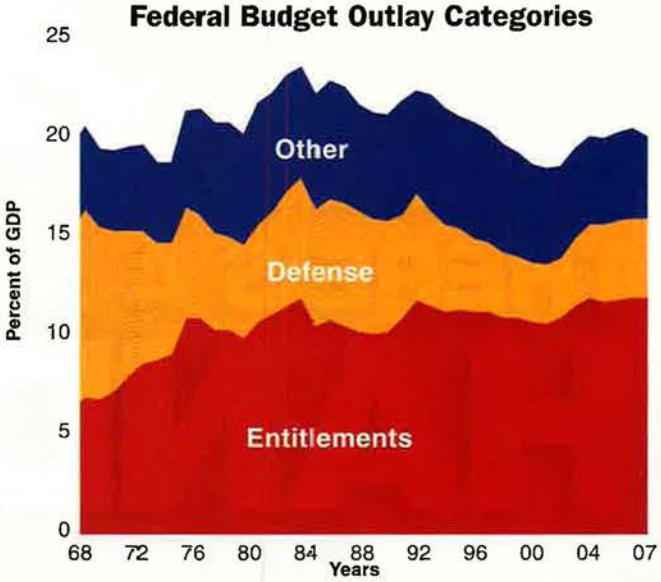
With defense spending manifestly inadequate to the job, pro-military groups began to call for pegging defense outlays at four percent of GDP. The fundamental claim was that the nation not only needed to spend more but could well afford to spend more.

Two factors complicate the situation.

Complication 1. Defense spending in 2009 is forecast to reach 4.3 percent of GDP. Why, then, is Mullen pressing for four percent, which would be a lower figure?

The answer is that there are two categories of defense outlays—one used to fund today's wars and another that finances the "core" defense budget, paying for manning, training, and equipping the standing military force.

Federal Budget Outlay Categories



The 4.3 percent figure combines both types of spending. Mullen, however, is talking only about core outlays. Funding for that critical function is still bouncing around at three to 3.5 percent of GDP. An extra half-percent of GDP allocated to the core defense budget in 2009 would provide to the US military an additional $75 billion.

The distinction is important, because war spending does nothing to maintain or modernize the standing force. Indeed, it has consistently failed to completely replace equipment worn out or lost in combat.

Complication 2. Because the US has in the past devoted a far larger portion of national wealth to defense, it should be able today to commit a far larger share, all things being equal.

However, all things are not equal. The postwar period has seen a spectacular expansion of many other categories of federal spending—in particular, so-called "entitlements" spending.

Medicare, Medicaid, Social Security, and other entitlement programs now account for government spending equal to 12 percent of the nation's GDP.

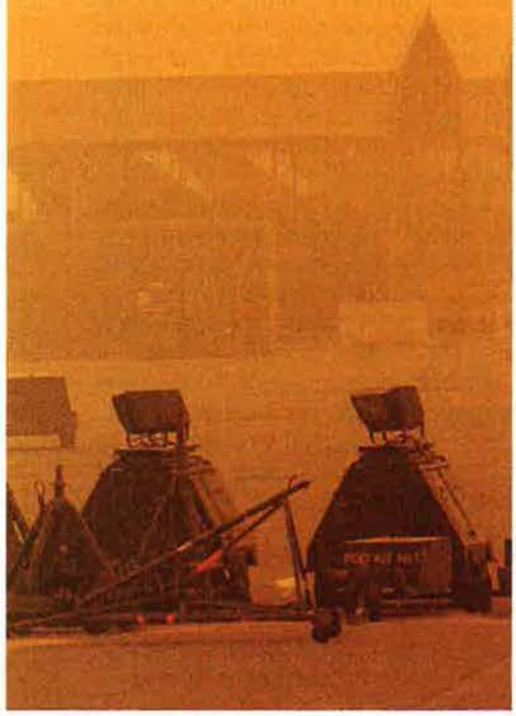
The pressure caused by this huge new spending burden has robbed the US of much of its flexibility and capacity to easily expand the defense effort. In pondering ways to increase defense, US officials face the nightmare trifecta—raise taxes, cut popular social programs, or accept a big federal deficit.

Basic political dynamics in Washington tend to pit the Pentagon against the entitlements—hence, Spinney's charge of a looming "total war on Social Security and Medicare."

It is of course true that, at some unspecified level, military spending (or any other kind of federal spending) exerts a drag on the economy. However, the US is nowhere close to that point. The United States can afford more for defense, and more importantly, it needs more for defense. The question is whether there is the political will to provide it. ■

More information: http://www.afa.org/AboutUS/SOP_2008.pdf

War



USAF photo by SSgt. Matthew Hannen

USAF photo by SSgt. Jeremy T. Lock

new safe havens for resurgent terror organizations.

For airmen, the long war will not be ending anytime soon. Under any conceivable troop plan for Iraq, for example, USAF will still have critical continuing missions. Airmen will provide intelligence-surveillance-reconnaissance capabilities, keep major aerial ports running, and continue training Iraqi air forces. USAF will probably provide some degree of on-call air support for some time.

The Air Force has constantly changed and adapted to provide the kinds of sophisticated capabilities needed for the long war. In the process, this combat-hardened organization has become an Air Force unlike any other.

Expeditionary Now

The Cold War force garrisoned at large US, European, and Asian bases is now an expeditionary force whose members know packing up and setting up as a way of life. Secure networks run all operations and logistics. Female airmen serve in nearly every combat specialty, from security forces to bomber crews. The Total Force of active, Guard, and Reserve is integrated more tightly than ever.

USAF photo

While the changes wrought by the long war range from the epic to the personal, there are six that stand out. They are best summed up with the words precision, nonlinear battlespace, cyberspace, unmanned air systems, ISR fusion, and cooperative targeting.

Each of the six can be found at the core of operations today—but they were barely on the horizon in 1990, at the start of the long war. All are having a profound impact on the current Air Force and its role in joint operations and will continue to do so well into the future.

The six concepts are not static. They got their start in the early 1990s. However, the upswing in activity in Iraq and Afghanistan since 2005 has led to their being intertwined with new tactics and initiatives.

■ Precision. Laser guided weapons debuted in Vietnam and won popular acclaim in the 1991 Gulf War, yet USAF sent into battle in Desert Storm only about 150 fighters that could self-designate laser guided bombs.

Technological improvements have accelerated, and the Air Force now fields an enormously powerful and versatile precision force.

In 2003, USAF fighters in theater had the ability to employ precision weapons with laser or GPS satellite guidance. Most important, the ubiquitous Joint Direct Attack Munition was a combat-proven asset. B-52s and B-1s often carried a mix of weapons to give air controllers a choice.

After its debut in 2004, the new 500-pound JDAM became the weapon of

Above: Battlefield airman in Iraq, 2004. Left: SAC B-52 crew in the US, 1987.

USAF photo by Kristi Machado

The MQ-9 Reaper, deadliest of the UAVs, 2003.

choice to support ground forces fighting in Iraq's urban areas.

The precision revolution did not stop with strike. In the field of mobility, the Joint Precision Airdrop System debuted in Afghanistan in 2006. JPADS combined a steerable pallet with GPS aiming. The system—a joint effort between the Army and the Air Force—allowed aircraft to drop cargo more accurately, from much higher altitudes, and at greater speeds.

After August 2006, the wars saw a surge of precision airdrops staged in support of coalition and special operations forces in Afghanistan. In February 2007, JPADS made its first combat drop in Iraq with improved software. This product of the long war opens up new possibilities for deploying forces with a lighter footprint and for conducting relief supply missions in more places.

■ Nonlinear battlespace. The June 1996 attack on the Air Force's Khobar Towers housing complex in Saudi Arabia showed that rear areas were no longer safe havens. The Air Force does not necessarily operate from secure, garrisoned bases well behind the front lines. During the 2003 invasion of Iraq, for example, fighters and helicopters moved north into Iraqi airfields almost as soon as they were captured.

Of equal consequence, the Air Force and Army agreed in 2005 to change the division of labor so that the Air Force is responsible for defending its own overseas air bases. Take the example of Balad AB, Iraq. During certain periods, mortar attacks were frequent. Mess halls, cargo facilities, even ramps and taxiways presented tempting presurveyed targets.

The perimeter at Bagram Air Base in Afghanistan was a problem from the start, and saw terrorist attacks at or near the front gates. Air Force security forces have gone on the offense to keep the perimeter and gate secure.

Training to Survive

The fact that any airman may be in harm's way led to an increase in expeditionary combat skills that begins now in basic training. Fitness, firing weapons, and small unit discipline are recognized as essential qualities for every airman in an emergency situation. The combat training of those so-called "in lieu of" airmen on loan to the Army to drive convoys underscores this transition.

The long war has shown that deployment of airmen to unpredictable and unsettled locations is a given. The Air Force is planning to train more security forces for specialized expeditionary combat skills and is procuring everything from mine-resistant vehicles to new handguns and body armor for the nonlinear battlefield.

All of this is intended to increase the individual airman's chances of surviving conventional attacks on the ground, in so-called "outside-the-wire" missions. Long term, the Air Force goal is to open and operate from air bases of its own choosing, in a high- or low-threat area.

■ Cyberspace. China may be seen as this nation's top potential adversary in the realm of cyberspace—but it actually was the working conditions of the long war that highlighted cyberspace as a vital and distinct domain.

In 1991, computer-aided force planning and management was in its infancy. Now, online chat is the backbone of tactical operations, and cyberspace stores and transmits the Air Force's most critical information.

The dependence on cyberspace systems permeates operations in Afghanistan and Iraq. Vast amounts of information and communications are quickly transmitted worldwide, and must be done so securely.

Against that background, the Air Force drew cyberspace into its mission statement in 2005. This philosophical shift elevated the cyber realm to be on par with the Air Force's traditional operating domains of air and space.

In 2007, the service established its provisional Air Force Cyber Command. The birth of AFCYBER took place amidst a longer-term effort to shift funding to the new command and to infuse it with the right personnel on the right career paths.

USAF photo by MSgt. Terry L. Blevins

F-15E fighter at a Southwest Asia base, 2003.

USAF photo by SSgt. Efrain Gonzalez

Kosovo-bound B-52 (front) and B-1B in Britain, 1999.

The Air Force is now on the cusp of routinely presenting cyber-attack capabilities to joint force commanders as options to "strike" theater targets. It is a new form of precision, with immense implications. Looking back, the embrace of cyberspace may stand as one of the most significant products of the long war.

■ Unmanned air systems. The MQ-1 Predator and the newer, more capable MQ-9 Reaper are the darlings of the long war.

It is safe to say that none of these new medium- and high-altitude UAVs were even a glint in the eye of top generals during the Cold War. Despite years of experiments and research, it took most of the 1990s for the Air Force to develop Predator into a capable platform.

The high-altitude Global Hawk emerged from the 1990s to play a dominating reconnaissance role in Afghanistan in 2001 and Iraq in 2003—while still formally listed as a test program.

The fact that unmanned systems have become a hotly disputed roles and missions issue attests to how important the unmanned revolution really is. The hours flown in the long war have convinced all of the utility of unmanned systems, as well as their reliability—at least in benign airspace.

The Air Force is fully committed to UAVs and has redoubled crew production, accelerated acquisition, and stood up new units for the mission. The 42nd Attack Squadron, which operates Reapers flying over the CENTCOM region from its home base at Creech AFB, Nev., is the Air Force's first unmanned attack squadron. The "attack" designation signifies how far beyond ISR unmanned aircraft have moved.

Autonomous air refueling is being pursued in large part to extend the already-impressive endurance of unmanned vehicles.

UAVs have been normalized within the Air Force. They are part of the Total Force; leaders make efforts to ensure their crews have a normalized career path; upgrades and spirals continue improvements in effectiveness.

Yet the future of unmanned forces will require effective Air Force stewardship to ensure the force of tomorrow continues to improve and meet evolving requirements.

Predators and Reapers operate today in benign airspace. Future UAV missions may have to contend with hostile and defended airspace, which would put today's fragile platforms in danger.

■ ISR fusion. It is difficult to assign a term to the revolutionary fusion of intelligence-surveillance-reconnaissance products that now constitute daily fare in air operations centers.

Even Adm. Michael G. Mullen, Chairman of the Joint Chiefs of Staff, struggled to describe the impact of the "whole ISR piece" on current operations.

What's clear is that USAF has been at the core of a series of revolutions in the ability to fuse ISR into a powerful weapon. The War on Terror's demand for uninterrupted tracking of individuals, such as terrorist ringleaders, led to rapid fusion of numerous information sources. Never before have airmen been able to produce a comparable real-time product for commanders.

A suite of products and tactics is responsible. Full-motion video provided by Predator is perhaps the best-known example, but there are many more.

The E-8 Joint STARS aircraft's ground moving target indicator radar has been used to rerun insurgent movements and track targets.

Global Hawk imagery, shipped by satellite, has been used in real time to verify targets.

A fusion of numerous "national" sources—including signals intelligence—is routinely used to locate top terrorists and set up lethal strikes. Almost none of this was possible in 1991.

The fusion provides commanders such a powerful tool that none will deploy or operate without this ISR picture in the future.

The Distributed Common Ground Station merges signals and imagery intelligence from many sources into a working picture of the battlespace. Based on an open architecture, the DCGS enables intelligence professionals to manage and task information flow from dedicated sites. It's an integration capability far superior to anything available before the start of the long war.

■ Cooperative targeting. The long war has seen a series of revolutions in the way USAF provides close air support for soldiers, marines, and commandos. Insurgent and urban battles have honed air and ground cooperation like never before.

USAF photo by MSgt. Andy Dunaway

A-10 attack aircraft over Afghanistan, 2008.

USAF photo

C-130 airlifter at a remote Afghan airstrip, 2007.

The wake-up call was Operation Anaconda in Afghanistan in March 2002. Airmen delivered copious air strikes to support US troops trapped in the Shah-i-Kot mountains, but all agreed the coordination systems were overwhelmed.

Coordination improved with use of a detailed keypad grid and close air support stacks over Iraq in 2003. Since then, the air component has often been the ground soldier's watchdog, literally following patrols to provide ISR or air attack as needed. The laptop-based ROVER (Remote Operations Video Enhanced Receiver) system allows airmen and ground controllers to share a real-time video picture of a target they are tracking. This allows for stunning efficiency: An F-16's infrared sensor pods recently directed a foot patrol to within a meter of an individual hiding in brush.

Gains like this have occurred before, of course. Air-ground cooperation was honed to a fine edge in World War II, only to decay afterward. The shortcomings were vivid just five years later in Korea, where lessons had to be learned all over again, under fire.

But today's strategy hinges on air-ground integration. Effective backing of deployed US ground forces, the Iraqi Army, and other allies around the world is a key to reducing and repositioning US ground forces overseas. This requires US airpower.

The key question for the Air Force is whether it will be able to reap the full benefits of the lessons of the long war.

For all the transformation that's taken place, there is still a lengthy to-do list coming straight from combat experience. On the list just for existing aircraft are a string of modifications such as beyond-line-of-sight links and communications for all aircraft; a single data link for joint and coalition aircrews; positive identification capability for all aircraft; better electronic attack; protection optimized for modern air-to-air and air-to-ground threats; and infrared self-protection.

In the Background Now

Improving weaponry is important, too. Top needs include more flexible fuses, weapons that can withstand GPS or laser denial, and modular and upgradable seekers.

One of the greatest unknowns is whether the Air Force has the backing to bridge from the long war to the next war.

The long war has not moved air, space, or cyberspace to the center of the nation's thinking about national defense. Almost the reverse has happened. The eye-catching air strikes of the 1991 Gulf War gave way to air operations conducted in the background.

The no-fly zones and occasional strike operations of the 1990s were fleeting headlines.

Today's continuous combat air patrols providing surveillance and firepower over ground forces in Afghanistan and Iraq are scarcely noticed.

Even more obscure are the thousands of sorties flown for Operation Noble Eagle to defend the US against another 9/11 scenario.

Simultaneously, USAF's top leadership has had many bruising encounters during the long war. The Air Force saw three of its Chiefs of Staff retire early—in 1990, 1997, and 2008.

The resignation of Gen. T. Michael Moseley, who led coalition air forces over Afghanistan and during the invasion of Iraq, was accompanied by the resignation of Secretary of the Air Force Michael W. Wynne. This was a historic decapitation ordered by Defense Secretary Robert M. Gates. Each of these incidents over the past 18 years had a common element: Pentagon leadership was at odds with the Air Force.

Serious questions linger about the ability of the Air Force to come out the other side of the long war with a modernized, effective force.

It will be difficult to capitalize on the many tactical lessons of the long war while dragging along an old and increasingly decrepit force structure. The long war has sucked recapitalization accounts dry while piling up more debt in the form of extra wear and tear.

Older aircraft are most immediately affected, but it's the grind on relatively new platforms such as the C-17 that may be most problematic in the long run.

Nor is it clear that USAF will emerge from the long war with its roles and missions intact. The proper wartime distribution and control of unmanned aircraft is far from settled, but Air Force initiatives to take charge have twice been smacked down.

The Army is dramatically increasing its battlefield lift business with the Joint Cargo Aircraft, encroaching on one of USAF's key missions.

Cyberspace leadership is still undefined, and USAF's efforts to take the lead could create conflict with the other services and government agencies with stakes in the cyber mission.

The Pentagon's unwillingness to fund USAF's required number of new fighters seems designed to push the service toward even more of a supporting role.

For airmen, the biggest question does not concern whether the Air Force can succeed in the long war. The real question is how USAF can best defend US interests in the face of inadequate budgets and flagging influence. The Air Force must somehow keep investing in victory for tomorrow as well as today, but it can't do that all by itself. ■

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. Her most recent article for* Air Force *Magazine, "The Big B," appeared in the July issue.*

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PACAF Between War and Peace

The new Pacific Air Forces commander seeks to bring a measure of calm to this big USAF command.

By Richard Halloran

USAF photo by SrA. Brian Kimball

When Gen. Carrol H. Chandler took command of Pacific Air Forces last November, he retained as his own the top priorities of his predecessor, Gen. Paul V. Hester. He did this for two fundamental reasons. First, Chandler thought PACAF was already headed in the right direction. Second, he said, "There was no reason to create more turmoil." He explained, "This was an effort to 'freeze the stick' around the priorities that people had been working on for almost three years."

The turmoil to which Chandler refers is the cumulative effect of USAF's personnel drawdown, the demands of the Global War on Terror, deployments to Iraq and Afghanistan, reduction of US forces in South Korea, the buildup of air and naval forces in Guam, the movement of 13th Air Force from Guam to Hawaii, and revision of the mission of 7th Air Force in Korea.

The turbulence has taken a toll. For example, the PACAF commander worries about the retention of mid-level noncommissioned officers in his command. In addition to the demands of their regular jobs, the airmen face multiple deployments to Iraq and Afghanistan, and many are of an age when they want to start families. "They're tired," he says.

Moreover, the dangers have remained large and constant. Potential threats PACAF faces today are known to any attentive newspaper reader: a rising China, resurgent Russia, and recalcitrant North Korea. They are among the reasons Chandler says: "While the Pacific region is not at war, neither is it at peace."

Faced with this situation, Chandler has come to believe that enlightened leadership means recruiting and training good people, giving them the tools to do their jobs, and then "just getting out of the way and letting them do it." He adds in the next breath: "That doesn't mean we throw the regulations out the window. We're always here to give them guidance."

After taking command, Chandler visited all nine major USAF bases in Hawaii, Alaska, South Korea, Japan, and Guam as well as the capitals Seoul, Tokyo, and Singapore. He concludes that PACAF actually has a "luxury" because of the demands on its airmen.

"When you come to us, you will be able to start doing the job you were trained for. You grow up in a hurry ... because we give you as much responsibility as you can take as quickly as you can."

Among the critical duties of senior officers in the Pacific region is the attempt to build serious engagement with China as the communist regime dedicates earnings from its surging economy to modernize its military forces.

"How Do We Deal With China?"

Adm. Timothy J. Keating, commander of US Pacific Command, has been to China twice and will most likely go again sometime within the next year. Senior Chinese officers reciprocate in coming to the US, usually beginning with a visit to PACOM on the way to Washington.

Chandler has not been to China but is prepared to accept an invitation if offered. He recognizes that "the Chinese are rapidly moving forward with significant aerospace developments based on improvements to existing foreign technologies." Much of that foreign technology comes from Russian weapons. Chandler's Chinese counterpart was scheduled to visit him in the spring but canceled after the devastating earthquake in southwestern China.

"The question is," Chandler asks, "how do we deal with China?" He believes the US can avoid a cold war of the type that for more than four decades characterized US relations with the Soviet Union.

"I think we have an opportunity so long as we deal with the Chinese from a position of strength," he says, "so that we do not miscalculate and we do not misunderstand each other." He says the US must ensure "the Chinese do not think that somehow they could exclude us from the [Asian] side of the Pacific."

Where many US military leaders see terror as the top threat, Chandler tends to focus on nuclear proliferation, particularly as it regards the "reclusive and unpredictable" regime in North Korea. PACAF officers suggest that North Korea's nuclear capability not only affects the Korean peninsula's military balance but broader regional stability.

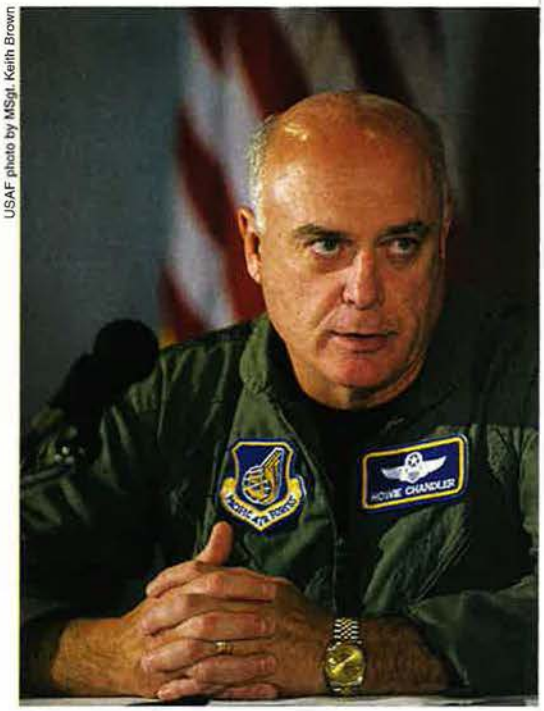
Transfer of nuclear technology or material to potential enemies, national or transnational, threatens the US and its allies—and US military forces. Moves to acquire nuclear weapons would be highly destabilizing.

China, for example, has made clear its firm stance that any action by Taiwan to acquire nuclear arms would justify Chinese military action, which might require a US response under the Taiwan Relations Act.

Confronted with those threats, Chandler's priorities in PACAF's sprawling area of responsibility are properly positioning forces, providing combat capability to Pacific Command, offering humanitarian assistance when needed, and engagement both with friends and potential adversaries, notably China.

Underpinning all is the task of developing and sustaining a force of top-notch airmen. Chandler says his task is to balance requirements for the long haul with needs of the combatant commander, who, he noted, tends to take the position of, "What have you done for me lately?"

PACAF must integrate three squadrons of F-22 Raptors into its operations to provide immediate response in a crisis. One F-22 squadron is to be based at Hickam AFB, Hawaii, and two at Elmendorf



USAF photo by MSgt. Keith Brown

Photo by Andre Benschop-Aeropromotion

Far left: A KC-135 refuels a B-2 over the Pacific Ocean. Left: An F-15 takes off from Andersen AFB, Guam. Above: Gen. Carrol Chandler, PACAF commander.

USAF photo by SSgt. Vanessa Valentine

Maintainers prep a B-52 bomber on the flight line at Andersen AFB, Guam. USAF's heavy bombers are continuously deployed to the island.

AFB, Alaska. All are expected to rotate through Guam on deployments.

Later, USAF may station F-35 Lightning squadrons at Eielson AFB, Alaska, and at Kadena Air Base on the Japanese island of Okinawa.

A persistent bomber presence of B-52H, B-1B, and B-2 bombers rotating to Guam will continue as the US presses ahead with upgrades to Andersen Air Force Base and that island's infrastructure.

KC-135 tankers based in Hawaii, Alaska, and Japan (and also rotating through Guam) form a perpetual air bridge here to help overcome the region's vast distances.

A pressing need, Chandler says, is to strengthen PACAF's intelligence-surveillance-reconnaissance capabilities. "Recent ballistic missile and underground nuclear testing by North Korea, successful anti-satellite operations by China, and the increased number of Russian long-range bomber missions in the Arctic have further emphasized the need to remain vigilant," he says.

The expected arrival, in 2009, of the first of three or four long-range, high-altitude Global Hawk unmanned aerial vehicles will do much to improve PACAF's ISR capabilities. Global Hawk is packed with sensors designed to detect everything from mobile nuclear launchers to pirates at sea.

Intelligence analysis is equally important, and analysts must be culturally astute to provide commanders with the context needed to make proper decisions. PACAF has brought in a foreign policy advisor, Brian Woo, from the State Department for that purpose. Chandler says the command must "continue the professional development of regional affairs specialists and support requirements for more human intelligence capability."

Vast New Training Space

To keep PACAF's combat readiness high, the command relies on training exercises such as Northern Edge in Alaska (primarily for USAF and Navy aircrews), Red Flag Alaska for USAF and allied crews, and the expertise in an expanding array of air operations centers.

The large force-package exercises frequently make use of Alaska's training space. At Red Flag Alaska in April, US pilots were joined by those from Australia, Britain, and Canada. A month later, at Northern Edge, 120 aircraft from PACAF bases, plus those from the Naval Strike and Air Warfare Center in Nevada, trained over land and sea. At Red Flag Alaska in June, 16 Tornados from the German Air Force and four Stinger missile teams from Japan's Air Self-Defense Force took part.

Chandler wants to bring Red Flag Alaska up to the level of the Red Flag at Nellis AFB, Nev. He wants the two to complement each other, not compete with each other. "We still have to work on some instrumentation in Alaska," he says. While sparsely populated Alaska has much open airspace away from residential areas, USAF fliers must be aware of "bush pilots."

"Civil aviation is a big part of what goes on in the state," Chandler says. "If we're going to use that much airspace, then we need to understand how we're going to interact with light, commercial aviation."

PACAF's key fighting element is 13th Air Force. Its 613th Air and Space Operations Center is tasked to plan, command, and control an air campaign. Housed next door to PACAF headquarters, the darkened AOC cavern—with more than 200 flickering computer screens—has USAF, Navy, Army, and Marine Corps operators, plus representatives of other agencies running a full range of modern air operations, all under the watchful eye of a campaign commander in a central battle cab.

The 13th Air Force AOC will have close ties with the new US-Japanese bilateral air operations center being built at Yokota AB, Japan, and will also work with the Australian AOC in Canberra. The region's best known AOC is in South

USAF photo by Capt. Renee Lee

An airman marshals an A-10 at Korat RTAB, Thailand. Members of the 25th Fighter Squadron, Osan AB, South Korea, were there to participate in an exercise.

Photo by Andre Benschop-Aeropromotion

A C-17 takes on fuel from a KC-135 tanker over the mountains of Alaska during a Red Flag Alaska exercise.

Korea "where, for over 30 years, US and [South] Korean airmen have developed the model for conducting combined air and space operations," Chandler said. Another AOC, situated in Alaska, is used to synchronize air operations for NORAD.

Meanwhile, the communications and navigation satellites serving PACAF need to be replaced. "Many of these satellites have outlived their designed endurance," Chandler says.

The first Wideband Global SATCOM satellite went operational in April, providing better communication from Pacific Command to the West Coast. "Over the next 10 years," Chandler says, "the Air Force must recapitalize all of these systems to maintain the advantage our space capability provides our nation."

PACAF's top priorities, obviously enough, are to deter war if possible or defeat an enemy if necessary. Right behind those, however, is the goal of winning friends and influencing potential adversaries.

The concept goes by various names—theater security cooperation, engagement, humanitarian assistance-disaster relief, regional stability. Whatever the name, however, it consumes lots of PACAF's attention, time, and resources. Chandler says: "We must maintain high-end capabilities while conducting low-end operations." Success in these operations can depend on the cooperation of other nations.

After a May cyclone devastated Myanmar, PACAF positioned C-130s loaded with fresh water and other supplies at U Tapao RTAB, Thailand, to be ready to supply help. More than 100 C-130 and Marine KC-130 flights eventually went into Burma, but some sat on the runway there and eventually left when the junta refused to allow the US to deliver relief supplies.

The Humanitarian Angle

This February, by contrast, C-17s loaded with blankets and shelters took off for China within 18 hours of a request for help with the aftermath of a severe snowstorm. In May, C-17s flew relief supplies and tents into China after an earthquake took tens of thousands of lives and left millions homeless.

PACAF a few months ago also mounted a medical mission, called Pacific Angel, to remote areas of Cambodia and Thailand. "This humanitarian assistance," Chandler says, "resonates with just about everybody."

Pacific Air Forces each year takes part in roughly 30 international exercises, including big ones such as Cope India, with India's Air Force, and Cobra Gold, in Thailand. Other exercises are held with aviators from Australia, Japan, South Korea, Singapore, Malaysia, and Indonesia. Chandler says scenarios are set 10 to 20 years in the future with topics covering the full spectrum of conflict.

Chandler seeks to expand intelligence sharing among allies and partners. Specifically, he says, opening an "information-sharing aperture" was the purpose of the Global Hawk Capabilities Forum held in April at Hickam and a companion trip to Beale Air Force Base, the California home of the RQ-4. At these events, representatives of Japan, Australia, South Korea, Philippines, Singapore, Indonesia, Malaysia, Thailand, Brunei, Sri Lanka, and India took briefings on Global Hawk's capabilities as the US encouraged cooperation in combating terror and piracy and supporting humanitarian assistance.

Chandler observed, "Some have suggested that the United States may be neglecting its security in the Asia-Pacific because it has been too focused on Iraq, Afghanistan, and conflicts in other regions." Some, he went on, are concerned that "US military strategy and resource decisions are overly devoted to current threats," to the detriment of the skills and equipment needed against future adversaries.

"America," Chandler contends, "can and must be able to do both." ■

Pacific Air Forces at a Glance

Headquarters
Hickam AFB, Hawaii

Numbered Air Forces
5th Air Force, Yokota AB, Japan
7th Air Force, Osan AB, South Korea
11th Air Force, Elmendorf AFB, Alaska
13th Air Force, Hickam AFB, Hawaii

Principal Bases
Andersen AFB, Guam
Eielson AFB, Alaska
Elmendorf AFB, Alaska
Hickam AFB, Hawaii
Kadena AB, Japan
Kunsan AB, South Korea
Misawa AB, Japan
Osan AB, South Korea
Yokota AB, Japan

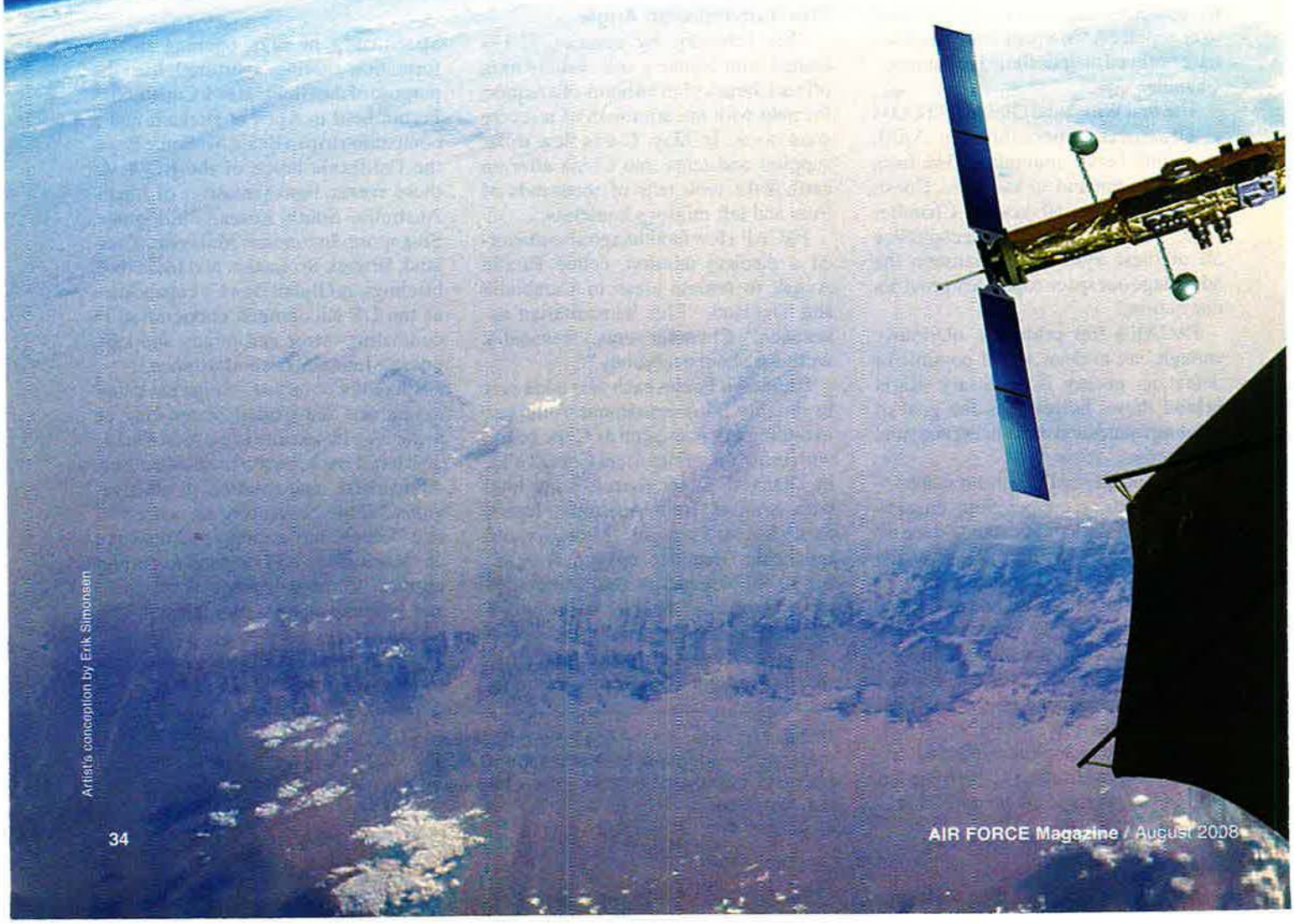
Major Units
3rd Wing, Elmendorf AFB, Alaska
8th Fighter Wing, Kunsan AB, South Korea
15th Airlift Wing, Hickam AFB, Hawaii
18th Wing, Kadena AB, Japan
35th Fighter Wing, Misawa AB, Japan
36th Wing, Andersen AFB, Guam
51st Fighter Wing, Osan AB, South Korea
354th Fighter Wing, Eielson AFB, Alaska
374th Airlift Wing, Yokota AB, Japan

Richard Halloran, formerly a New York Times *foreign correspondent in Asia and military correspondent in Washington, D.C., is a freelance writer based in Honolulu. His most recent article for* Air Force *Magazine, "Pacific Choke Point," appeared in the July issue.*

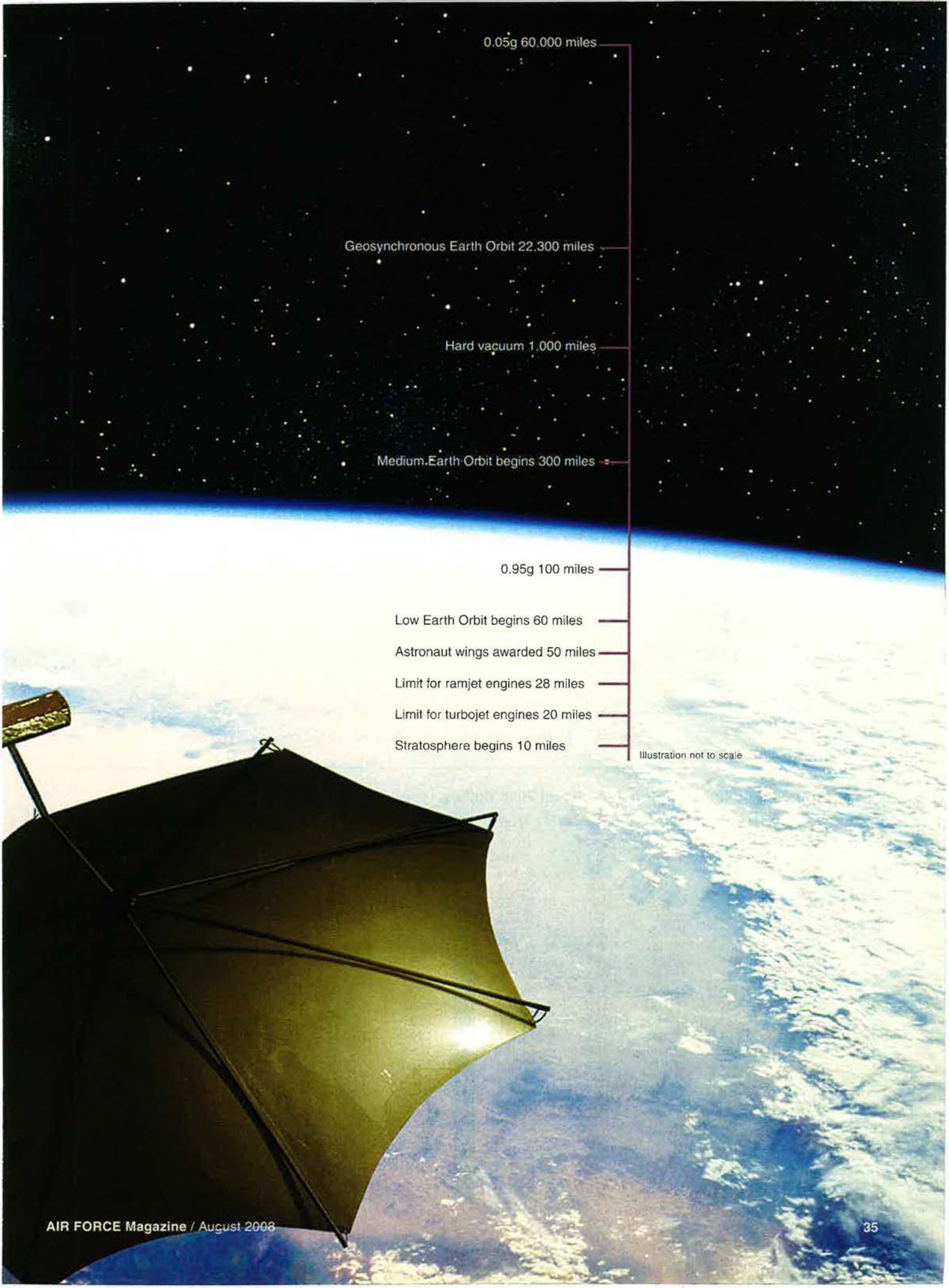
2008 Space Almanac

The US military space operation in facts and figures.

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



Artist's conception by Erik Simonsen


0.05g 60,000 miles
Geosynchronous Earth Orbit 22,300 miles
Hard vacuum 1,000 miles
Medium Earth Orbit begins 300 miles
0.95g 100 miles
Low Earth Orbit begins 60 miles
Astronaut wings awarded 50 miles
Limit for ramjet engines 28 miles
Limit for turbojet engines 20 miles
Stratosphere begins 10 miles
Illustration not to scale

US Military Missions in Space

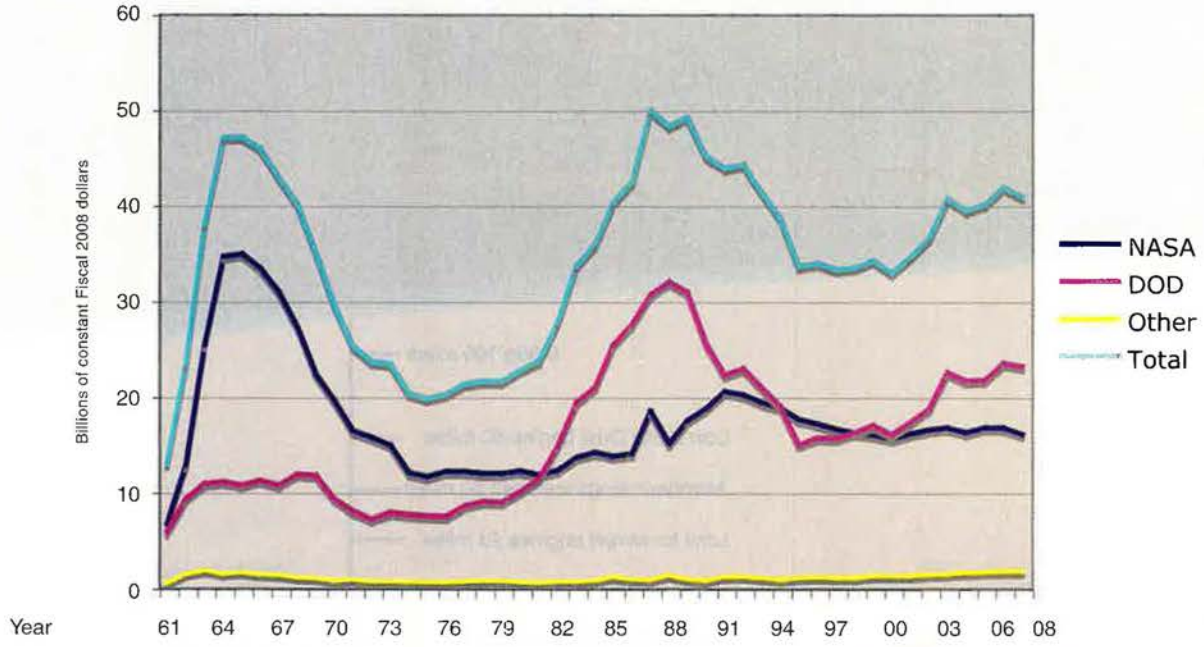
Space Support
Launch of satellites and other high-value payloads into space and operation of those satellites through a worldwide network of ground stations.

Space Force Enhancement
Provide satellite communications, navigation, weather information, missile warning, command and control, and intelligence to the warfighter.

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

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

US Space Funding



Figures in millions of constant Fiscal 2008 dollars

Year	NASA	DOD	Other	Total
1959	1,913	3,592	249	5,755
1960	3,330	4,044	310	7,684
1961	6,609	5,809	485	12,903
1962	12,698	9,172	1,406	23,276
1963	25,293	10,812	1,793	37,898
1964	34,540	11,011	1,467	47,018
1965	34,823	10,668	1,633	47,124
1966	33,361	11,125	1,410	45,895
1967	30,856	10,630	1,361	42,848
1968	27,160	11,784	1,068	40,012
1969	22,211	11,698	990	34,899
1970	19,501	9,226	775	29,502
1971	16,331	7,963	853	25,146
1972	15,671	7,180	681	23,532
1973	14,862	7,799	708	23,369
1974	11,943	7,645	684	20,272
1975	11,566	7,507	626	19,699
1976	12,095	7,437	631	20,163
1977	12,114	8,494	681	21,289
1978	11,857	8,961	740	21,557
1979	11,850	8,927	729	21,506
1980	12,124	9,969	599	22,692
1981	11,725	11,340	550	23,615
1982	12,226	14,771	692	27,689
1983	13,561	19,328	701	33,590
1984	14,091	20,948	811	35,850
1985	13,734	25,323	1,158	40,215
1986	13,945	27,494	928	42,367
1987	18,428	30,598	875	49,901
1988	15,019	31,905	1,337	48,261
1989	17,387	30,835	964	49,187
1990	18,723	25,514	826	45,063
1991	20,456	22,235	1,211	43,902
1992	20,093	22,869	1,214	44,176
1993	19,308	20,848	1,080	41,236
1994	18,758	18,966	911	38,635
1995	17,576	14,915	1,063	33,554
1996	17,099	15,664	1,126	33,890
1997	16,566	15,595	1,050	33,211
1998	16,127	16,177	1,099	33,403
1999	15,957	16,910	1,258	34,124
2000	15,509	16,029	1,308	32,846
2001	16,030	17,261	1,280	34,571
2002	16,450	18,666	1,418	36,535
2003	16,647	22,476	1,513	40,635
2004	16,166	21,577	1,653	39,395
2005	16,641	21,661	1,691	39,993
2006	16,676	23,392	1,742	41,811
2007	16,019	23,068	1,729	40,816
Total	**$823,629**	**$757,816**	**$51,066**	**$1,632,512**

The Year in Space

July 30, 2007
Officials from DOD, NASA, and NOAA announce completion of a $4.2 billion restructuring contract for the National Polar-orbiting Operational Environmental Satellite System (NPOESS).

July 30
Space and Missile Systems Center, NOAA, and Lockheed Martin successfully show that a Defense Meteorological Satellite Program satellite, well past its design life, could still function without a gyro-enabled attitude control capability.

Sept. 14
The 50th Space Wing completes transfer from the 1970s-era Global Positioning System ground control segment to a modern ground control system, dubbed the Architecture Evolution Plan, with no loss of data.

Sept. 20
The Re-entry Structures Experiment, a hypersonic vehicle bearing five innovative experiments, marks its inaugural flight by achieving an altitude of 95,000 feet at Mach 5 and safely landing at White Sands Missile Range, N.M.

Oct. 3
Gen. Kevin P. Chilton, formerly head of Air Force Space Command, Peterson AFB, Colo., assumes command of US Strategic Command, Offutt AFB, Neb. Gen. C. Robert Kehler, former STRATCOM deputy commander, becomes head of Air Force Space Command.

Oct. 10
Cape Canaveral AFS, Fla., space operators oversee launch of the first Wideband Global SATCOM, via a United Launch Alliance Atlas V.

Oct. 23
Retired Air Force Col. Pamela A. Melroy commands the shuttle *Discovery,* launched into space from Kennedy Space Center, Fla., for a construction mission aboard the International Space Station.

Nov. 10
The 23rd and final Defense Support Program satellite enters orbit aboard a United Launch Alliance Delta IV heavy lift expendable launch vehicle, launched from Cape Canaveral AFS, Fla.

Dec. 3
Air Force Space Command's 460th Space Wing at Buckley AFB, Colo., reactivates the 11th Space Warning Squadron, establishing it at Schriever AFB, Colo.

Dec. 20
A United Launch Alliance Delta II rocket boosts a new Global Positioning System IIR-M satellite into orbit from Cape Canaveral AFS, Fla.

Dec. 28
The 1st Space Operations Squadron, Schriever AFB, Colo., ends operation of the legacy Command and Control Segment satellite control system, which the Air Force has used since 1989.

Feb. 20, 2008
Air Force Space Command personnel and assets support Operation Burnt Frost, the successful intercept and shootdown of a decaying US intelligence satellite that could have reached Earth with a full load of fuel.

March 7
Air Force Reserve Command stands up its first wing dedicated to space operations, redesignating the 310th Space Group as the 310th Space Wing at Schriever AFB, Colo.

March 13
Air Force Space Command personnel at Vandenberg AFB, Calif., team with industry to conduct the first launch of an Atlas V evolved expendable launch vehicle from the West Coast launch facility.

March 15
Cape Canaveral AFB, Fla., hosts launch of the sixth of eight modernized GPS IIR-M satellites built by Lockheed Martin.

March 25
The Defense Department and the Intelligence Community officially cancel the current Space Radar program, citing affordability and feasibility concerns.

May 15
The Air Force selects Lockheed Martin to develop GPS III satellites in an initial $4.6 billion contract award. Teamed with ITT and General Dynamics, Lockheed will build the first two satellites.

May 19
At the request of Beijing, the US provides to China National Geospatial-Intelligence Agency satellite images of earthquake-ravaged Sichuan Province.

June 2
AFSPC's 1st Space Operations Squadron at Schriever AFB, Colo., terminates operations of the Midcourse Space Experiment Satellite/Space Based Visible (MSX/SBV), the first US on-orbit asset to conduct surveillance of objects in space.

Space and Missile Badges

CURRENT

Space Badge

Astronaut

Missile Badge

Missile Badge With Operations Designator

HISTORICAL

Space/Missile Badge

Air Force Space Command, Peterson AFB, Colo.

(As of July 1, 2008)

Commander
Gen. C. Robert Kehler

14th Air Force
Vandenberg AFB, Calif.
Commander
Lt. Gen. William L. Shelton

- **21st Space Wing**
  Peterson AFB, Colo.
- **30th Space Wing**
  Vandenberg AFB, Calif.
- **45th Space Wing**
  Patrick AFB, Fla.
- **50th Space Wing**
  Schriever AFB, Colo.
- **460th Space Wing**
  Buckley AFB, Colo.

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

- **Program Office**
  DMSP Systems Group
  GPS Wing
  Launch and Range Systems Wing (EELV, Delta II)
  MILSATCOM Systems Wing
  Satellite Control & Network Systems Group
  Space Based Infrared Systems Wing
  Space Development & Test Wing (Kirtland AFB, N.M.)
  Space Superiority Systems Wing

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

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

- **90th Missile Wing**
  F.E. Warren AFB, Wyo.
- **91st Missile Wing**
  Minot AFB, N.D.
- **341st Missile Wing**
  Malmstrom AFB, Mont.

Space Leaders

US Space Command

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

US Strategic Command

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

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

Air Force Space Command

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

Army Space & Missile Defense Command

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

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

(As of June 30, 2008. A = Acting)

National Reconnaissance Office

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

Naval Space Command

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

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

Naval Network Warfare Command

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


FOR THE WARFIGHTER, A PROVEN PATH TO TSAT.
The capabilities necessary for the Transformational Satellite Communications System are well within reach. In fact, the technologies critical to the requirements of TSAT are a direct transfer of satellite systems already developed and demonstrated by Boeing. This includes proven networked packet-switching and bandwidth capabilities far beyond any existing or funded MILSATCOM constellation. For the warfighter, that means a low-risk, proven path to the breakthrough capabilities of TSAT.
CISCO, HUGHES, IBM, HARRIS, BALL AEROSPACE
BELL LABS, RAYTHEON, GENERAL DYNAMICS, L-3
TEAM
TSAT
BOEING

Major Military Commands With Space Functions

The Unified Command

US Strategic Command

Headquarters: Offutt AFB, Neb.
Established: June 1, 1992
Cmdr.: Gen. Kevin P. Chilton, USAF

MISSIONS

Deter attacks on US vital interests
Ensure US freedom of action in space and cyberspace
Deliver kinetic and nonkinetic effects to include nuclear and information operations for the joint warfighter
Synchronize global missile defense plans and operations and regional combating of weapons of mass destruction plans
Provide integrated surveillance and reconnaissance allocation recommendations

The Service Components

Air Force Space Command

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

MISSIONS

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

Naval Network Warfare Command

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

MISSIONS

Operate and maintain the Navy's space, network, and information operations systems and services
Support warfighting operations and command and control of naval forces
Promote innovative technological solutions to warfighting requirements
Advocate for maritime space, network, and information operations needs

Army Space & Missile Defense Command

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

MISSIONS

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

Major US Agencies With Roles in Space

Central Intelligence Agency

Headquarters: McLean, Va.
Established: 1947
Director: Michael V. Hayden

Mission

Provide national security intelligence to senior US policy-makers

Direct Space Role

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

National Geospatial-Intelligence Agency

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

Mission

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

Formerly National Imagery and Mapping Agency (NIMA).

National Reconnaissance Office

Headquarters: Chantilly, Va.
Established: September 1961
Director: Scott F. Large

Mission

Engage in the research and development, acquisition, launch, and operation of overhead reconnaissance systems necessary to meet the needs of the Intelligence Community and DOD

National Security Agency

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

Mission

Protect US communications
Produce foreign signals intelligence

US Military Payloads by Mission, 1958-2007

(Orbital only)

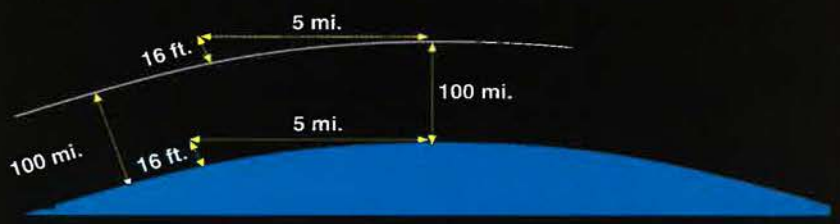
Applications	**406**
Communications	*127*
Weather	*48*
Navigation	*99*
Launch vehicle/spacecraft tests	*6*
Other military	*126*
Weapons-Related Activities	**46**
SDI tests	*11*
Anti-satellite targets	*2*
Anti-satellite interceptors	*33*
Reconnaissance	**444**
Photographic/radar imaging	*256*
Electronic intelligence	*55*
Ocean surveillance	*48*
Nuclear detection	*12*
Radar calibration	*37*
Early warning	*36*
Total	**896**

AFSPC Personnel Deployed by Unified Command

USCENTCOM	1,032
USEUCOM	27
USJFCOM	0
USNORTHCOM	44
USSOUTHCOM	17
USSOCOM	0
USPACOM	2
USTRANSCOM	0
Total deployed	**1,122**
By Region	
Western and Southern Europe	
Germany	15
UK	0
Italy	5
Turkey	1
Spain	1
Other countries	8
East Asia and Pacific	
Japan/Okinawa	0
South Korea	0
Other countries	1
Africa, Near East, South Asia	
Saudi Arabia	17
Egypt	0
Other countries	990
Western hemisphere	
Canada	0
Other countries	84

Orbits

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

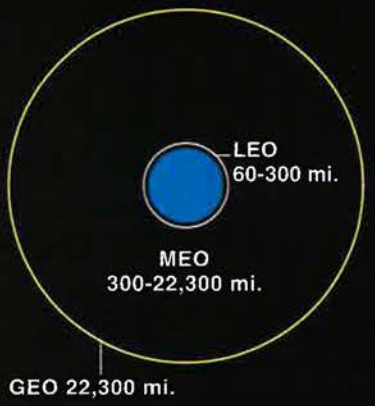


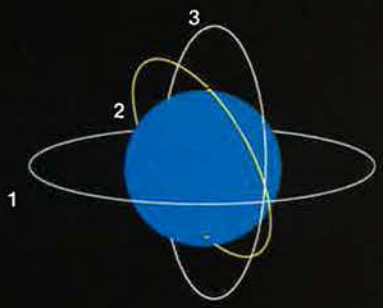
Orbital Altitude

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

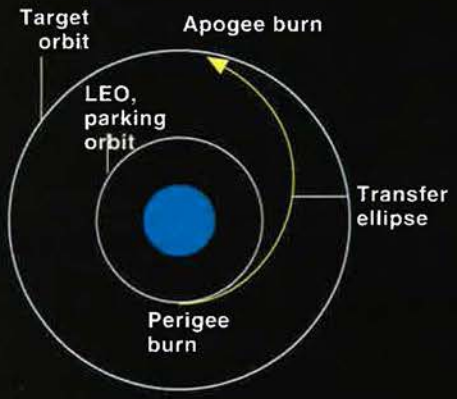
Orbital Inclinations

1 Equatorial
2 Sun synchronous
3 Polar





Geosynchronous Transfer Orbit



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

Illustrations are not drawn to scale.

US Military/Civil Launches

(As of Dec. 31, 2007)

Year	Military	Civil	Total	Year	Military	Civil	Total	Year	Military	Civil	Total	Year	Military	Civil	Total
1958	0	7	7	1971	16	16	32	1984	11	11	22	1997	8	29	37
1959	6	5	11	1972	14	17	31	1985	4	13	17	1998	5	29	34
1960	11	5	16	1973	11	12	23	1986	4	2	6	1999	7	23	30
1961	19	10	29	1974	8	16	24	1987	6	2	8	2000	11	17	28
1962	32	20	52	1975	9	19	28	1988	8	4	12	2001	7	14	21
1963	25	13	38	1976	11	15	26	1989	11	7	18	2002	1	16	17
1964	33	24	57	1977	10	14	24	1990	11	16	27	2003	11	12	23
1965	34	29	63	1978	14	18	32	1991	6	12	18	2004	5	11	16
1966	35	38	73	1979	8	8	16	1992	11	17	28	2005	6	6	12
1967	29	29	58	1980	8	5	13	1993	12	11	23	2006	7	10	17
1968	23	22	45	1981	7	11	18	1994	11	15	26	2007	8	10	18
1969	17	23	40	1982	6	12	18	1995	9	18	27				
1970	18	11	29	1983	8	14	22	1996	11	22	33	**Total**	**603**	**740**	**1,343**

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

Sites for Space Launches, 1957-Present

As of Dec. 31, 2007

Launch Site	Operator	Total Launches
Plesetsk	Russia	1,563
Tyuratam/Baikonur, Kazakhstan	Russia	1,277
Vandenberg AFB, Calif.	US	643
Cape Canaveral AFS, Fla.	US	635
Kourou, French Guiana	ESA	188
JFK Space Center, Fla.	US	141
Kapustin Yar	Russia	101
Xichang	China	49
Tanegashima	Japan	45
Shuang Cheng-tsu/Jiuquan	China	40
Kagoshima	Japan	34
Wallops Flight Facility, Va.	US	32
Taiyuan	China	26
Pacific Ocean Platform	Sea Launch	24
Sriharikota	India	24
Edwards AFB, Calif.	US	21
Indian Ocean Platform	US	9
Palmachim	Israel	7
Svobodny	Russia	5
Hammaguir, Algeria	France	4
Woomera, Australia	Australia	4
Alcantara	Brazil	3
Barents Sea	Russia	3
Kwajalein, Marshall Islands	US	3
Dombarovski	Russia	2
Kodiak, Alaska	US	1
Musudan ri	North Korea	1
Tenerife, Canary Islands	US	1
Total		**4,886**

What's Up There

As of Dec. 31, 2007

Country Organization	Payloads in Orbit: Satellites	Payloads in Orbit: Space Probes	Debris	Total
US	986	60	2,551	3,597
Russia*	1,369	35	2,033	3,437
People's Republic of China	63	1	2,595	2,659
France	45	0	212	257
Japan	102	10	32	144
India	34	0	97	131
European Space Agency	37	6	30	73
Intl. Telecom Sat. Org.	63	0	0	63
Globalstar	60	0	0	60
CHBZ	3	0	56	59
Orbcomm	35	0	0	35
European Telecom Sat. Org.	28	0	0	28
Canada	25	0	2	27
Germany	25	2	0	27
United Kingdom	25	0	0	25
Luxembourg	15	0	0	15
Italy	14	0	0	14
Saudi Arabia	12	0	0	12
Australia	11	0	0	11
Brazil	11	0	0	11
Int. Maritime Sat. Org.	11	0	0	11
Sweden	11	0	0	11
Argentina	10	0	0	10
Indonesia	10	0	0	10
South Korea	10	0	0	10
ISS	1	3	5	9
Spain	9	0	0	9
Arab Sat. Comm. Org.	8	0	0	8
NATO	8	0	0	8
Taiwan	8	0	0	8
Israel	7	0	0	7
Mexico	7	0	0	7
Thailand	6	0	0	6
Czech Republic	5	0	0	5
Netherlands	5	0	0	5
Turkey	5	0	0	5
Other**	45	0	2	47
Total	**3,129**	**117**	**7,615**	**10,861**

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

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

US Satellites Placed in Orbit or Deep Space

(As of Dec. 31, 2007)

Year	Military	Civil*	Total	Year	Military	Civil*	Total	Year	Military	Civil*	Total	Year	Military	Civil*	Total
1958	0	7	7	1971	26	18	44	1984	17	16	33	1997	9	81	90
1959	6	5	11	1972	18	14	32	1985	13	17	30	1998	7	87	94
1960	12	5	17	1973	14	10	24	1986	7	4	11	1999	8	74	82
1961	20	12	32	1974	11	8	19	1987	10	1	11	2000	15	36	51
1962	35	20	55	1975	12	16	28	1988	11	9	20	2001	8	24	32
1963	33	22	55	1976	17	12	29	1989	15	9	24	2002	2	25	27
1964	44	25	69	1977	14	5	19	1990	22	17	39	2003	12	14	26
1965	49	39	88	1978	16	17	33	1991	22	13	35	2004	5	11	16
1966	52	47	99	1979	10	7	17	1992	12	18	30	2005	6	14	20
1967	51	34	85	1980	12	4	16	1993	12	18	30	2006	16	21	37
1968	35	26	61	1981	7	10	17	1994	18	18	36	2007	13	31	44
1969	32	27	59	1982	8	9	17	1995	15	23	38				
1970	23	8	31	1983	16	12	28	1996	16	22	38	**Total**	**864**	**1,022**	**1,886**

*Includes some military payloads.

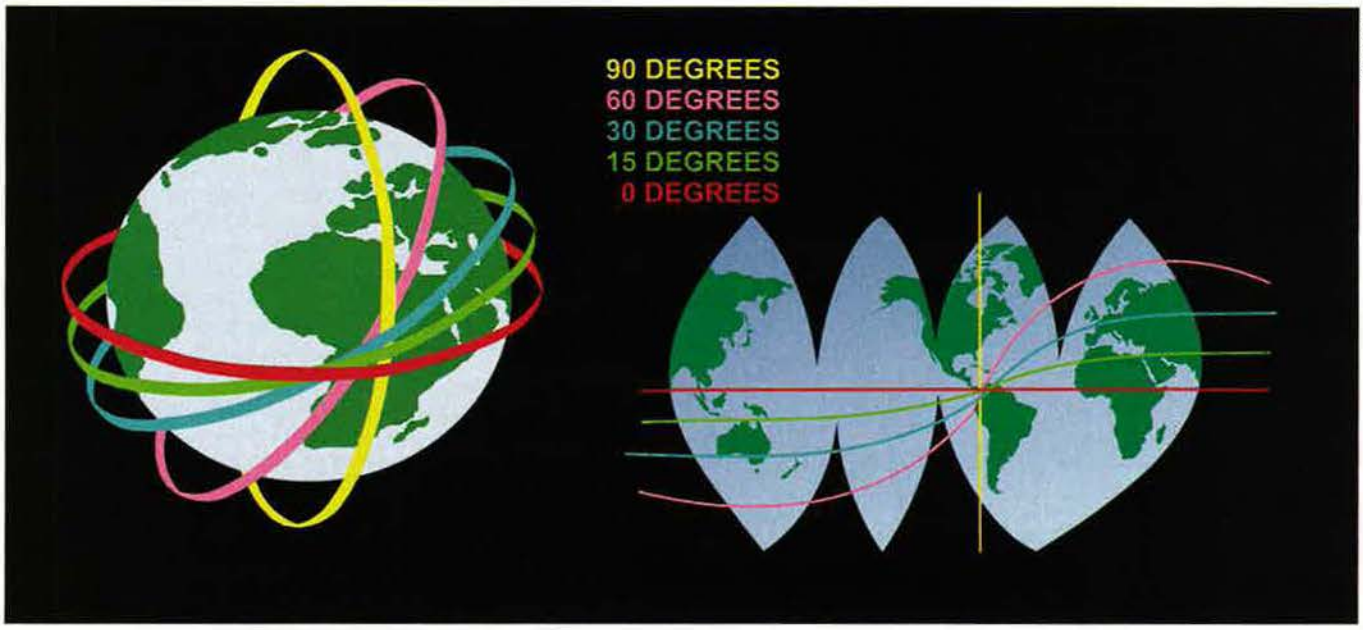
Air Force Personnel in Space Organizations

As of Sept. 30, 2007

	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
Active Duty Air Force	**19,198**	**18,201**	**17,337**	**17,004**	**19,064**	**19,495**	**19,862**	**16,758**	**18,345**	**17,617**
Selected Guard and Reserve										
Air National Guard	285	285	354	354	519	519	649	653	663	1,339
Air Force Reserve Command	508	629	699	705	847	987	1,024	1,050	1,379	1,401
Total Guard and Reserve	**793**	**914**	**1,053**	**1,059**	**1,366**	**1,506**	**1,673**	**1,703**	**2,042**	**2,740**
Direct-hire Civilian	**4,354**	**4,140**	**4,351**	**4,665**	**6,325**	**6,333**	**6,396**	**6,541**	**6,534**	**8,404**

Satellite Inclination

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

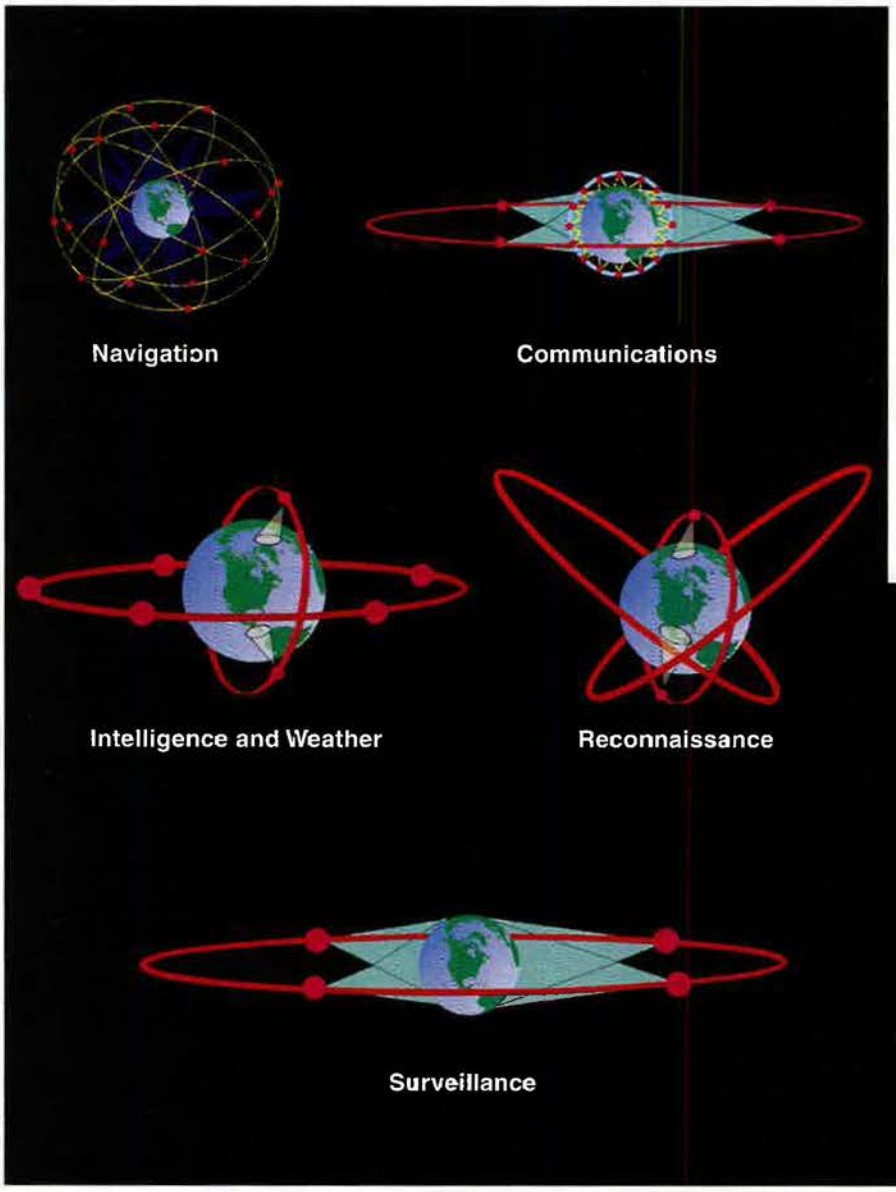


DOD image

AFSPC Squadrons by Mission Type

(As of Sept. 30, 2007)

Component	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
Active force										
ICBM	14	14	14	14	14	11	11	10	10	10
Space operations	10	10	8	8	8	8	9	8	8	7
Space communications	1	1	1	1	0	0	6	7	7	6
Space warning	8	8	7	7	8	8	6	6	6	6
Space surveillance	6	6	6	4	3	3	3	0	0	0
Space launch	5	5	3	3	3	4	4	3	3	3
Range	2	2	2	2	2	2	2	2	2	2
Space control and tactics	1	1	2	3	3	3	3	5	6	6
Space aggressor	0	0	0	0	0	1	1	1	1	0
Total active force	**47**	**47**	**43**	**42**	**41**	**40**	**45**	**42**	**43**	**40**
Reserve forces										
ANG										
Space operations	0	0	0	0	1	1	3	4	3	1
Space warning	0	0	0	0	1	1	1	2	1	2
AFRC										
Space operations	3	3	3	4	4	4	4	4	4	4
Space warning	1	1	1	1	1	1	1	1	1	1
Space aggressor	0	0	0	0	0	0	1	1	1	1
Total reserve forces	**4**	**4**	**4**	**5**	**7**	**7**	**10**	**10**	**10**	**9**
Total all components	**51**	**51**	**51**	**48**	**49**	**48**	**50**	**57**	**53**	**49**



DOD image

US Manned Spaceflights

Year	Flights	Persons
1961	2	2
1962	3	3
1963	1	1
1964	0	0
1965	5	10
1966	5	10
1967	0	0
1968	2	6
1969	4	12
1970	1	3
1971	2	6
1972	2	6
1973	3	9
1974	0	0
1975	1	3
1976	0	0
1977	0	0
1978	0	0
1979	0	0
1980	0	0
1981	2	4
1982	3	8
1983	4	20
1984	5	28
1985	9	58
1986	1	7
1987	0	0
1988	2	10
1989	5	25
1990	6	32
1991	6	35
1992	8	53
1993	7	42
1994	7	42
1995	7	42
1996	7	43
1997	8	53
1998	5	33
1999	3	19
2000	5	32
2001	6	38
2002	5	34
2003	1	7
2004	0	0
2005	1	7
2006	3	20
2007	3	21
Total	**150**	**784**

The Constellations

Multiple satellites working in groups to perform a single mission can provide greater coverage than a single satellite, enabling global coverage or increasing timeliness of coverage.

Navigation constellations provide simultaneous signals from multiple satellites to a location on the ground.

Communications constellations ensure at least one satellite is in line of sight of both ends of the communications link.

Weather and **reconnaissance** constellations generally contain both high and low altitude systems.

Some **surveillance** systems need continuous access to areas of interest, calling for high altitude, long dwell time orbits

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NASA photo

Athena II

USAF photo

Atlas V

USAF photo

Delta II

Major US Launchers in US Military Use

Athena I
Function: lift low to medium weights.
First launch: Aug. 22, 1997.
Launch site: Cape Canaveral AFS, Fla., Vandenberg AFB, Calif.
Contractor: Lockheed Martin.
Stages: two.
Propulsion: stage 1 (Thiokol Castor 120 Solid Rocket Motor), 435,000 lb thrust; stage 2 (Pratt & Whitney Orbus 21D SRM), 43,723 lb thrust.
Dimensions: length 62 ft, max body diameter 7.75 ft.
Weight: 146,264 lb.
Payload: 1,750 lb to LEO.

Athena II
Function: lift low to medium weights.
First launch: Jan. 6, 1998.
Launch site: CCAFS, VAFB.
Contractor: Lockheed Martin.
Stages: three.
Propulsion: stages 1-2 (Castor 120 SRMs), 435,000 lb thrust; stage 3 (Orbus 21D SRM), 43,723 lb thrust.
Dimensions: length 93 ft, max body diameter 7.75 ft.
Weight: 266,000 lb.
Payload: 4,350 lb to LEO.

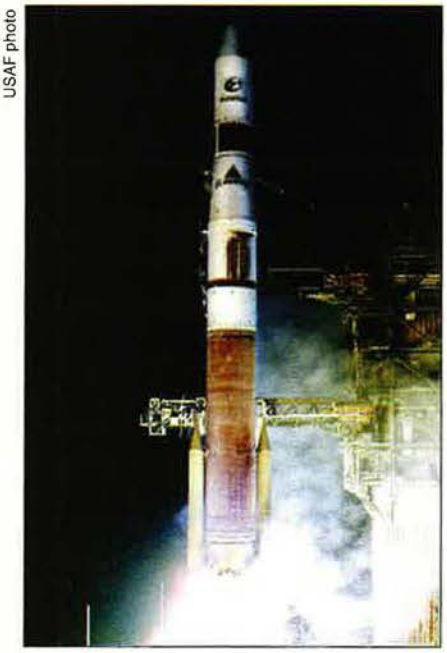
Atlas V
Function: lift medium to heavy weights.
Variants: 400 and 500 series.
First launch: Aug. 21, 2002.
Launch site: CCAFS, VAFB.
Contractor: Lockheed Martin.
Stages: two.
Propulsion: (400 and 500 series) stage 1: one RD AMCROSS LLC RD-180 engine with two chambers, 860,200 lb thrust; stage 2: Centaur, one or two Pratt & Whitney RL10A-4-2 engines, 16,500-22,300 lb thrust. Strap-on solid rocket boosters, up to three (400), up to five (500).
Dimensions: (stage 1) length 106.2 ft, max body diameter 12.5 ft; (stage 2) length 41.6 ft, max body diameter 10 ft.
Weight: 741,061-1.2 million lb.
Payload: (400 series) 27,558 lb to LEO, 10,913-17,196 to GTO; (500 series) 22,707-45,238 lb to LEO, 8,752-19,180 lb to GTO. (500 series supports 16.5 ft diameter payload fairing.)

Delta II
Function: lift medium weights.
First launch: Feb. 14, 1989.
Launch site: CCAFS, VAFB.
Contractor: Boeing.
Stages: up to three.
Propulsion: stage 1 (Rocketdyne RS-27A), 237,000 lb thrust; stage 2 (Aerojet AJ10-118K), 9,753 lb thrust; stage 3 (Thiokol STAR 48B SRM), 14,920 lb thrust; nine strap-on SRMs (Alliant Techsystems), 100,270 lb thrust.
Dimensions: length 125.2 ft, max body diameter 8 ft.
Weight: 511,190 lb.
Payload: 5,960-13,440 lb to LEO.

Delta IV
Function: lift medium to heavy weights.
Variants: Medium, Medium-Plus, and Heavy.
First launch: Nov. 20, 2002.
Launch site: CCAFS; VAFB.
Contractor: Boeing.
Stages: two.
Propulsion: stage 1, Rocketdyne RS-68 (Heavy, two additional core engines), 650,000 lb thrust; stage 2 (Medium), P&W RL10B-2, 24,750 lb thrust.
Dimensions: (core booster, all versions) length 125 ft, max body diameter 16.7 ft.
Weight: (Medium) 64,719 lb; (heavy) 196,688 lb.
Payload: 20,170-49,740 lb to LEO; 9,480-28,620 lb to GTO. (Heavy supports 16.6 ft diameter payload fairing.)

EELV
Function: lift medium to heavy weights.
Note: Atlas V and Delta IV (see individual entries) are participating in USAF's evolved expendable launch vehicle (EELV) modernization program. These systems replaced Atlas II, Titan II, and Titan IV launch vehicles.

USAF photo



Delta IV

USAF photo

Space Shuttle

Orbital Sciences Corp. photo

Taurus

Pegasus
Function: lift low weights.
Variants: Standard and XL.
First launch: (Standard) April 5, 1990; (XL) June 27, 1994.
Launch site: dropped from L-1011 aircraft.
Contractor: Orbital Sciences, Alliant.
Stages: three.
Propulsion: (XL) (all Alliant Techsystems) stage 1, 109,400 lb thrust; stage 2, 27,600 lb thrust; stage 3, 7,800 lb thrust.
Dimensions: length 49 ft, wingspan 22 ft, diameter 4.17 ft.
Weight: 42,000 lb.
Payload max: (Standard) 850 lb to LEO; (XL) 1,050 lb to GEO.

Space Shuttle
Function: lift heavy weights.
First launch: April 12, 1981.
Launch site: John F. Kennedy Space Center, Fla.
Contractor: Boeing (launch).
Stages: delta-winged orbiter.
Propulsion: three main engines, 394,000 lb thrust; two SRMs, 3.3 million lb thrust.
Dimensions: system length 184 ft; span 78 ft.
Weight: 4.5 million lb (gross).
Payload max: 55,000 lb to LEO.

Taurus
Function: lift low weights.
Variants: Standard and XL.
First launch: March 13, 1994.
Launch site: CCAFS, Kodiak Launch Complex, Alaska; VAFB; Wallops Island, Va.
Contractor: Orbital Sciences.
Stages: four.
Propulsion: Castor 120 SRM, 495,400 lb thrust; stage 1, 109,140 lb thrust; stage 2, 26,900 lb thrust; stage 3, 7,200 lb thrust. (Stages 1-3, Alliant Techsystems)
Dimensions: length 89 ft, max body diameter 7.6 ft.
Weight: 170,000 lb max.
Payload max: 3,000 lb to LEO.

Major Military Satellite Systems

Advanced Extremely High Frequency Satellite Communications System
Common name: AEHF
In brief: successor to Milstar, AEHF will provide assured strategic/tactical, worldwide C2 communications with at least 10 times the capacity of Milstar II but in a smaller package.
Function: EHF communications.
Operator: MILSATCOM JPO (acquisition); AFSPC.
First launch: 2009, planned.
On orbit: three, planned.
Orbit altitude: 22,000+ miles.

Defense Meteorological Satellite Program
Common name: DMSP
In brief: satellites that collect air, land, sea, and space environmental data to support worldwide strategic and tactical military operations. Operational control transferred to NOAA in 1998; backup operation center at Schriever AFB, Colo., manned by Air Force Reserve Command personnel.
Function: environmental monitoring.
Operator: NPOESS Integrated Program Office.
First launch: Aug. 23, 1962.
On orbit: two (primary).
Orbit altitude: approx 527 miles.

Defense Satellite Communications System III
Common name: DSCS
In brief: nuclear-hardened and jam-resistant spacecraft used to transmit high-priority C2 messages to battlefield commanders.
Function: SHF communications.
Operator: AFSPC.
First launch: October 1982.
On orbit: five (primary).
Orbit altitude: 22,000+ miles.

Defense Support Program
Common name: DSP
In brief: early warning spacecraft whose infrared sensors detect heat generated by

Major Military Satellite Systems, Continued

a missile or booster plume.
Function: strategic and tactical missile launch detection.
Operator: AFSPC.
First launch: November 1970.
On orbit: classified.
Orbit altitude: 22,000+ miles.

Enhanced Polar System
Common name: EPS
In brief: next generation polar communications to replace interim polar system (see Interim Polar System, below), which provides polar communications capability required by aircraft, submarines, and other forces operating in the high northern latitudes. Pre-acquisition, system definition, and risk reduction efforts started in Fiscal 2006.
Function: EHF polar communications.
Operator: MILSATCOM JPO (acquisition); AFSPC.
First launch: availability 2013.
On orbit: two, planned.
Orbit altitude: 22,300+ miles.

Global Broadcast System
Common name: GBS
In brief: wideband communications program, initially using leased commercial satellites, then military systems, to provide digital multimedia data directly to theater warfighters.
Function: high-bandwidth data imagery and video.
Operator: Navy.
First launch: March 1998 (Phase 2 payload on UHF Follow-On). Continues on Wideband Global SATCOM (WGS) in 2008.
On orbit: two.
Orbit altitude: 23,230 miles.

Global Positioning System
Common name: GPS
In brief: constellation of satellites used by military and civilians to determine a precise location and time anywhere on Earth. Block IIR began replacing older GPS spacecraft in mid-1997; first modified Block IIR-M with military signal (M-code) on two channels launched in 2005. Next generation Block IIF with extended design life, faster processors, and new civil signal on third frequency launches in 2008. Generation after next GPS III with advanced anti-jam and higher quality data is slated for initial launch in 2014.
Function: worldwide positioning, navigation, and precise time transfer.
Operator: AFSPC.
First launch: Feb. 22, 1978 (Block I).
On orbit: 30.
Orbit altitude: 10,988 miles.

Interim Polar System
Common name: IPS
In brief: USAF deployed a modified EHF payload on a host polar-orbiting satellite to provide an interim solution to ensure warfighters have protected polar communications capability. Polar 3 slated for launch in 2007.
Function: EHF polar communications.
Operator: Navy.
First launch: 1997.
On orbit: two.
Orbit altitude: 25,300 miles (apogee).

Milstar Satellite Communications System
Common Name: Milstar
In brief: joint communications satellite that provides secure, jam-resistant communications for essential wartime needs.
Function: EHF communications.
Operator: AFSPC.
First launch: Feb. 7, 1994.
On orbit: five.
Orbit altitude: 22,300 miles.

Mobile User Objective System
(also known as Advanced Narrowband System)
Common name: MUOS
In brief: next generation narrowband UHF tactical communications satellite to replace the UHF Follow-On Satellite (see below). Concept study contracts awarded in 1999; production award to Lockheed Martin in September 2004; initial launch in 2010.
Function: UHF tactical communications.
Operator: Navy.
First launch: 2010, planned.
On orbit: none.
Orbit altitude: 22,300 miles.

Space Based Infrared System High
Common name: SBIRS High
In brief: advanced surveillance system for missile warning, missile defense, battlespace characterization, and technical intelligence. System initially will complement, then replace, Defense Support Program spacecraft (see p. 47).
Function: infrared space surveillance.
Operator: AFSPC.
First launch: 2009, planned.
On orbit: none.
Orbit altitude: 22,300 miles.

Space Based Surveillance
Common name: SBSS
In brief: Will replace the Midcourse Space Experiment/Space Based Visible (MSX/SBV) satellite that performs tracking and optical signature collection on Earth-orbiting objects.
Function: space surveillance.
Operator: AFSPC.
First launch: Early 2009, planned.
On orbit: one Pathfinder satellite to be launched in 2008 and four operational satellites are planned for the 2014 timeframe.
Orbit altitude: 528 miles.

Space Tracking and Surveillance System
(formerly SBIRS Low).
Common name: STSS
In brief: infrared surveillance and tracking satellites to detect and track ballistic missiles from launch to impact. System is sensor component of layered ballistic missile defense system and will work with SBIRS High (see above).
Function: infrared surveillance.
Operator: MDA (acquisition); AFSPC.
First launch: 2008 or later for R&D, planned.
On orbit: none.

Transformational Satellite Communications System
Common name: TSAT
In brief: protected strategic and tactical survivable SATCOM and unprotected wideband SATCOM connectivity for authorized users. Protected TSAT SATCOM uses anti-jam and low probability of intercept capabilities coupled with defensive information warfare, nuclear survivability, resistance to physical destruction, and US control of SATCOM access for assured communications. TSAT represents part of the space backbone of the global information grid supporting Internet-like connectivity, netcentric operations, and warfare (NCOW). It will feature laser crosslink and greatly reduced transmission time to users on the ground. Intended to replace Advanced Extremely High Frequency system (see p. 47), it is slated for launch around 2016. Currently in design and risk-reduction phase.

Artist's conception by Erik Simonsen

Space Based Infrared System High

Major Military Satellite Systems, Continued

Function: EHF, Ka-band and laser communications.
Operator: MILSATCOM Systems Wing (acquisition); AFSPC (operations).
First launch: 2016, planned.
On orbit: five and one spare, planned.
Orbit altitude: 22,300 miles.

UHF Follow-On Satellite
Common name: UFO
In brief: new generation satellites providing secure, anti-jam communications; replaced FLTSATCOM satellites.
Function: UHF and EHF communications.
Operator: Navy.
First launch: March 25, 1993.
Constellation: four primary, four redundant.
On orbit: nine.
Orbit altitude: 22,300 miles.

Wideband Global SATCOM
Common name: WGS
In brief: multiservice program leveraging commercial methods to rapidly design, build, launch, and support a constellation that will augment X-band satellite communications (DSCS) and one-way Ka-band (Global Broadcast Service) while providing a new two-way Ka-band service (see p. 47 and 48).
Function: wideband communications and point-to-point service (Ka-band and X-band frequencies).
Operator: AFSPC (bus); SMDC/ARSTRAT (payload).
First launch: Oct. 10, 2007.
On orbit: six, planned.
Orbit altitude: 22,000+ miles.

Dark and Spooky
A number of intelligence satellites are operated by US agencies in cooperation with the military. The missions and, especially, the capabilities are closely guarded secrets.
Most of the names of satellites, such as White Cloud (ocean reconnaissance), Aquacade (electronic ferret), and Trumpet (Sigint), are essentially open secrets but cannot be confirmed by the Intelligence Community.

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Major Civilian Satellites in US Military Use

Geostationary Operational Environmental Satellite
Common name: GOES
In brief: in equatorial orbit to collect weather data for short-term forecasting.
Function: storm monitoring and tracking, meteorological research.
Operator: NOAA.
First launch: Oct. 16, 1975 (GOES-1).
Constellation: two, with on-orbit spare.
Orbit altitude: 22,300 miles.

Globalstar
Common name: Globalstar
In brief: mobile communications with provision for security controls.
Function: communications.
Operator: Globalstar L.P.
First launch: February 1998.
Constellation: 48.
Orbit altitude: 878 miles.

Ikonos
Common name: Ikonos
In brief: one-meter resolution Earth imaging.
Function: remote sensing.
Operator: Space Imaging, Inc.
First launch: Sept. 24, 1999.
Constellation: one.
Orbit altitude: 423 miles.

Inmarsat
Common name: Inmarsat
In brief: peacetime mobile communications services, primarily by US Navy.
Function: communications.
Operator: International Maritime Satellite Organization.
First launch: February 1982 (first lease), Oct. 30, 1990 (first launch).
Constellation: nine.
Orbit altitude: 22,300 miles.

Intelsat
Common name: Intelsat
In brief: routine communications and distribution of Armed Forces Radio and TV Services network.
Function: communications.
Operator: International Telecommunications Satellite Organization.
First launch: April 6, 1965 (Early Bird).
Constellation: 51.
Orbit altitude: 22,300 miles.

Iridium
Common name: Iridium
In brief: voice, fax, data transmission.
Function: handheld, mobile communications.
Operator: Iridium L.L.C.
First Launch: May 5, 1997.
Constellation: 66 (six on-orbit spares).
Orbit: 485 miles.

Landsat
Common name: Landsat
In brief: imagery use includes mapping and planning for tactical operations.
Function: remote sensing.
Operator: US Geological Survey.
First launch: July 23, 1972.
Constellation: one.
Orbit altitude: 438 miles (polar).

National Polar-orbiting Operational Environmental Satellite System
Common name: NPOESS
In brief: advanced joint civil-military polar environmental satellite that provides weather, atmosphere, ocean, land, and near-space data. Managed by tri-agency (DOD, Department of Commerce, and NASA) integrated program office. Designed to replace USAF's DMSP and NOAA's Polar-orbiting Operational Environmental Satellite (POES) (see p. 50).
Function: worldwide environmental forecasting.
Operator: IPO (AFSPC for acquisition and launch; NOAA for operations).
First launch: 2010, planned.
Constellation: three.
On orbit: none.
Orbit altitude: 550 (LEO) miles.

Orbcomm
Common name: Orbcomm
In brief: potential military use under study in Joint Interoperability Warfighter Program.
Function: mobile communications.
Operator: Orbcomm Global L.P.
First launch: April 1995.
Constellation: 30.
Orbit altitude: 500-1,200 miles.

Pan Am Sat
Common name: Pan Am Sat
In brief: routine communications providing telephone, TV, radio, and data.
Function: communications.
Operator: Pan Am Sat.*

Major Civilian Satellites in US Military Use, Continued

First launch: 1983.
Constellation: 21.
Orbit altitude: 22,300 miles.
*Merged with Intelsat 2005-06

Polar-orbiting Operational Environmental Satellite
(also known as NOAA-K, L, and M before launch; NOAA-15, 16, and 17, respectively, once on orbit).
Common name: POES
In brief: two advanced third generation environmental satellites (one morning orbit and one afternoon orbit) provide longer-term weather updates for all areas of the world. Final two spacecraft in this series are NOAA-N (launched in 2005) and N Prime. To be replaced by NPOESS.
Function: extended weather forecasting.
Operator: NOAA (on-orbit); NASA (launch).
First launch: May 13, 1998 (NOAA-15).
Constellation: two.
Orbit altitude: 517 miles.

Quickbird 2
Common name: Quickbird 2
In brief: high-resolution imagery for mapping, military surveillance, weather research, and other uses.
Function: remote sensing.
Operator: DigitalGlobe.
First launch: Oct. 18, 2001.
Constellation: one.
Orbit altitude: 279 miles.

Satellite Pour l'Observation de la Terre
Common name: SPOT
In brief: terrain images used for mission-planning systems, terrain analysis, and mapping.
Function: remote sensing.
Operator: SPOT Image S.A. (France).
First launch: Feb. 22, 1986.
Constellation: three.
Orbit altitude: 509 miles.

Telstar
Common name: Telstar
In brief: commercial satellite-based, rooftop-to-rooftop communications for US Army and other DOD agencies.
Function: communications.
Operator: Loral Skynet.
First launch: November 1994.
Constellation: three.
Orbit altitude: 22,300 miles.

Tracking and Data Relay Satellite System
Common name: TDRSS
In brief: global network that allows other spacecraft in LEO to communicate with a control center without an elaborate network of ground stations.
Function: communications relay.
Operator: NASA.
First launch: April 1983.
Constellation: seven.
Orbit altitude: 22,300 miles.

Major US Military Ground-Based Space Surveillance Systems

Air Force Space Surveillance System
Common name: Air Force Fence
In brief: continuous wave radars located across the southern US to track man-made objects in Earth orbit.
Function: space surveillance.
Operator: AFSPC.
Operational: March 31, 1959 (US Navy).
Unit location: Dahlgren, Va. (command & control); receivers in Arkansas, California, Georgia, Mississippi, and New Mexico; transmitters in Alabama, Arizona, and Texas.
Components: One command & control center, six receiver sites, and three transmitter sites.

AN/FPS-85 Phased-Array Radar
Common name: Eglin radar
In brief: active phased-array radar used in all weather to track man-made objects in Earth orbit.
Function: space surveillance.
Operator: AFSPC.
Operational: Jan. 29, 1969.
Unit location: Eglin AFB, Fla.
Components: AN/FPS-85 solid-state phased-array radar.

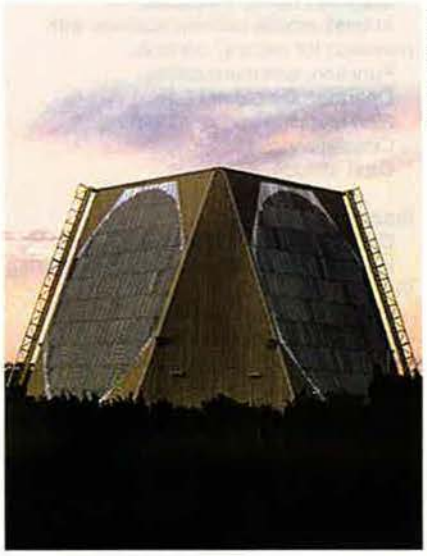
Ballistic Missile Early Warning System
Common name: BMEWS
In brief: phased-array radar used for tactical warning and attack assessment and tracking Earth-orbiting satellites.
Function: ballistic missile attack and space surveillance.
Operator: AFSPC.
Operational: 1959 (Trinidad, British West Indies); July 1, 1961 (Clear AFS, Alaska).
Unit location: Clear AFS, Alaska; RAF Fylingdales, Britain; Thule AB, Greenland.
Components: (Clear AFS) AN/FPS-120 solid-state phased-array radar (SSPAR) with two faces; computers for radar control and data processing.

Ground-based Electro-optical Deep Space Surveillance
Common name: GEODSS
In brief: optical system that tracks objects such as Earth-orbiting satellites in deep space.
Function: space surveillance.
Operator: AFSPC.
Operational: June 30, 1982.
Unit location: Socorro, N.M.; Diego Garcia, Indian Ocean; Maui, Hawaii.
Components: three telescopes, low-light-level EO cameras, and high-speed computers.

Moron Optical Space Surveillance
Common name: MOSS
In brief: optical system that tracks objects such as Earth-orbiting satellites in deep space.
Function: space surveillance.
Operator: AFSPC.
Operational: June 1998.
Unit location: Moron, Spain.
Components: optical telescope and high-speed computers.

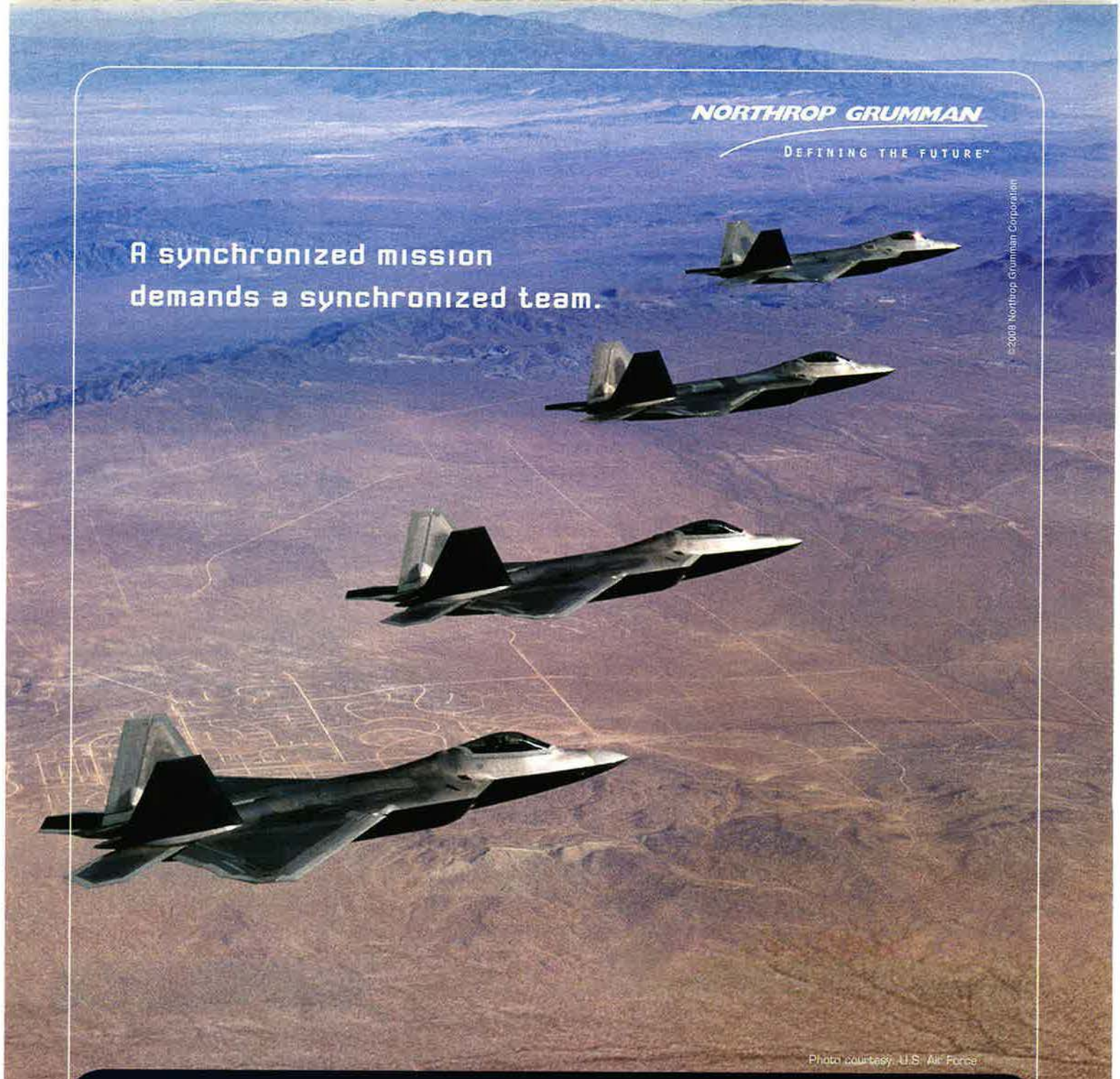
Pave Phased-Array Warning System
Common Name: Pave PAWS
In brief: Phased-array radar used to detect and track sea-launched and intercontinental ballistic missiles, as well as Earth-orbiting satellites.
Function: missile warning and space surveillance.
Operator: AFSPC.
Operational: August 1980.
Unit location: Beale AFB, Calif.; Cape Cod AFS, Mass.
Components: AN/FPS-115 phased-array radar; computers for radar control and data processing.

Perimeter Acquisition Radar Attack Characterization System
Common name: PARCS
In brief: ICBM and SLBM warning and space surveillance of Earth-orbiting satellites in deep space.
Function: ballistic missile warning and space surveillance.
Operator: AFSPC.
Operational: 1977.
Unit location: Cavalier AFS, N.D.
Components: One AN-FPQ-16 single-faced, phased-array radar.



Raytheon photo

The AN-FPS-115 Pave PAWS phased-array warning system radar.



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Milestones in Military Space

March 22, 1946. JPL-Ordnance WAC, first US rocket to leave Earth's atmosphere, reaches 50-mile height after launch from White Sands Proving Ground, N.M.
Oct. 4, 1957. USSR launches Sputnik 1, first man-made satellite, into Earth orbit.
Jan. 31, 1958. US launches its first satellite, Explorer 1.
Dec. 18, 1958. Project Score spacecraft conducts first US active communication from space.
Feb. 28, 1959. USAF successfully launches Discoverer 1 (of then-classified Corona program), world's first polar-orbiting satellite, from Vandenberg AFB, Calif.
April 6, 1959. The first military unit to be charged with conducting military satellite operations, USAF's 6594th Test Wing, is established at Palo Alto, Calif.
April 13, 1959. Air Force Thor/Agena A boosts into orbit Discoverer 2 satellite, first satellite to be stabilized in orbit in all three axes, to be maneuvered on command from Earth, to separate a re-entry vehicle on command, and to send its re-entry vehicle back to Earth.
Aug. 7, 1959. Explorer 6 spacecraft transmits first television pictures from space.
June 22, 1960. US launches Galactic Radiation and Background (GRAB) satellite, the nation's first successful reconnaissance spacecraft. It collects electronic intelligence (Elint) from Soviet air defense radars.
Aug. 18, 1960. Discoverer/Corona satellite takes first image of Soviet territory ever snapped from space.
April 12, 1961. Soviet cosmonaut Yuri Gagarin pilots Vostok 1 through nearly one orbit to become first human in space.
May 5, 1961. Lt. Cmdr. Alan B. Shepard Jr., aboard Freedom 7 Mercury capsule, becomes first American in space, climbing to 116.5 miles during suborbital flight lasting 15 minutes, 28 seconds.
Feb. 20, 1962. Project Mercury astronaut Lt. Col. John H. Glenn Jr., aboard Friendship 7 capsule, completes first US manned orbital flight.
May 15, 1963. USAF Maj. L. Gordon Cooper Jr. makes nearly 22 orbits in spacecraft Faith 7, becoming the first American astronaut to perform an entirely manual re-entry.
Oct. 17, 1963. Vela Hotel satellite performs first space-based detection of nuclear explosion.
March 18, 1965. First space walk conducted by Alexei Leonov from Soviet Voskhod 2.
June 3, 1965. Gemini 4 astronaut USAF Maj. Edward H. White II performs first American space walk.
June 18, 1965. USAF accepts Titan III, first Air Force vehicle specifically designed and developed as a military space booster.
Dec. 15, 1965. Crews of Gemini 6 and Gemini 7 rendezvous in space. Navy Capt. Walter M. Schirra and USAF Maj. Thomas P. Stafford in Gemini 6 maneuver to within a foot of Gemini 7 crew.
Jan. 25, 1967. Soviets complete first successful fractional orbital bombardment system test, deorbiting Kosmos 139 satellite re-entry vehicle to an impact point within Soviet Union.
July 3-4, 1967. Air Force, Army, and Navy conduct first satellite-based tactical communications.
Oct. 20, 1968. Soviet Kosmos 249 spacecraft carries out first co-orbital antisatellite test,exploding Kosmos 248 target satellite into cloud of debris.
July 20, 1969. At 10:56 p.m. EDT, Apollo 11 astronaut Neil A. Armstrong puts his foot on the surface of the moon, becoming the first human to do so.
November 1970. USAF launches first classified Defense Support Program satellite, whose infrared sensors provide space-based early warning of missile launches.
April 19, 1971. First space station, Salyut 1, goes aloft.
Feb. 22, 1978. Atlas booster carries first Global Positioning System Block I satellite into orbit, paving way for a revolution in civil, commercial, and military navigation.
April 12-14, 1981. Space shuttle performs its first orbital flight and becomes first reusable spacecraft to land back on Earth.
Aug. 30, 1983. USAF Col. Guion S. Bluford Jr. becomes the first African American in space, as a mission specialist aboard *Challenger.*
Sept. 13, 1985. First US anti-satellite intercept test destroys Solwind scientific satellite by air-launched weapon.
Jan. 17, 1991. What USAF calls "the first space war," Operation Desert Storm, opens with air attacks.
Jan. 13, 1993. USAF Maj. Susan J. Helms, flying aboard space shuttle *Endeavour,* becomes first US military woman in space.
Feb. 6, 1995. USAF Lt. Col. Eileen M. Collins is first woman to pilot a US spaceship, doing so when *Discovery* and space station Mir perform first US-Russian space rendezvous in 20 years.
May 29, 1998. USAF hands control of DMSP spacecraft to NOAA—the first transfer of a fully operational military space system to civilian agency.
July 23-27, 1999. USAF Col. Eileen M. Collins beomes first woman to command a shuttle mission, *Columbia* (STS-93).
Nov. 21, 2000. For the first time, a single Delta II rocket, lifting off from Vandenberg AFB, Calif., launches two different primary payloads.
April 22, 2003. AFSPC's 14th Air Force activates first-of-its-kind space intelligence squadron, the 614th SIS, to identify and devise means to respond to threats to US space systems.
Jan. 11, 2007. Chinese ASAT destroys orbiting Chinese satellite, making China only the third nation (after the US and Russia) to do so.

Major Space Treaties and Laws

Long Title	Nickname	Entry Into Force
Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space, and Under Water	Nuclear Test Ban	Oct. 10, 1963
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies	Outer Space Treaty	Oct. 10, 1967
Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space	Rescue Agreement	Dec. 3, 1968
Convention on International Liability for Damage Caused by Space Objects	Liability Convention	Sept. 1, 1972
Convention on Registration of Objects Launched Into Outer Space	Registration Convention	Sept. 15, 1976
Agreement Governing the Activities of States on the Moon and Other Celestial Bodies	Moon Agreement	July 11, 1984

Acknowledgements

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

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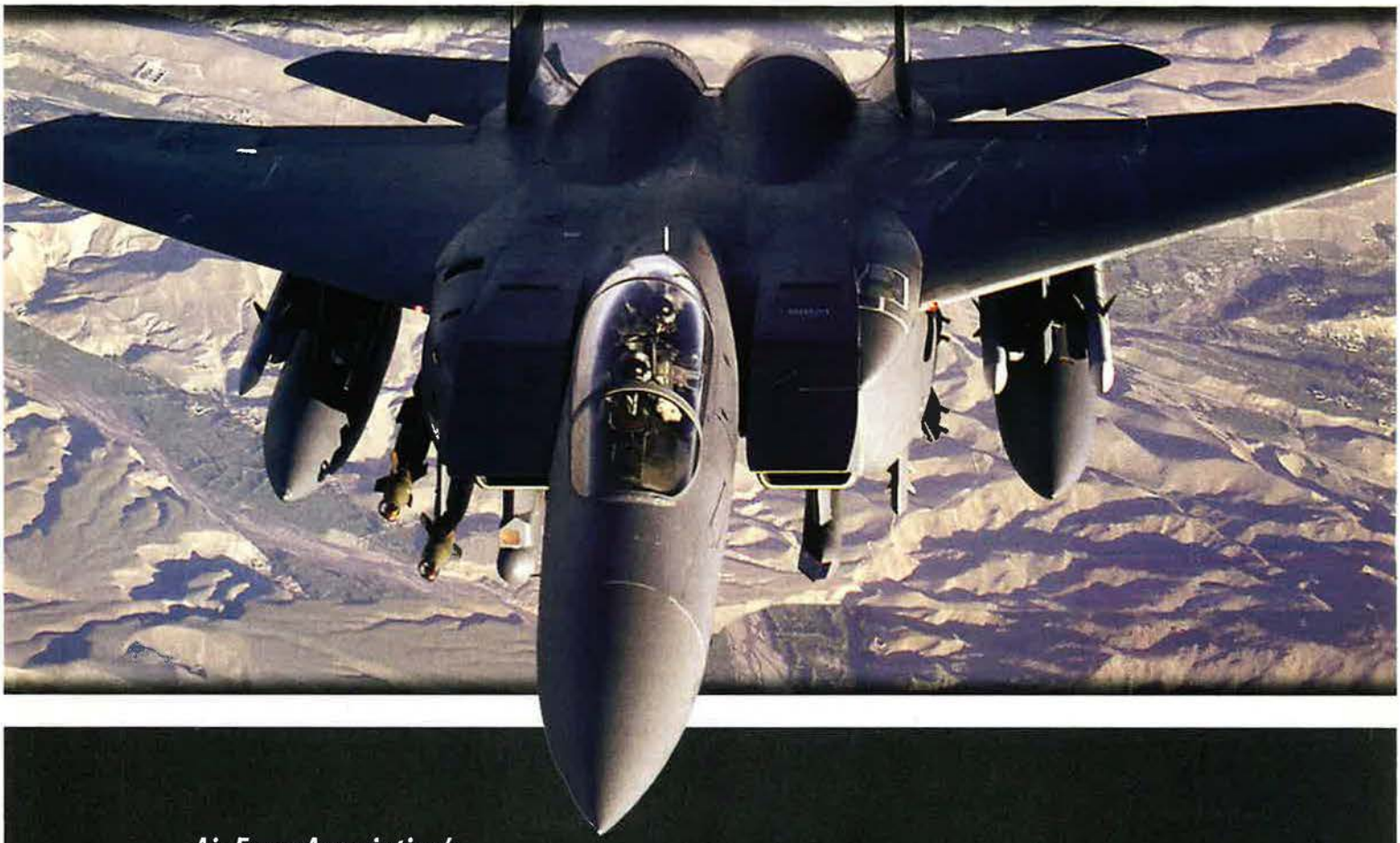

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Travail of

Once again, for the second time in four years, the Air Force's drive to bring on a new aerial refueling aircraft has hit the wall. It's now anybody's guess how long the program will be delayed, and the prospect of Congress injecting itself in the process looms large.

In June, government auditors dealt the latest blow, upholding a Boeing protest based on a claim that the service made serious errors in giving Northrop Grumman a $35 billion contract to replace aging aerial tankers. The auditors recommended that USAF take steps to correct the problems, possibly to the point of redoing the competition.

The ruling was issued by the Government Accountability Office, a Congressional watchdog agency. It came four years after a prior tanker lease agreement with Boeing fell apart under political pressure.

The issue has become even more pressing in light of Air Force plans, disclosed in June, to ground or retire all of its remaining 80 or so KC-135Es this fiscal year, which ends Sept. 30. As a result, USAF will have to endure a "shortage of aircraft" in its tanker fleet until replacements become available, an Air Mobility Command spokesman said.

Technicians who now work on the KC-135E will be shifted to the KC-135R fleet to help that tanker bear some of the extra load. As recently as February, the Air Force said it planned to keep KC-135Es active in the inventory through about 2016. USAF gave no immediate explanation for the change in plan.

The GAO, in a June 18 report, found "a number of significant errors" in the Air Force's handling of the process to choose between Boeing's KC-767 and Northrop Grumman's KC-30, a variant of the Airbus A330 airliner. The mistakes "could have affected the outcome of what was a close competition," GAO counsel Michael R. Golden said in a press release, adding, "We therefore sustained Boeing's protest." He noted that GAO denied a number of Boeing's other claims of unfair treatment in the KC-X contest.

The auditors recommended that USAF set aside the award, pay Boeing's legal costs in bringing the protest, and "reopen discussions with the offerors, obtain revised proposals, re-evaluate the revised proposals, and make a new source selection decision." They also suggested that the Air Force may have done a poor job of stating its requirements in the first place, and if so, might want to refine its needs before further discussions with the contractors.

The Air Force had 60 days, by law, to review the GAO's findings and respond. However, the Defense Department, citing the urgency of the tanker replacement, chose not to wait that long before launching a corrective plan.

Defense Secretary Robert M. Gates, at a July 9 press conference, announced that the Pentagon was accepting the GAO's findings and was taking over the tanker selection process.

"I've concluded that the contract cannot be awarded," given the problems cited by the GAO, Gates said. He announced that he was putting Pentagon acquisition, technology, and logistics chief John J. Young Jr. in charge of picking a winner in the tanker contest.

Young said he would staff an all-new source selection committee, and work on refining only those issues with which GAO found fault in the Air Force's choice. Young said he had a strong desire to "leverage" the vast amount of work done by the Air Force, and said problems identified by the GAO were "correctable."

Boeing protested shortly after the Air Force's Feb. 29 award of the KC-X contract to Northrop Grumman. Among its many complaints, stated in a 138-page brief, Boeing said the Air Force had given Northrop Grumman a pass on meeting some requirements, had misled Boeing

the Tanker

The KC-X program, though critical, just can't seem to get started.

By John A. Tirpak, Executive Editor

Left: A Northrop Grumman artist's conception of the KC-30. Above: A Boeing illustration of the KC-767. The two images are drawn to the same scale.

about the size airplane the Air Force really wanted, and had substituted its own cost numbers for Boeing's.

The GAO supported Boeing's protest in 10 areas, eight of which dealt with the evaluation of the two airplanes. The findings, distilled from GAO's 69-page report, are as follows:

Extra Credit

- The Air Force didn't follow its own criteria in measuring the capabilities of each airplane, and was vague in explaining how it would weigh their relative strengths. Boeing offered to meet more nonmandatory requirements than Northrop Grumman, but the Air Force ignored the offer.
- USAF gave credit to the KC-30 for far exceeding requirements in aerial refueling even though the rules said no additional credit would be given above a certain level, which Boeing had met. The Air Force had said this was a key discriminator between the two bids, but it shouldn't have been.
- Northrop Grumman got credit for being able to pass fuel to all USAF aircraft capable of aerial refueling, but it wasn't documented that this was so.
- The Air Force told Boeing it had met a particular requirement, but when the service changed its mind, it didn't tell the company and give it a chance to correct the shortfall. The Air Force was talking to Northrop Grumman about the same requirement at the time.
- Northrop Grumman wouldn't provide a plan for setting up organic depot maintenance for its tanker within two years of delivering the first production aircraft, as required. The Air Force treated this failing as an "administrative oversight" and didn't penalize the company as it should have.
- The Air Force's evaluation of life cycle costs was "unreasonable." The Air Force's math was off, and when it was corrected, Boeing's costs emerged as lower, by a tiny fraction of a percent. Further, USAF calculated military construction costs using a computer model not proved to be valid, and the Air Force used generic information to calculate milcon required, rather than specific costs for each airplane.
- The Air Force didn't believe Boeing's cost numbers and substituted its own. However, the service didn't prove that Boeing's numbers were unrealistic. Moreover, it was unreasonable for the Air Force to develop the costs with the computer model it used because the model was meant to weigh overall program costs and not just nonrecurring engineering costs.
- Although the Air Force argued that Boeing lost its right to complain on some points because it didn't do so during negotiations, GAO said the company was under no obligation to file "a defensive protest" in the middle of the process, and was right to wait until it was debriefed following the selection.

The auditors pointed out that they made no judgment about which company offered the better airplane in the KC-X contest, merely that the process wasn't sound, and not nearly as "open and transparent" as the Air Force strenuously insisted it was.

In structuring the KC-X contest, the Air Force said it went to great lengths to avoid any grounds for a protest. It invited other services and the GAO itself to participate in designing and evaluating the competition, hoping to inoculate itself as much as possible against missteps. At the press conference announcing Northrop Grumman as the winner of the KC-X, USAF acquisition chief Sue C. Payton told reporters the process was above reproach and "we've got it nailed." Moreover, the Air Force had strong motivation to do it right: The 47-year-old KC-135Es are in critical need of replacement, and the service wanted to prove it could manage a clean acquisition after previous fumbles on the tanker and other major programs.

Boeing illustration

A KC-767 refuels a US Navy fighter in this Boeing artist's conception.

Young, at the July Pentagon press conference, said he hoped to mobilize a new evaluation team and issue a revised request for proposals on the tanker by the end of July or early this month. He said he hoped to choose a winner by the end of the year.

However, at a House Armed Services Air and Land Forces subcommittee hearing the next day, Young said that picking a new winner by December will be tough.

"I cannot guarantee you [that] we will make that schedule," he said. "There's probably an infinite number of obstacles." He also noted that "the air is charged around this competition," and the political heat may make things even harder.

Rep. Neil Abercrombie (D-Hawaii), subcommittee chair, replied that if Young doesn't succeed by the end of the year, "then this thing is going to start all over again and it's going to take a heck of a lot longer." That's because a new Presidential Administration and a new Congress will be seated in January, and new players may act to become more involved in the program.

Young said that he believed the original, Pentagon-blessed KC-X requirement is sound, and that this will be the "foundation" of whatever tweaks are made to the request for proposals. However, he created some tension by suggesting the RFP will state a more definitive preference for a larger airplane.

The new RFP will be crafted to better reflect requirements and "make clear which of those ... we may place greater or lesser value on," Young said. He wants both teams to "understand what we value."

Although a shift to larger aircraft would seem to favor the larger KC-30 being offered by Northrop Grumman, Young also said that the Pentagon will "look at" a shift in the weighting given to life cycle costs as well. The bidders made offers predicated on lowest life cycle costs over 25 years, but Young said 40 years might be more realistic, given the very long service being asked of today's tankers. Such a move might favor Boeing, whose smaller aircraft presumably would consume less fuel in the long run.

Extremely Unusual

Even so, Boeing officials said the prospect of preference for a bigger aircraft worried them. Boeing had originally planned to bid a tanker version of its larger 777 airliner alongside the KC-767, but narrowed its bid to just the KC-767 when its analysis concluded the Air Force didn't need a bigger airplane. Company officials said they weren't sure they could make a credible offer on a KC-777 within the tight time limits Young seeks to impose on the recompetition. One company official said it remains within Boeing's rights to protest the revised RFP if the company thinks the competition has been fundamentally altered, or changed in a prejudicial way.

The Air Force, in its original analysis of alternatives, labeled both the KC-767 and KC-30 as "medium-sized" aircraft, Young pointed out.

Young told the House subcommittee that his taking over the tanker competition could create an "extremely unusual" situation should he revoke the Milestone B authority he already granted USAF to proceed on the tanker program. As chairman of the Defense Acquisition Board, he would have to rule on the correctness of an acquisition strategy he himself develops as the new source selection authority for KC-X.

The GAO's findings merely stoked the already intense political heat over the tanker contract. Congressional delegations from Washington, Illinois, and Kansas—all places where Boeing would do considerable work on the tanker—lined up to praise the GAO's findings, but some of those lawmakers suggested they would step in and take legislative action to secure the work for their constituencies.

Rep. Norman D. Dicks (D-Wash.), perhaps the most vocal of Boeing's supporters in Congress, said, "It is now up to Congress to review the matter and to make its judgment" about how best to replace the tanker fleet. He added that "we should proceed expeditiously to build the best aircraft—the Boeing KC-767—here at home." His comments were echoed by Washington's Sen. Patty Murray (D), who said, "It is Congress' job to determine whether major defense purchases meet the needs of our warfighter and deserve taxpayer funding. The Pentagon must both justify its decision [to buy the KC-30] and address the flawed process that led to [the GAO's] ruling." She complained that she and other members of Congress who have sought details as to how Northrop Grumman was chosen to build the KC-X had been "stonewalled," although the Pentagon has said it couldn't give up such information while the protest review was under way.

Murray also noted that the KC-X competition never took things into account such as the simmering trade dispute between the US and Europe over subsidies to airline companies, economic issues such as jobs in the US, "and the importance of maintaining our most critical advantage: innovation through American defense-oriented research and development."

Aerospace industry analysts indicated that Boeing's KC-X loss, if it stands, would cripple the company's efforts to market the KC-767 beyond its two foreign customers, Italy and Japan, and cede worldwide tanker business to Northrop Grumman and European Aeronautic Defense and Space Co. Boeing has also long said that without the KC-767 work, demand for the commercial version of the 767 will swiftly dry up.

Payton, in March testimony before Congress, noted that the Air Force, by law, was prohibited from considering economic impacts, trade disputes, or jobs in evaluating the KC-X bids, and that an offer from any of a dozen countries closely allied with the US, such as France, must be treated the same as if the bidder were a US company.

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A Force Remade by

Six big changes have produced a new kind of Air Force.

By Rebecca Grant

Air Force F-16CJ fighters in the Gulf, 2003.

On the morning of Aug. 2, 1990, the US Air Force was a fighting organization of 535,000 active duty airmen. Some 106,000 of these troops were assigned to foreign air bases. Their chief mission was containing Soviet power, and virtually all of USAF's attention was focused on Europe and the Far East.

Except for two tankers finishing up a training exercise in the United Arab Emirates, none of these overseas USAF forces were in the Persian Gulf region. The Air Force's B-52 bombers sat nuclear alert at Strategic Air Command bases. Only a few fighters were equipped with precision weapons. And just about the only unmanned aircraft around were target drones.

Then Saddam Hussein's Iraqi forces attacked and overran Kuwait. Within hours, the first Air Force fighters were racing to the Mideast to deter any further southward movement of the Iraqi divisions poised to threaten the Kingdom of Saudi Arabia.

No one would have guessed it at the time, but the international mission to deter Iraq and then rescue Kuwait was the beginning of the Air Force's longest war. It has been fought in the skies over southern and northern Iraq, on the streets of Baghdad, in the border hamlets of Afghanistan, and at other little-noted global battle spots. After numerous force reductions, today's Air Force comprises only about 323,000 airmen, most of whom have known little but fighting in the long war.

After 18 years, it is time to take stock. How has the Air Force adapted to this long war, and how well is it positioned for what lies ahead?

Politically, the long war is about security after the collapse of the Cold War's artificial bipolarity. Operationally, it's been an airpower war from the outset. Airpower has taken the lead in every campaign, operated virtually alone for long stretches, and at all times has provided the architecture for employment of joint forces.

The first challenge was to find a way to prevail against entrenched Iraqi forces—the Desert Storm campaign. After American ground forces left the region, the remaining coalition partners relied on two no-fly zones to contain Iraqi forces, because Saddam did not comply with UN resolutions.

Next, the United Nations and NATO nations, respectively, authorized the use of stand-alone air campaigns as the principal military tools to halt Serb-led "ethnic cleansing" actions in Bosnia in 1995 and Kosovo in 1999.

The Sept. 11, 2001 terrorist attacks in the United States sparked direct military action against Taliban-controlled Afghanistan, which had become a safe harbor for the al Qaeda terrorist organization. Washington again assembled and led a coalition to unseat the Taliban government and, on Oct. 7, 2001, launched Operation Enduring Freedom.

In March 2003, a smaller US-led coalition invaded Iraq to wipe out the perceived threat posed by Saddam to Americans and their allies. The unknowns were great in a country where Saddam had blatantly defied no-fly zones and UN weapons inspectors who had for years attempted to enforce the terms of the 1991 cease-fire agreement.

Across the Middle East, the task after major combat operations ended in early 2003 was to bring stability to regions stuffed with arms and hostility. Iraq became a battleground over civil authority and the site of a duel between al Qaeda and the US-led coalition.

Moreover, the US and NATO have in the past year stepped up their activity in Afghanistan in an effort to bolster and rebuild the country and deny any

Northrop Grumman illustration

In this illustration by an artist for Northrop Grumman, a KC-30 refuels a B-2 bomber.

Young, in his July testimony, said the GAO found the Air Force's strategy to cope with the trade dispute acceptable. That strategy was to get the bidders to agree that if they have to pay any fines, those expenses aren't chargeable to the contract.

Even so, Murray said that Congress needs "answers before handing billions of American defense dollars to a subsidized, foreign company focused on dismantling the American aerospace industry." Northrop Grumman has pointed out that EADS would receive about half the revenues from the KC-X contract, and claims that it will create 48,000 jobs in the US if it is permitted to build the airplane. In addition to a dedicated factory in Mobile for the KC-X, EADS promised to also build A330s for the US market at the Mobile facility.

Rep. Rick Larsen (D-Wash.) also voiced the buy-American viewpoint, saying, "American taxpayers should not foot the bill for a product made in clear violation of [World Trade Organization] rules."

Sen. Richard C. Shelby (R-Ala.), in whose state the KC-30 would be built, said he was bewildered by the GAO's findings.

"I cannot believe that in the most highly scrutinized procurement in the history of the United States Air Force, the GAO found so many errors. The fact that the Air Force will likely have to go back to square one on the warfighter's No. 1 priority is very disturbing."

Sen. Jeff Sessions (R), also of Alabama, pointed out that "the competition is not over," and expressed his confidence that "the merits of the Northrop Grumman-EADS tanker will be acknowledged." He said, "I firmly believe" the KC-30 "is the superior aircraft."

A somewhat darker message came from Sen. Carl Levin (D-Mich.), chairman of the Senate Armed Services Committee, who had largely withheld comment during the 100-day period of the GAO's review.

"We now need not only a new full, fair, and open competition in compliance with the GAO recommendations, but also a thorough review of—and accountability for—the process that produced such a flawed result," Levin said in a press release.

How McCain Fits In

When Northrop Grumman won the tanker contest in February, Presidential candidate Sen. John McCain (R-Ariz.) was targeted by Boeing supporters as the villain who made it possible to, in their contention, ship American jobs overseas. After the tanker lease concept was aborted, McCain insisted that Boeing not receive the tanker work as sole-source, and he pushed the Bush Administration to drop language in the original KC-X solicitation that could have penalized a foreign competitor over the airliner subsidies dispute. That allowed Northrop Grumman to bid a tanker based on the Airbus A330.

In a statement issued after the GAO's findings were released, McCain said his "paramount concern" with the program "has always been that the Air Force buy the most capable aerial refueling tankers at the most reasonable cost. Everyone agrees that this can only happen under fair and open competition." He urged a speedy review of the audit findings and implementation of them "as quickly as, and to the fullest extent, possible."

McCain's presumptive opponent for the Presidency, Sen. Barack Obama (D-Ill.), suggested he'd like to see Boeing get the work. In a press release, Obama said that since the operational stakes are so high, and given the fact that the KC-X is "the second largest military procurement contract in history," that the competition "must be reopened to ensure a fair and transparent process that fully considers the needs of America's military and our workforce." Boeing is headquartered in Illinois.

With the GAO's findings, there was rising pressure on Capitol Hill to do, as one staffer said, "the Solomonic thing" and split the tanker buy between Boeing and Northrop Grumman.

Young, however, waved off the split-buy concept, which the Air Force had discarded as being inefficient and expensive, requiring more than $4 billion in upfront development costs and to develop a second logistical support system.

While there's often "great benefit" from prototyping and running a competitive fly-off, Young said there's a fairly low level of technical risk in taking an off-the-shelf airliner and configuring it with a boom tanking system.

"We believe it is the best use of [the] taxpayer's money to pick one aircraft for the nation," Young said at the Pentagon press conference.

"We're already getting the benefit ... of a commercial marketplace that delivers something like 400 aircraft in each company last year," and the Pentagon will reap a "huge benefit from getting commercial market pricing."

He also said that splitting the buy has a "down side," in that it would "guarantee both companies" get orders for their aircraft.

Such a scheme would likely not yield the "aggressive pricing" both companies have made, and would obviate the planned future KC-Y and KC-Z competitions.

A Northrop Grumman-funded study conducted by one of Young's predecessors, former Pentagon acquisition Jacques S. Gansler, said savings could be achieved by an annual "tanker war."

Gates, at the Pentagon briefing, said that despite his decision to put Young in charge of picking a tanker winner, he still has "confidence" in the Air Force's acquisition team, given that "GAO sustained eight of slightly more than a hundred issues protested." After a winner is chosen, Young said the Air Force will be back in charge of "execution" of the program.

However, Acting Air Force Secretary Michael B. Donley said he expects USAF to "rapidly apply the lessons learned from this experience and move forward," especially since "other Air Force acquisition decisions are on the horizon." ■

At Incirlik, the aircraft come and go, binding together far-flung US forces.

The Turk Connection

By James Kitfield

One need only visit sprawling Incirlik Air Base in remote southeastern Turkey to grasp an essential truth that often seems to elude the comprehension of some officials and lawmakers in Washington, D.C.

It is this: The deep and long-standing strategic Turkish-American military partnership, so critical in the Cold War years, has grown stronger since the Sept. 11, 2001 terror attacks in the United States.

Moreover, this has proved to be the case despite periodic eruptions of political tension between the US and this secular—though still devoutly Islamic—nation, one of America's oldest NATO allies.

For a visitor, there is ample, on-the-ground evidence of vital support that Turkey, by giving the Pentagon ready access to this base, now provides the US. Incirlik is the hub of activity for supply of American forces scattered throughout the central and southwest Asian regions.

The base is a hive of USAF mobility operations, with transport and tanker aircraft taking off and landing at all hours of the day. Fully 70 percent of the air cargo bound for American forces in Iraq passes through Incirlik. The base in the past year was the departure point for more than 8,000 sorties. In addition, flights out of Incirlik transported more than 30,000 military passengers.

The air base can be found along an "arc of instability" stretching from Lebanon and Gaza in the west, to Afghanistan and Pakistan in the east. Incirlik's 10,000-foot runway is laid out within sight of the soaring minarets of a huge mosque in nearby Adana, but its significance extends far in many directions.

USAF photo by MSgt. Ron Przysucha

A USAF F-16 soars over central Turkey during Exercise Anatolian Eagle, a Red Flag-type joint exercise held twice a year.

Well to the east lies Afghanistan, with its forbidding Hindu Kush range. To the south lies Iraq, blocked off by the massive snowcapped Qandil Mountains. Airpower obviously means everything to US forces fighting in this region, isolated as they are by vast distances and hemmed in by natural barriers.

In the 1990s, Incirlik was the hub for Operation Northern Watch, the US Air Force-led enforcement of the "no-fly" zone over northern Iraq. ONW provided protection for Iraqi Kurdistan and helped to keep Saddam Hussein contained. US aircraft of Northern Watch flew more sorties over Iraq during these years than they did during the entirety of the Korean War.

Today, however, the runways and aprons of Incirlik are dominated not by fighter and attack aircraft, as in bygone years, but by C-17 transports and KC-135 tankers. According to United States Air Forces in Europe, the major command

USAF photo by A1C Nathan Lipscomb

Airmen of the 39th Security Forces Squadron go on the offensive during a joint exercise at Incirlik AB, Turkey.

that has overall administrative authority over the US forces here, the six Air Force C-17s deployed to Incirlik lift the same amount of cargo that once required a total of 10 military transports flying out of Germany. This translates into a savings of $160 million annually.

KC-135 tankers operating out of Incirlik flew more than 3,400 sorties last year, delivering roughly 35 million gallons of jet fuel to aircraft on missions in Afghanistan and Iraq. Fully 95 percent of the mine resistant ambush protected (MRAP) vehicles flown into Iraq to better protect troops from improvised explosive devices were likewise routed through Incirlik and came in on Air Force transports.

USAF photo

A USAF load team of the 728th Air Mobility Squadron places a Turkish ambulance on a C-17 Globemaster III at Incirlik AB, Turkey.

Incirlik has no permanently assigned aircraft, but C-17s, KC-135s, and other aircraft regularly rotate through the base on expeditionary assignments. Hundreds more stop over on their way to or from the Southwest Asian war zones, delivering engines, fuel, tires, and other materiel needed for the war effort.

Formerly a Cold War bulwark on NATO's exposed southern flank, Turkey has now found itself on the front line in the War on Terror. Turkey was the first nation, for instance, to allow US tanker aircraft to operate on its soil in support of Operation Enduring Freedom in Afghanistan in 2001.

On a grand strategic scale, Turkey serves as a bridge between the West and Islamic East in a time when some worry about a so-called "clash of civilizations" in the region. Turkey has preserved a democratic and secular political identity while still maintaining its historically Islamic religious, social, and cultural orientation.

Time of Testing

Ankara has both a long-standing "special" bilateral partnership with the United States and close ties to Europe through NATO. It is home to a NATO air operations center, and a forward operating base for the Alliance's E-3 AWACS aircraft. The nation also maintains close ties to nearly all nations in its region, to include Israel and Iran.

In recent years, however, the US-Turkish alliance has been tested like never before.

In part because Turkey suffered an estimated loss of $30 billion in trade as a result of sanctions on Iraq during the 1990s, and an influx of hundreds of thousands of refugees as a result of the 1991 Persian Gulf War, the United States' 2003 invasion of Iraq was deeply unpopular in Turkey.

The decision by the Turkish Parliament—despite intense American pressure—not to allow the Army's 4th Infantry Division to transit through Turkey for the 2003 invasion of Iraq badly strained relations between Ankara and Washington. Denied this northern launching point, the 4th ID instead had to route through Kuwait and arrived two weeks after the land war had started.

More recently, attacks inside Turkey by Kurdish separatists based in northern Iraq have greatly inflamed anti-American sentiment in Turkey, with many officials and politicians blaming US forces for not doing more

to reign in the Iraq-based Kurdistan Workers' Party (PKK), which is designated by Ankara and Washington as a terrorist group.

Tensions were further exacerbated late last year when US lawmakers threatened to officially label Turkish actions against the Armenians after World War I as "genocide," interceding in a deeply contentious issue with profound historical resonance in a region of long memories.

When the House Foreign Affairs Committee approved such a resolution last October, Ankara recalled its ambassador to Washington, and Turkey's top general threatened to suspend ties with the US military.

Secretary of Defense Robert M. Gates immediately weighed in, saying American lawmakers "need to take very seriously" any action that could damage the relationship between the US and Turkey. Restricted access to Incirlik or Turkish airspace could have "enormous present-day implications" for the US forces in Iraq, Gates said.

For US military commanders, those recent strains in US-Turkish relations only underscored the need to strengthen the foundation of the alliance through closer military-to-military ties.

The importance of the US-Turkish relationship is not lost on Gen. Roger A. Brady, the new commander of USAFE. Despite responsibility for a theater spanning three continents and 92 countries, Brady made one of his first trips as USAFE commander to Ankara to engage with the Chief of the Turkish Air Force and other senior members of the Turkish General Staff.

As another unmistakable sign of the strategic weight given to that military-to-military relationship, US European Command maintains an Office of Defense Cooperation (ODC) in Ankara, headed by a two-star general—rather than the customary colonel.

On top of frenetic ongoing operations out of Incirlik, the Ankara ODC coordinates a very large foreign military sales program with Turkey; facilitates robust exchanges with Turkish military officers as part of its International Military Training and Education Program; and also coordinates participation in joint exercises.

Rave Reviews

These include Turkey's Anatolian Eagle exercises, held twice a year. Anatolian Eagle, a Red Flag-style training event for large force packages, has won rave reviews from commanders in Europe who are faced with dwindling training opportunities in many other areas. American fighter squadrons routinely take part in the Anatolian Eagle exercises, which take advantage of the extensive Konya Range.

At training ranges in Germany, Air Force pilots often must deal with bad weather, limited range space, heavy air traffic, and restrictive noise limitations. Air Force officials say that the Turkish exercise allows pilots to improve their skills against mobile SAM sites, while the landscape and weather in central Anatolia is also similar to that in nearby Iraq and Afghanistan, improving the realism of the exercises.

Because the Turkish Air Force flies mostly F-16 fighters (along with some older F-4s), USAF and Turkish pilots can also compare tricks of the fighter trade.

"The Turkish Air Force almost exclusively flies F-16s, ... so we get to compare and contrast how they fly their F-16s, and how we fly ours," said Lt. Col. Matt Chesnutt, commander of the 22nd Expeditionary Fighter Squadron, in 2006.

"The level of our military-to-military engagements is of such size and scope that they probably rate among the top three such relationships we have in the world," Maj. Gen. Eric J. Rosborg, chief of the Office of Defense Cooperation in Turkey, told *Air Force* Magazine.

Despite the well-publicized tensions of recent years, Rosborg says that the day-to-day interactions between US military commanders and the Turkish General Staff have remained positive. "Turkey has not only been a good NATO partner for many years, but given its unique location and US operations in Southwest Asia writ large," Incirlik, which the US has operated from since 1954, "has become a critically important hub for us," said Rosborg. "Maintaining access to Incirlik is a key objective for EUCOM, and that's a byproduct of continuing a positive military-to-military relationship with Turkey. We work very hard at that."

Turkey is a "key ally in the [Global War on Terror], and our operations through Incirlik Air Base are vital to our efficient intermodal distribution into Iraq," said Gen. Norton A. Schwartz, the USAF Chief of Staff-designate, in testimony given to a House subcommittee earlier this year.

"This year, we delivered over 66,000 [short tons] of cargo via aircraft flying out of Incirlik, 10,000 [short tons] and 144 cargo aircraft sorties more than in 2006," noted Schwartz, who was commander of US Transportation Command when he testified.

Besides supporting operations in

USAF photo by SrA. James Seymore

A KC-135 of the 385th Air Expeditionary Group takes off from Incirlik Air Base. The tankers support Operation Iraqi Freedom and Operation Enduring Freedom.

Iraq and Afghanistan, Incirlik-based aircraft have in recent years also taken part in the relief effort following the Pakistan earthquake, and in the operation to evacuate noncombatants from Lebanon during the 2006 war between Israeli forces and Hezbollah.

The host unit at Incirlik is the 39th Air Base Wing, which oversees three ground support units and service members from 54 units and 32 bases who are currently deployed there as part of expeditionary forces. In all, roughly 2,100 US military personnel operate out of Incirlik. The wing helps operate a major overland logistics artery that supplies approximately 20 percent of the JP-8 fuel used by coalition forces inside Iraq.

US airmen work hand in hand with their Turkish counterparts on a daily basis, conducting joint operations in areas ranging from air traffic control to law enforcement.

Besides operating a critical resupply hub in the global air bridge and maintaining a large weapons storage area, the 39th ABW also hosts rotational squadron deployments for USAFE-based fighter squadrons on training assignments.

In early 2007, for instance, the 22nd Fighter Squadron "Stingers" and an aircraft maintenance unit, from Spangdahlem AB, Germany, deployed to Incirlik for training in advance of a tour of duty in Iraq.

That training provided the squadron with a chance to practice flying and maintaining in an environment quite similar to Iraq, squadron officials said, and helped pilots shift their focus from a primary mission of suppression of enemy air defenses to close air support.

That fact that Turkey not only flies predominately F-16 aircraft, but is also a major participant in the F-35 Joint Strike Fighter program, is seen by US officials as more glue that cements the military relationship.

"The Turks operate the third largest F-16 fleet in the world, and they are in the process of upgrading many of them with more advanced avionics, so they have a very capable air force," said Lt. Col. Youngkun Yu, deputy chief of USAFE's Europe and Eurasia Branch.

With more than $175 million invested in the Joint Strike Fighter program, he said, Turkey is also the largest of what are called Level 3 partners in that aircraft development program.

USAF photo by TSgt. Larry A. Simmons

SSgt. Daryl Washington, 728th Air Mobility Squadron, walks the wing of a C-17 during a preventive maintenance inspection at Incirlik Air Base.

"Because the US and Turkish air forces have common platforms, we are very interoperable, and that's extremely important," said Yu. "From a larger strategic viewpoint, that means when we fly together on exercises, or possibly going forward in the Global War on Terror, no one has to worry about establishing common tactics and techniques. We already share common procedures for things like midair refueling," he said.

Intelligence for Two

A secular democracy with a Muslim population, "Turkey is a globally accepted example of the successful integration of these two elements. It is geographically, economically, politically, and militarily critical," Army Gen. Bantz J. Craddock, Supreme Allied Commander, Europe (SACEUR), told Congress earlier this year.

"Turkey's geostrategic location, European orientation, and enduring relationship with the United States make it a bridge of stability between the Euro-Atlantic community and the nations of Central Asia and the Persian Gulf," said Craddock. "Its proximity to Iran, Iraq, Syria, and Russia ensure Turkey will continue to play a vital role in international efforts to combat the transit of foreign fighter terrorists."

Perhaps the most important military-to-military cooperation between Turkey and the United States is the least talked about. When Turkish Prime Minister Recep Tayyip Erdogan traveled to Washington last November and met with President Bush, he reportedly warned that unless the United States was willing to take a more active role in helping Ankara combat PKK terrorists, Turkey was prepared to launch an all-out invasion of Kurdish northern Iraq.

Shortly after, Bush publicly promised to increase intelligence sharing with Turkey. Reports had already been surfacing of Air Force U-2 surveillance airplanes taking off from Incirlik and transiting into northern Iraq. The US Army was also reported to have provided Turkey with satellite surveillance related to the PKK. Those reports were followed by attacks against suspected PKK strongholds in northern Iraq by Turkish aircraft and artillery.

"When we talk with the Turkish General Staff, the issue of dealing with the PKK problem is usually chief among their concerns," said Rosborg. "So the meeting between President Bush and Prime Minister Erdogan and their agreement to share intelligence on the PKK [has] taken a lot of the angst out of the US-Turkish relationship that we saw last year."

The relationship between the US and Turkey seemed to be on the rocks in recent years, but "we're in a much better place now," said Rosborg. ■

James Kitfield is the defense correspondent for National Journal *in Washington, D.C. His most recent article for* Air Force *Magazine, "On African Ground," appeared in the February issue.*

How the Luftwaffe the Battle of Britain

British courage and capability might not have been enough to win; German mistakes were also key.

By John T. Correll

In July 1940, the situation looked dire for Great Britain. It had taken Germany less than two months to invade and conquer most of Western Europe. The fast-moving German Army, supported by panzers and Stuka dive bombers, overwhelmed the Netherlands and Belgium in a matter of days. France, which had 114 divisions and outnumbered Germany in tanks and artillery, held out a little longer but surrendered on June 22. Britain was fortunate to have extracted its retreating expeditionary forces from the beaches at Dunkirk.

Britain itself was next. The first objective for the Germans was to establish air superiority as a precondition for invasion. The Luftwaffe estimated haughtily that it would be able to defeat the Royal Air Force's Fighter Command in southern England in four days and destroy the rest of the RAF in four weeks.

Winston Churchill, who on May 10 had succeeded Neville Chamberlain as Prime Minister, was resolute. In a ringing speech to Parliament, he declared, "We shall fight on the beaches, we shall fight on the landing grounds, we shall fight in the fields and in the streets, we shall fight in the hills; we shall never surrender."

Not everyone agreed with Churchill. Appeasement and defeatism were rife in the British Foreign Office. The Foreign Secretary, Lord Halifax, believed that Britain had lost already. To Churchill's fury, the undersecretary of state for foreign affairs, Richard A. "Rab" Butler, told Swedish diplomats in London that "no opportunity would be neglected for concluding a compromise peace" if it could be had "on reasonable conditions."

Joseph P. Kennedy, US ambassador to Britain, informed the State Department July 31 that the German Luftwaffe had the power to put the RAF "out of commission." In a press statement, Sen. Key Pittman (D-Nev.), chairman of the Senate Foreign Relations Committee, declared, "It is no secret that Great Britain is totally unprepared for defense and that nothing the United States has to give can do more than delay the result." Gen. Maxime Weygand, commander in chief of French military forces until France's surrender, predicted, "In three weeks, England will have her neck wrung like a chicken."

Thus it was that the events of July 10 through Oct. 31—known to history as the Battle of Britain—came as a surprise to the prophets of doom. Britain won. The RAF proved to be a better combat force than the Luftwaffe in almost every respect. The decisive factors were British capability and determination, but German mistakes, before and during the battle, contributed significantly to the outcome.

German rearmament was forbidden by the Treaty of Versailles at the end of World War I, but aircraft development continued under the guise of civil aviation. When Hitler came to power in 1933, he pursued militarization openly. The Luftwaffe, formally established as a separate branch of service in 1935, was soon the largest air force in Europe and, in the opinion of many, the best.

Lost

German pilots honed their skills in the Spanish Civil War. Between 1936 and 1939, they were rotated as "volunteers" through the Condor Legion, supporting Francisco Franco and the Nationalists. They perfected techniques, tested their airplanes—including the Ju 87 Stuka dive bomber and the Bf 109 fighter—and gained experience.

America's most famous aviator, Charles A. Lindbergh, toured German bases and factories in September 1938. "Germany now has the means of destroying London, Paris, and Prague if she wishes to do so," Lindbergh wrote in a report to Kennedy in London. "England and France together have not enough modern war planes for effective defense or counterattack."

The Luftwaffe's fearsome reputation was enhanced by the pushover German victories in Poland, the Netherlands, Belgium, and France. In July 1940, it was about twice the size of the RAF, but the critical measure was not gross numbers. Essentially, the Battle of Britain pitted the first-line fighters of RAF Fighter Command against the fighters, bombers, and dive bombers of two German air fleets. In that matchup, the German advantage was significantly greater.

Air Chief Marshal Hugh Dowding, commander of Fighter Command, said, "Our young men will have to shoot down their young men at the rate of five to one."

The Luftwaffe was not as invincible as it looked. One of its fundamental weaknesses was unstable leadership. The commander in chief was Reichsmarschall Hermann W. Goering, a World War I ace and the successor, in 1918, to Manfred von Richthofen in command of Jagdgeschwader 1, the Flying Circus. He had become a fat, blustering caricature of himself. He had not kept up with changes in airpower and had little knowledge of strategy. Goering was prone to impulsive and erratic decisions. When Hitler intervened in the decision-making, which he did regularly, the results were even worse.

However, the Luftwaffe's immediate problem in 1940 was that the subjugation of Britain was not the kind of mission it was prepared to perform. Its strength was Blitzkrieg, the short, fast "lightning war" in which the German Army, supported by Stuka air strikes, swept through Poland in 1939 and Western Europe in 1940. In both the Blitzkrieg and the war in Spain, the Luftwaffe's forte was close air support of ground forces.

The officer corps was infatuated with the dive bomber. It had worked well for the Condor Legion in Spain, where pilots had difficulty hitting targets from high altitude. The dive bomber was accurate in putting bombs directly on compact targets, which predominated in Spain.

The foremost advocate of the dive bomber was Ernst Udet, another flamboyant flying ace from World War I. His friend Goering appointed him to be technical chief of the Luftwaffe, a position for which he was utterly unsuited. Udet insisted that every bomber have a dive bombing capability, which added weight and subtracted speed from numerous aircraft in development.

The Luftwaffe's signature dive bomber was the Ju 87 Stuka, instantly recognizable with its inverted gull wings, sturdy fixed undercarriage, and wheel spats. It was enormously successful as a terror weapon in the Blitzkrieg. A wind-powered siren, used in diving attacks, contributed to the psychological effect.

Germany had no long-range bombers and would not field its first strategic bomber, the Heinkel 177, until 1944. What it had in 1940 was an assortment of twin-engine medium bombers, notably the slow-moving He 111 and Do 17. They had been adequate to supplement the Stuka on the continent, but they were out of their league in the Battle of Britain. The best of the German medium bombers was the Ju 88, which had better range and speed,

Opposite: Pilots from the RAF's 601st Squadron scramble to their Hurricanes in August 1940. Left: A World War II era British propaganda poster shows a group of Spitfires shooting down German Heinkel 177s.

Critical Matchup, July 1940

RAF		Luftwaffe	
754	single seat fighters	1,107	single seat fighters
149	two seat fighters	357	two seat fighters
560	bombers	1,380	bombers
0	dive bombers	428	dive bombers
500	coastal	233	coastal
N/A	reconnaissance	569	reconnaissance
1,963	Total	4,074	Total

Aircraft numbers attributed to the two sides vary and changed constantly in 1940 because of losses and replacements. Counts also differ in how many aircraft were judged to be in service.

but it was just coming into production at that time.

The Luftwaffe also had the Bf 110, nominally a twin-engine fighter. It had good speed and range, but it was not agile enough to take on RAF fighters. Germany might have done well to use it instead as a fighter-bomber—which it did later in the war—but it was rarely employed in that role in 1940.

Germany's best airplane, and arguably the best airplane on either side, was Willy Messerschmitt's masterpiece, the Bf 109 fighter. It packed a powerful engine into a small, sleek airframe and was the world's most advanced fighter when it first flew in 1935. It went on to score more victories than any other aircraft in World War II. Its problem in 1940 was limited range. Flying from bases in France, it had only about 10 minutes of fighting time over London. It could not escort the bombers on deep penetration missions in Britain.

For the first time, the Luftwaffe faced a first-class opponent. The RAF had been established in 1918 as a separate military service and was reorganized in 1936 into Bomber, Fighter, Coastal, and Training Commands.

Two superb fighters would bear the brunt of the coming battle. The Hawker Hurricane was regarded as Fighter Command's "workhorse." It was teamed with a "thoroughbred," the Supermarine Spitfire. In July 1940, the RAF had 29 squadrons of Hurricanes and 19 squadrons of Spitfires.

The Spitfire was one of the greatest fighters of all time. It had been introduced in 1936 but was still around to shoot down a German jet aircraft Me 262 in 1944. It became the symbol of the Battle of Britain. The Hurricane was larger and slower, but like the Spitfire, it could turn inside the Bf 109. Bf 109 pilots, if they could, attacked from altitude, which gave them an advantage.

The RAF had several force multipliers, the most important of which was radar. The official British term for it was "RDF," for radio direction finding, before a changeover in 1943 to match the American usage of "radar." Britain had no monopoly. The German Navy made limited use of radar. However, the incompetent Udet had rejected radar for the Luftwaffe in 1938 because it did not fit with his notions of air combat.

What the RAF Knew

Dowding was an early champion of radar. Britain had a chain of 29 RDF stations along its southern and eastern coastlines. The radar was effective for more than 100 miles out. Once Luftwaffe formations crossed England's coastline, the Royal Observer Corps began tracking them. The RAF knew when and where to respond, and could delay scrambling its fighters until the last moment.

Unbeknownst to Berlin, Britain had cracked the high-level German "Enigma" code. The intelligence product derived from these intercepts was called "Ultra." It provided useful information about the Luftwaffe's overall moves, but it did not add greatly to the day-to-day intelligence from other sources.

Yet another RAF force multiplier was high-octane fuel. When the war began, both the Luftwaffe and the RAF were using 87 octane aviation fuel. Beginning in May 1940, the RAF obtained 100 octane fuel from the United States and used it throughout the battle. It boosted the performance of the Merlin engines in the Hurricanes and Spitfires from 1,000 to about 1,300 horsepower.

Dowding—known as "Stuffy"—had been commander of Fighter Command since its founding in 1936. He was the oldest of the RAF senior commanders—intensely private, eccentric and obstinate, but a leader of exceptional ability. It was on his authority that the first British radar experiments with aircraft had been carried out. Dowding was unbending and thus not favored by the politicians in the Air Ministry.

Fighter Command, headquartered at Bentley Priory in the London suburbs, was organized to fight in four groups. The largest was 11 Group, covering southeastern England and the approaches to London. Its commander was Air Vice Marshal Keith R. Park, an excellent officer but,

German officers gaze across the English Channel at the white cliffs of Dover.

Photo courtesy National Archives

A civilian aircraft "spotter" scans the skies around St. Paul's Cathedral in London, searching for incoming German airplanes.

like Dowding, not attuned and responsive to the politicians.

To the immediate north was the area of 12 Group, covering the Midlands and East Anglia and commanded by Air Vice Marshal Trafford Leigh-Mallory. The other two groups had lesser roles—southwestern England was covered by 10 Group, and northern England and Scotland by 13 Group.

Germany would employ two main air fleets. Luftflotte 2, with headquarters in Brussels, was commanded by Field Marshal Albert Kesselring. Its Bf 109 fighters were concentrated in Pas de Calais, across from Dover at the narrowest point of the English Channel. Luftflotte 2 also had bombers and fighters elsewhere in northern France and Belgium. Luftflotte 3, commanded by Field Marshal Hugo Sperrle from his headquarters in Paris, flew from bases in Normandy and Brittany.

Goering and his staff consistently underestimated the RAF. In early August 1940, Goering insisted that the British had no more than 400 to 500 fighters. In fact, Fighter Command on Aug. 9 had 715 ready to go and another 424 in storage, available for use within a day.

When France fell, Hitler ordered a strategic pause, believing the British would accept a dictated peace on his terms. The Luftwaffe mounted sporadic bomb raids on southern England and shipping in the Channel. However, in the official reckoning, the Battle of Britain began July 10 with a fighter engagement over the channel; the Luftwaffe lost 13 aircraft and the RAF 10.

On July 16, Hitler ordered preparations started for Operation Sea Lion, an invasion of Britain. The German Navy said Sept. 15 was the earliest possible date it could be ready. On Aug. 1, Hitler ordered the Luftwaffe to "overpower the English Air Force," which stood in the way of the invasion.

Goering assured Hitler, "The RAF will be destroyed in time for Operation Sea Lion to be launched by Sept. 15." At first, the Luftwaffe regarded the entire RAF as the target and scattered its efforts for weeks before focusing on Fighter Command.

Finally recognizing the value of the radar sites, the Luftwaffe tried to destroy them, but did so by aiming bombs at the radar towers, which were easy to replace and almost impossible to hit. The radar site buildings where the trained operators worked would have been easier targets but were seldom attacked. In yet another mistake, Goering told the Luftwaffe to ignore the radar sites and strike at other targets.

Faithless Kennedy

The RAF lost 58 airplanes in July, but the full fury of the battle was yet to come. With great fanfare, Goering declared Aug. 13 to be Adler Tag (Eagle Day), on which he launched 1,485 sorties against Britain. "Within a short period you will wipe the British air force from the sky. Heil Hitler," he said in a message to the air fleets.

Among those impressed by the German claims was Kennedy, who wired President Roosevelt, "England will go down fighting. Unfortunately, I am one who does not believe that it is going to do the slightest bit of good."

On Aug. 15, Goering ordered a maximum effort from his air fleets. They flew more than 2,000 sorties that day, the most of any day during the Battle of Britain. The German high command claimed 99 RAF fighters destroyed in the air. In actuality, the RAF lost 34 fighters while shooting down 75 German airplanes. The fighting on Aug. 19 was only slightly less intense.

RAF Bomber Command regularly attacked targets on the Continent, flying 9,180 sorties between July and October. This had the effect of freezing some German fighters in place for air base defense, limiting the number that could be committed to the attack on Britain.

Bad weather caused a lull in the fighting Aug. 19 to 23. It was a much-needed respite for both sides. When the battle resumed Aug. 24, the Luftwaffe changed tactics and concentrated its force on 11 Group airfields.

What the Germans really wanted was to lure the RAF fighters up for air battles, which the Bf 109 pilots believed they would win. Park and Dowding, however, refused to respond to Luftwaffe fighter sweeps. They went after the German bombers instead.

The Stuka had made its reputation in the Blitzkrieg under conditions of German air supremacy. It was far less fearsome with Spitfires and Hurricanes on its tail. The Stuka's top speed was 230 mph (compared to more than 350 for the Spitfire), and it was even slower and more vulnerable when diving to deliver bombs.

"Due to the speed-reducing effect of

Aircraft Losses: Churchill's Count

	British fighters lost	Enemy aircraft destroyed
July (from July 10)	58	164
August	360	662
September	361	582
October	136	325
Total	**915**	**1,733**

Accounts of aircraft losses in the Battle of Britain vary. This one was compiled by Winston Churchill and published in his book* Their Finest Hour. *Of the RAF fighter losses, about 770 were Hurricanes and Spitfires, and of the German losses, about 50 were Bf 109s.

the externally suspended bomb load, she only reached 150 mph when diving," said German ace Adolf Galland, who was no admirer of the Stuka. The RAF laid such punishment on the Stuka that Goering on Aug. 19 withdrew it "until the enemy fighter force has been broken."

The attacks continued relentlessly. On average, the Luftwaffe sent 1,000 airplanes a day, and seldom fewer than 600. On Aug. 30 to 31, more than 1,600 came. The worst day for Fighter Command was Aug. 31 when it lost 39 aircraft and 14 pilots. Most days the Luftwaffe's losses were even heavier than the RAF's, but the production of Hurricanes and Spitfires was no longer keeping up with losses, and there were not enough replacements for the experienced pilots who had been killed.

Some pilots scrambled six times a day. Civilian teams from Hawker and Supermarine joined RAF ground crews, working to get damaged Hurricanes and Spitfires ready to fly again.

The British people look back on this part of the battle as "the desperate days." Looking back later, Churchill said, "In the fighting between Aug. 24 and Sept. 6, the scales had tilted against Fighter Command."

Just as things were looking grim, Hitler made a critical mistake. He changed Luftwaffe targeting. In August, two German pilots who had flown off course on a night mission dropped their bombs on London. The RAF bombed the Berlin suburbs in reprisal. Germans were shocked and outraged, having been assured by Hitler and Goering that their capital was safe from British bombers. An enraged Hitler on Sept. 5 ordered a change in basic strategy, shifting the Luftwaffe's focus of attack from British airfields to the city of London.

That took the pressure off Fighter Command at a critical time. RAF fighter losses fell below the output of replacements. In diverting the offensive from the RAF, the Germans had lost sight of the valid assumption with which they had begun: The key objective was destruction of the RAF. Otherwise, the Sea Lion invasion would not be possible.

The Luftwaffe had one massive shot left. On Sept. 15, Germany threw about 400 bombers and 700 fighters into an all-out attack on Britain. In the middle of the afternoon, Park committed the last of his reserves. Every airplane that 11 Group could put in the air was engaged.

It was enough. RAF pilots shot down 56 Luftwaffe aircraft, and many others limped back to their bases in France with major damage or went down in the Channel. The RAF lost 28. Never again would the Luftwaffe come against Fighter Command in such strength.

Today, the nation celebrates Sept. 15 as "Battle of Britain Day."

Rescue workers search frantically for victims amid the wreckage of a London street during the Blitz, which began as the Battle of Britain came to an end.

Losses All Around

Both sides gradually came to the realization that the Luftwaffe's attempt to destroy the RAF had failed. On Sept. 17, Hitler postponed Operation Sea Lion until further notice. This was no doubt a great relief to the German Navy, which was not prepared to carry out an invasion. On Oct. 31, the British Defense Committee agreed that the danger of invasion had become "relatively remote."

That date is commemorated as the end of the Battle of Britain.

However, it was not yet clear to all that the Luftwaffe had failed. The Nov. 10 *Boston Sunday Globe* published its version of an interview with Kennedy, quoting him as having declared, "Democracy is finished in England." Kennedy denied having said it, but the reporter, Louis Lyons, had a witness to back him up. Kennedy was finished as ambassador and as a player in the Roosevelt Administration. He submitted his resignation that month.

Both sides had taken heavy losses, although claims during the battle of enemy aircraft shot down were later shown to be excessive. In all, the RAF lost 1,547 airplanes—1,023 from Fighter Command, 376 from Bomber Command, and 148 from Coastal Command. German losses were even higher—a total of 1,887, of which 650 were Bf 109s and 223 were Bf 110s.

More than half of the German aircraft destroyed were shot down by Hurricanes. Whenever possible, the RAF had sent Spitfires to fight the Bf 109s and used Hurricanes against German bombers—but the Hurricanes had downed their share of fighters, too.

At the end of the Battle of Britain, Fighter Command had slightly more airplanes than it did at the start. Surging British industry produced replacements at an encouraging rate. Fighter Command also had more pilots than in July, but had taken terrible losses in its most experienced airmen. The German aircraft industry was unable to surge its production, and between August and December 1940, Luftwaffe fighter strength fell by 30 percent and bomber strength by 25 percent.

Later, in a speech to the Canadian Parliament, Churchill recalled Weygand's prediction from June 1940 that England would "have her neck wrung like a chicken" in three weeks. "Some chicken," Churchill said. "Some neck."

The Battle of Britain was over, but the sustained bombing of British cities—"the Blitz"—was just beginning. Hitler's motives for the Blitz are not clear. It killed more than 40,000 civilians and destroyed a vast number of buildings, to no strategic purpose.

Meanwhile, Berlin turned to a new objective. Hitler in December ordered his forces to prepare for Operation Barbarossa, the invasion and destruction of Russia. Goering was once again optimistic. The Luftwaffe, he promised, would shoot down the Red Air Force "like clay pigeons." The rest is history. ■

John T. Correll was editor in chief of Air Force *Magazine for 18 years and is now a contributing editor. His most recent article, "Billy Mitchell and the Battleships," appeared in the June issue.*

Verbatim

By John T. Correll, Contributing Editor

The Strategic Imbalance

"The imbalance between our readiness for future global missions and the wars we are fighting today limits our capacity to respond to future contingencies and offers potential adversaries, both state and non-state, incentives to act. We must not allow the challenges of today to keep us from being prepared for the realities of tomorrow."—***Adm. Michael G. Mullen, Chairman of the Joint Chiefs of Staff, Senate Appropriations defense subcommittee, May 20.***

On Watch for Watchers

"Yesterday, while voting on the war supplemental spending bill in the House of Representatives, I couldn't help but notice a contingent of approximately 20 flag rank Army officers sitting ... watching the debate and vote for a couple of hours. ... At a time when our nation is at war, our troops are overextended, and the Administration is literally asking for emergency military spending, what good to the 'war on terror' is having US generals and other top ranked officers—who were likely accompanied by staff and escorted by their chauffeurs—spending hours sitting in the gallery of the House of Representatives?"—***Rep. Pete Stark (D-Calif.) in an irate letter to Secretary of Defense Robert M. Gates May 16 about observers who turned out to be a class from the Army War College.***

The Changing Force

"And you'll see the impact of these changes in your own Air Force careers. Instead of serving at 10,000 feet, some of you will serve on the ground as battlefield airmen—deploying behind enemy lines and using laser technology to fix targets for aviators circling above. Instead of sitting in jet fighter cockpits, some of you will sit before computer consoles ... here in the United States, where you'll guide Predator UAVs half a world away and use them to strike terrorist hideouts. These and other changes will increase your ability to prevail in asymmetric warfare. They will make you more effective in the defense of freedom."—***President Bush, Air Force Academy commencement, May 28.***

The Long Decline

"The Air Force has been in a long, gradual decline since the Cold War ended. First, the nuclear deterrence mission disappeared. Then it was unable to modernize its air fleet. And finally it couldn't connect with the Bush Administration's vision of military transformation."—***Loren B. Thompson, Lexington Institute,*** **New York Times,** ***June 10.***

Carter's Count

"The US has more than 12,000 nuclear weapons, the Soviet Union has about the same, Great Britain and France have several hundred, and Israel has 150 or more."—***Former President Jimmy Carter, in the first-ever public acknowledgment by any US President of Israeli nuclear weapons, Reuters, May 27.***

Al Qaeda's Setbacks

"On balance, we are doing pretty well. Near strategic defeat of al Qaeda in Iraq. Near strategic defeat for al Qaeda in Saudi Arabia. Significant setbacks for al Qaeda globally—and here I'm going to use the word 'ideologically,' as a lot of the Islamic world pushes back on their form of Islam."—***CIA Director Michael V. Hayden,*** **Washington Post,** ***May 30.***

Endgame in Sight

"We are now seeing what the endgame in Iraq looks like—with our forces drawing down over time, in a series of very complex battlefield rearrangements that slowly cede more responsibility for day-to-day security operations to the Iraqis."—***Gates,*** **Wall Street Journal,** ***May 21.***

Ground Force Buildup

"Regardless of the number of troops in Iraq and Afghanistan, we will need a total active land force of something like one million soldiers and marines. ... Those who believe that the need for such a force size will abate as troops are drawn down in Iraq should consider the larger pattern of American operations over the past generation. Since its creation in 1983, the US Central Command, which is responsible for operations in East Africa, the Middle East, and Central Asia has demanded an ever-increasing American presence, a presence which has changed from being largely air and maritime to boots on the ground."—***Thomas Donnelly and Frederick W. Kagan, authors of*** **Ground Truth: The Future of US Land Power** ***(AEI Press),*** **Wall Street Journal,** ***May 23.***

The Credibility of Deterrence

"Any senior official who diminishes in any way the perception that the US might use nuclear weapons, effectively denuclearizes us. It amounts to unilateral arms control by fiat."—***Air Force Col. Tom Ehrhard (Ret.), nuclear strategist and former ICBM launch control officer,*** **National Journal,** ***May 24.***

Time to Reconsider

"Certainly there are a very large number of gay and lesbian men and women serving honorably in our military today. And they're doing it within the existing law. I'm not advocating anything—except I'm saying the policy was the right policy for the right time, and times change. It's appropriate to take another look."—***Former Sen. Sam Nunn, a key leader in adoption of the "Don't Ask, Don't Tell" policy in 1993,*** **Atlanta Journal-Constitution,** ***June 3.***

Innocence in Cyberspace

"If the US is defending itself against an attack that originates from a computer which was co-opted by an attacker, then there are real questions about whether the owner of that computer is truly innocent. At the least, the owner may be culpably negligent, and that does not, in fairness or law, prevent America from defending itself if the harm is sufficiently grave."—***Col. Charles W. Williamson III, Air Force staff judge advocate,*** **Armed Forces Journal,** ***May.***

Bigger Bullets

"If you hit a guy in the right spot, it doesn't matter what you shoot him with."—***Maj. Thomas Henthorn, chief of small-arms division at Army infantry school at Ft. Benning, Ga., on proposals for larger caliber bullets for M-4 and M-16 rifles, Associated Press, May 27.***

Daring work over the Atlantic brought this tanker crew the 1986 Mackay Trophy.

White Knuckles To the Azores

By Braxton Eisel

Of all the Air Force's capabilities, air refueling is the one most regularly taken for granted. Everyone simply assumes the tanker will be there when needed. During one long day more than two decades ago, that assumption was put to the acid test.

It was on this March 1986 flight that the crews of two Air Force KC-10 refuelers and eight Marine Corps A-4 Skyhawk fighters nearly made unplanned landings in the Atlantic Ocean. It was a day on which the fuel nearly ran out. For its extraordinary work to keep that from happening, the crew of one KC-10 received the Mackay Trophy, for the year's most meritorious military flight.

It began as a routine fighter drag—with the Air Force's then-new Extenders providing the navigation and fuel for fighters to cross from the US East Coast to Lajes Field, Portugal, on the Azores. The mission had even started on a lighthearted note from the weather briefer, who chirped, "Hope you guys brought your golf clubs."

Good weather or its alternative, extra gas, was key to getting to the Azores. It is one of only a few spots in the world in which arriving aircraft have no ready "divert" alternate; the nearest land is more than 1,000 miles away. If the weather forecast is bad, one simply waits for another day.

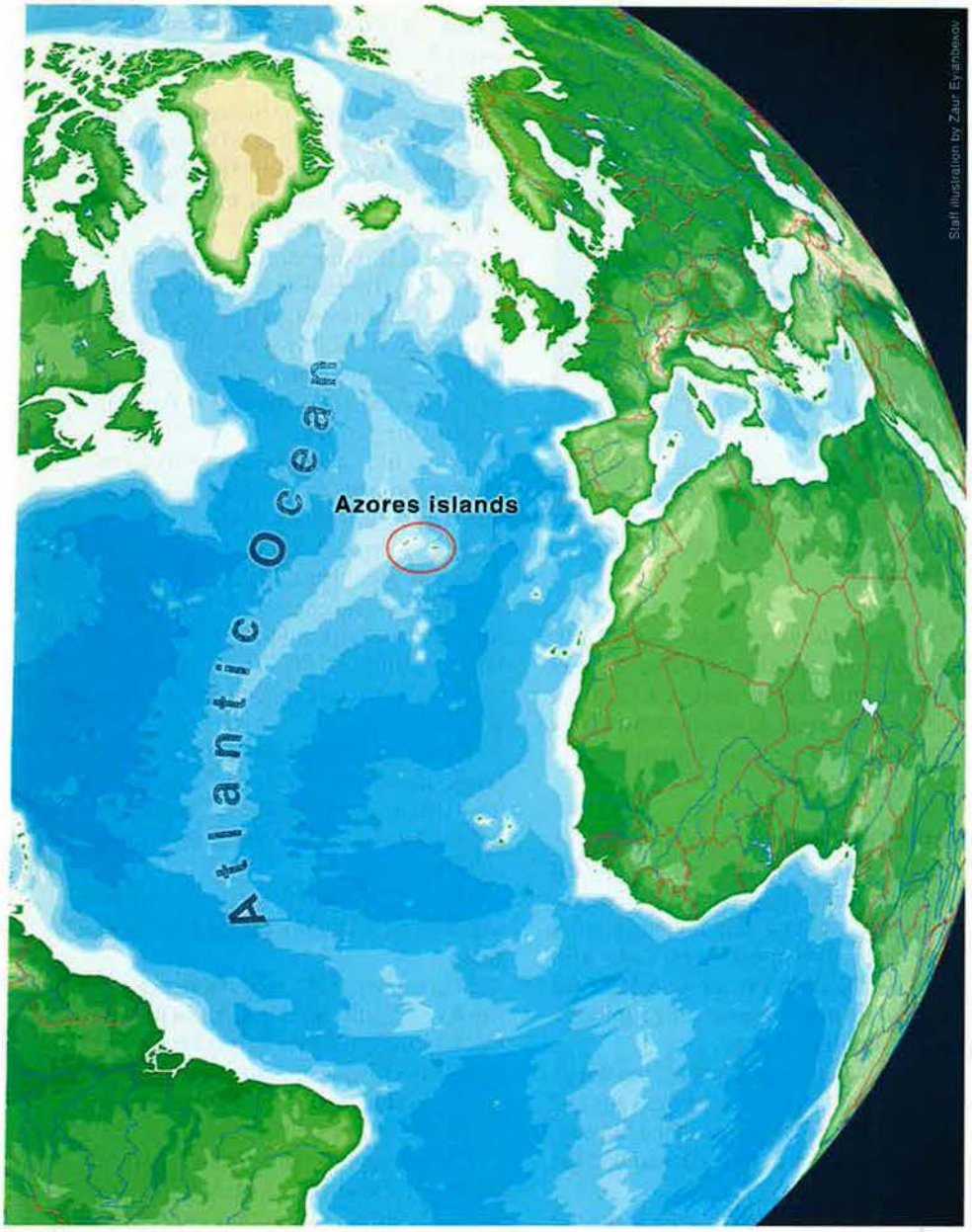
Photo courtesy Marc Felman

Gen. John Chain (middle), then commander in chief of SAC, congratulated the crew of Gold 11 for winning the 1986 Mackay Trophy.

Mission planners had gassed up the tankers with what was assumed to be more than enough fuel to get the fighters to Lajes and allow for contingencies, but the KC-10s were not flying with full tanks since it costs gas to carry gas.

Launching from Pease AFB, N.H., Capt. Marc D. Felman's KC-10 Gold 11 was to rendezvous with five A-4s (call signs Retro 61 through Retro 65) from MCAS Cherry Point, N.C. The marines would join up with the tanker over Nantucket and off everyone would go.

This same scenario was to occur for Gold 12 and its five Skyhawks, Retros



The Azores, an island chain in the Atlantic Ocean, are more than 1,000 miles away from the nearest land.

71 to 75, then again with Gold 13 and the five final A-4s, Retros 81 to 85.

Upon reaching the join-up point, Gold 11 found his set of fighters had maintenance issues back at Cherry Point. The tanker had to hold.

After more than an hour, the first set of fighters canceled and Gold 11 was ordered to take the second set of fighters, Retro 71 to 75. Gold 12 would follow with six fighters, now numbered as Retro 81 to 86, an hour or so later. The third tanker was no longer needed.

Shortly thereafter, the A-4s arrived and each fighter in turn stuck its refueling probe into the drogue Gold 11 trailed to verify the fighters could actually take gas before setting across the ocean. If the refueling system malfunctioned, it was far better to discover that fact near land.

Proving the point, the flight lead's wing tanks would not accept gas. Retro 71 had no choice but to abort his mission and return home, taking his wingman, Retro 72, with him for insurance. Retros 73 to 75 got fuel just fine.

Without Training Wheels

The giant tanker and its three "chicks" then headed across the Atlantic.

During most of the flight, all went well. Felman, the aircraft commander and pilot, was on nearly his first KC-10 mission without "training wheels"—either an instructor or evaluator over his shoulder. He had more than 2,500 hours as a tanker pilot, but most of those hours were in the venerable KC-135.

The marine aviators, wedged into the tiny cockpits of the A-4s, were in for a long day no matter what. Besides being crammed atop an unyielding ejection seat, their immersion-protection "poopy suits" were like wearing a thick body condom for hours on end.

Due to the real chance that nature could call, most of the A-4 drivers were probably also slightly dehydrated. It is no fun having to work one's "equipment" through layers of clothing, poopy suit, parachute harness, etc., to then try to perform near-Olympic caliber gymnastics to answer a call of nature. Many fighter pilots instead choose to forgo fluids in the hours before a long flight to avoid just such an uncomfortable scenario. Better to rehydrate after the aircraft is safely on the ground.

Passing the go-no go point—the spot on the flight where the aircraft had enough fuel to make it back to the US, the abort base in Greenland, or continue to Lajes—the flight continued. The updated weather forecast was still calling for Lajes to be in the clear.

Each A-4 regularly cycled through the refueling station, taking gas after performing the aerial ballet needed to plug the refueling probe jutting out to the right of the jet aircraft's nose into the 18-inch diameter drogue of the tanker. Driving the aircraft into the precontact position, about 15 feet aft of the drogue, the A-4 pilot crept forward with about two to three knots of overtake. He then concentrated on the drogue and drove the probe in with a solid, but not too aggressive, click.

Boom operator MSgt. Patrick S. Kennedy pumped the fighter full and directed the sequence for the next receiver.

About an hour from Lajes, the tranquil day ended. An unexpected warm weather front blew in, dropping Lajes to zero visibility in heavy fog. This was bad news, especially for the A-4s, which didn't carry any high-tech navigation gear to get them down through a thick soup.

Arriving overhead Lajes, the tower informed Felman that a commercial 707 had just gone around due to not being able to see the runway.

The A-4s made an approach and hoped for the best. Retro 73 spotted the runway through a pinhole in the clouds and safely made it down. The next two Skyhawks weren't so fortunate on their attempts, so they rejoined the tanker on top of the fog.

USAF photo

A KC-10 like Gold 11 prepares to take gas from the boom of another KC-10. This "give and pass" capability is unique in the tanker world.

For Gold 11, this should have been merely inconvenient. A tanker was normally kept on alert in Spain for just such a contingency. A quick call would launch that tanker to take over feeding the fighters, and Gold 11's crew would divert to Rota, Spain.

Except, on this unfortunate day, there was no alert tanker. Now Felman was in a bind; with the delay waiting for the fighters at the start of the mission, he only had enough fuel to get his tanker to Rota. If he refueled the fighters, then neither he nor they would have enough gas to make it there.

But if he didn't refuel the A-4s, they would go swimming pretty quickly.

He chose for everyone to keep flying while the crews explored other options.

"I decided to get up high and try to make Rota anyway," Felman said. "With the fighters flying formation on us, we climbed to [31,000 feet] with the intention of getting as close to Spain as we could. I told the Retros to keep cycling through and we'd give them 1,000 pounds each time until we all were out of gas, and then [we would] do the best we could.

"With some luck," he said, the flight might have "a shot of at least getting out over the coast instead of the water."

An officer at Santa Maria Airport, about 200 miles southeast of Lajes on another Azores island, called to say the flight might make it there, but the weather was quickly deteriorating. Mission control diverted the aircraft to the alternate field.

Scrambling for the approach plates to Santa Maria, Felman saw it had a 7,000-foot runway. That was plenty long enough for the A-4s, but it was the minimum for getting a KC-10 in and out. The only navigation aid was a nondirectional beacon, something the A-4s lacked.

Some Got Down

Since the A-4s had no radar and nothing more than a TACAN nav system, he asked the marines what their approach speed was and "told them to fly tight on me and I'd take them down until they saw the runway," relates Felman today.

The Skyhawks perched off the wingtips of the KC-10 until "at the very last second, we saw a glimpse of the runway, poured the coals to the -10, and had the A-4s land."

Unfortunately, there was a strong crosswind, which blew the fighters wide. Retro 74 made it down, but 75, flying on 74's right side, had to go around—there was no asphalt left on his side.

The second approach, again off the wing of the KC-10, successfully brought the fighter down. The third approach put the tanker down, using up every last foot of the runway to stop.

After a 180-degree turn at the end of the runway, the tanker taxied back to the terminal and began to gas up, but the worst part of the day was still to come. Gold 12, and its batch of fighters, was still in-bound and unaware of the situation in the Azores.

By the time a cumbersome high-frequency radio patch was made, it was too late. Gold 12 was low on gas, as were Retros 81 through 86.

In the meantime, a Marine Corps KC-130 at Lajes heard of the predicament and, despite not being fully fueled itself, launched into the smothering weather to try and rescue the inbound aircraft.

The KC-130 met up with Gold 12 and "took the chicks," Felman explained. The tanker would replicate Gold 11's approach to Santa Maria with the fighters in tight formation.

Gold 12 climbed for the gas-saving higher altitudes needed to make Rota.

Felman heard the roar but never saw the KC-130 missing its approach in the thick clouds. The A-4s, realizing they probably only had one shot to get down, tried a section landing with three aircraft while the others held up high.

Unfortunately, the three A-4s set down on the absolute end of the runway. The first and second landed OK but wide to the right, which meant the third Skyhawk simply ran out of

USAF photo

A KC-10 of the 22nd Air Refueling Wing, March AFB, Calif., roars away after refueling another aircraft.

room as it landed on the right edge of the runway.

The landing gear on this A-4 sheared off as the fighter took out the visual approach system indicator lights, spewing debris all along the runway end. The pilot got out all right, but the runway was now unusable.

The Santa Maria tower, however, couldn't see the drama being played out at the runway's far end and cleared a civilian flight for landing. Gold 11 copilot Capt. Thomas M. Ferguson pre-empted and surprised the tower controller by radioing, "Negative, the runway is closed due to a crash."

That is how the airport found out about the accident.

Meanwhile, above the impenetrable clouds, the Marine Corps KC-130 had to leave. Using their more sophisticated nav gear, the crew made a white-knuckle landing back at the still-weathered-in Lajes. The three still-airborne A-4s did not have this option, and were out of luck.

With no fuel to spare, the crew of Gold 12 made a courageous decision to come back, knowing that all of them would go in the drink if some unknown miracle didn't happen.

"When I told Gold 12 that I could be airborne in five minutes and he said, 'Go for it,' I knew he was in real trouble," Felman recounted. "Later, I found out that he was below 8,000 pounds [of fuel] and running the ditching checklist."

A KC-10 can carry up to some 300,000 pounds of fuel, making 8,000 literally the dregs of the tanks.

The miracle would have to come in the form of Gold 11. It was nowhere near full, but had been reloaded with enough gas to buy everyone some more time. The crew prepared for a quick launch—so quick, in fact, that the crew chiefs had to be left behind as there wasn't time to get them back aboard after engine start.

The lightly loaded Gold 11 leapt from the runway using every foot available.

They were minutes away from having a KC-10 and three A-4s turn into submarines. If the aircraft went down, more than a dozen lives would probably be lost, as the search and rescue forces at Lajes couldn't take off in the miserable weather. Rescue forces arriving via ship wouldn't show up for hours.

He had Gold 12 dial up the air-to-air TACAN so that Gold 11 could get a fix on the other tanker.

Photo courtesy Marc Felman

Capt. Marc Felman at the controls of the Gold 11 KC-10.

Popping above the soup at about 3,000 feet, Felman rolled out in front of Gold 12 at two miles. Using the "give and pass" ability of the KC-10, Gold 11 gave enough fuel to the other tanker to keep it airborne long enough for the by-now-very-concerned A-4s also to fill up from Gold 11.

While this unbelievable series of events was occurring, a scratch tanker crew from whoever could be scrounged was launched from Spain to speed to the area in hopes that there would still be someone left to take on fuel.

High Honor

And that is exactly what happened. With the partially refueled Gold 11 on-scene, the other KC-10 and the three remaining Skyhawks were all able to remain airborne until the rescue tanker arrived. That hastily launched tanker was able to bring the two tankers and three fighters safely to Rota.

Upon landing, the marines taxied away to their spots and the heavies went to their side of the ramp.

It was then that the crew of Gold 11 realized how close to ditching Gold 12 had been. "That crew came aboard our jet and had unloaded our bags before we had even finished our shutdown checklists," Felman said. In the highly self-sufficient military aviation world, having someone else tote your bags is a high honor.

Felman, who retired as a colonel, was glad to be done with that particular day. It was no doubt a sentiment shared by the marine pilots who almost witnessed what can happen if the tankers can't deliver the fuel everyone expects.

The significance of Gold 11's exploits was grasped by others, too. The Mackay Trophy is administered by the Air Force and the National Aeronautic Association. It is given for the "most meritorious flight of the year" under combat or noncombat conditions, and is on display at the National Air and Space Museum in Washington, D.C.

The 1986 trophy was awarded to the crew of Gold 11. The citation reads, "Following a precipitous and hazardous launch in near zero-zero weather, the crew of a KC-10 assigned to SAC's 68th Air Refueling Wing provided emergency refueling to a KC-10 and three A-4s over the Atlantic Ocean on 5 March [1986]."

The crew of Gold 11 consisted of: Capt. Marc D. Felman, Capt. Thomas M. Ferguson, MSgt. Clarence Bridges Jr., MSgt. Patrick S. Kennedy, MSgt. Gerald G. Treadwell, TSgt. Lester G. Bouler, TSgt. Gerald M. Lewis, SSgt. Samuel S. Flores, SSgt. Scott A. Helms, and SSgt. Gary L. Smith. ■

Braxton Eisel is a retired USAF lieutenant colonel who previously served as a Minuteman III flight commander, an E-3 AWACS and E-8 Joint STARS weapons controller, and as a liaison to the FAA. He is the author of Beaufighters in the Night: 417 Night Fighter Squadron USAAF *and a forthcoming history of F-4G Wild Weasel operations in Desert Storm. His most recent article for* Air Force *Magazine, "Leave it to the Guard," appeared in the January 2007 issue.*

2008-09 AFA

Sutter

Schlitt

Allen

The Air Force Association Nominating Committee met in Dallas on April 18 and selected a slate of candidates for the five national officer positions and three elective positions on the Board of Directors. The committee consists of the three most recent past Chairmen of the Board, one representative selected by each of the Vice Chairmen of the Board (Aerospace Education and Field Operations), two representatives from the Central geographic area, one representative from each of the regions in the West and East geographic areas, and one person representing each of the following constituencies: Total Air Force, Air Force veterans, and aerospace industry. The slate will be presented to the delegates at the National Convention in Washington, D.C., in September.

Joseph E. Sutter of Knoxville, Tenn., was nominated for his first one-year term as Chairman of the Board. He is currently serving as Vice Chairman of the Board for Field Operations. He is a Life Member and has been active in AFA since 1987. He has served as a member of the Board of Trustees of the former Aerospace Education Foundation (now part of AFA) and in AFA at the chapter, state, and national levels. He has served as President of the Gen. Bruce K. Holloway Chapter and as both Chapter and State Vice President for Aerospace Education, and as Tennessee State President. At the national level, he has served as a National Director, a member and the Chairman of the AFA Strategic Planning Committee, and as Chairman of the afa21 Governance Team. He has received the AFA Chairman's Citation, AFA Presidential Citation, Exceptional Service Award, and Medal of Merit and was named AFA Tennessee "Volunteer Member of the Year" in 1996 and 2004.

Sutter has been active in the civilian community. He is a past President of the Rotary Club of Knoxville, the East Tennessee Military Affairs Council, past Chair of his parish council, and served on the Board of Directors of the United Way of Knoxville. While maintaining active involvement in those organizations, he also currently serves as member of the Board of Directors of a major Knoxville health care system.

He served on active duty for 28 years at various USAF locations: Minot AFB, N.D.; Vandenberg AFB, Calif.; the Pentagon; Offutt AFB, Neb.; Whiteman AFB, Mo.; and the University of Tennessee, Knoxville. His primary military duties were in ICBM operations. He commanded an ICBM squadron, operations group, and missile wing. Other military duties included Staff Officer assignments at the Pentagon, including two years in Air Force Legislative Liaison, Hq. Strategic Air Command, Chief of the Advanced ICBM Requirements Division, and Senior Controller, SAC Command Center. He graduated from the Naval War College, College of Command and Staff with Highest Distinction, and from the Industrial College of the Armed Forces as a Distinguished Graduate.

His decorations include the Legion of Merit with two Oak Leaf Clusters; Meritorious Service Medal with four OLCs; Air Force Commendation Medal with one OLC; and the Air Force Achievement Medal.

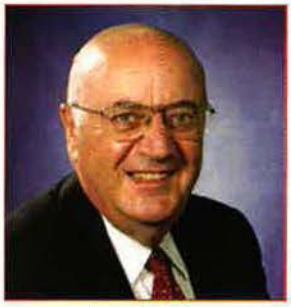
Sutter graduated from the University of Florida with a bachelor's degree in civil engineering and from the University of Southern California with a master of science degree in systems management. He works as a consultant on national security matters, serving USAF and other clients in the Washington, D.C., area.

He and his wife, Geri, are members of the AFA Thunderbird Society. Geri is currently serving as the AFA Tennessee State Secretary. They have three grown children and three grandchildren.

S. Sanford Schlitt is completing his first year as Vice Chairman of the Board for Aerospace Education and has been nominated for a second one-year term. He was active in the former AEF since 2002, serving first as a member of the AEF Board of Trustees and, after the organizations merged in 2006, as a member of the AFA Board of Directors. In that capacity, he was active in the afa21 process as a member of the Governance Team and was a principal architect of the Aerospace Education and Field Councils as part of AFA's new, combined governance structure. He has also served on the AEF Nominating and Program Committees, the AFA Strategic Planning Committee, the AFA Constitution Committee, as Chair of the AEF Audit Committee, and Co-Chair of the AFA/AEF Audit Committee.

Schlitt is a graduate of The American University in Washington, D.C., was commissioned into the West Virginia Air National Guard in 1967, and later transferred to the Reserves. He served for more than 34 years in a variety of assignments, principally in the contracts management and acquisition fields. He served as Chief of Staff for a Defense Contract Administrative Services Region; Deputy Commander (and Individual Mobilization Assistant) of the Defense Contract Management Command, Defense Logistics Agency; the Mobilization Assistant to the Deputy Assistant Secretary for Contracting, Assistant Secretary of the Air Force for Acquisition; and the Mobilization Assistant to the Principal Deputy, Of-

Nominees



Lauducci

Church

Lundgren

fice of the Assistant Secretary of the Air Force for Acquisition. After 10 years at the Pentagon, Schlitt retired in 2001 as a brigadier general and has received, among other awards, the Distinguished Service Medal, Legion of Merit, and Defense Meritorious Service Medal (with two Oak Leaf Clusters). He attended SOS, ACSC, AWC, and the Leadership Institute at Eckerd College.

He has established or purchased and then sold or successfully liquidated several businesses. He has served as Chairman of the Board of one company and member of the Board of another, a NASDAQ-listed public company, and on various associated committees, including those on compensation, governance, and audit. Schlitt served as a member of the Advisory Board to the College of Business and Information Technology for Argosy University. He also served on the Senate staffs of Sen. Hubert H. Humphrey and Sen. Walter Mondale. In 1980, he was a candidate for the United States Congress. Schlitt continues as the Senior Managing Director of a mortgage investment trust and has a daily involvement in financial portfolio management.

Schlitt has served as the elected President of his community association and as Vice President for Finance and board member for his temple and is a fund-raiser for local charities. He has been a member of the New York Friars Club and Chapter President and Vice President-Air for the Reserve Officers Association.

He and his wife, Patricia, reside in Sarasota, Fla. They have two children.

The Nominating Committee is submitting two names—Craig E. Allen and James R. Lauducci—for consideration for a one-year term as Vice Chairman of the Board for Field Operations.

Craig E. Allen of Hooper, Utah, was nominated for his first term as Vice President of the Board for Field Operations. He has been a member of AFA since 1972 and is a Life Member. He has served in a variety of elected positions at all levels of the association. He is a past National Director and has also served as President of the Rocky Mountain Region, Utah State President, and Northern Utah Chapter President. Craig is a recipient of the Medal of Merit, Exceptional Service Award, and Presidential Citation. In 2006, he was named AFA Member of the Year. He has also served on the national Executive Committee, as Chairman of the ad hoc Committee during the afa21 process, and currently serves as an advisor to the AFA Strategic Planning Committee, of which he is the immediate past Chairman.

Allen has been actively involved in leadership roles in a variety of other organizations in the community. He is a past President of the Utah AFA Aerospace Education Foundation, a past member of the Ogden-Weber Chamber of Commerce Military Affairs Committee, and the Hill Air Force Base Museum Board of Directors. He is also the past President of the Wasatch Front Chapter of the Back Country Horsemen of Utah and is now the Utah State Vice Chairman of the latter group.

During a 23-year military career in ICBM operations, maintenance, logistics, and acquisition, Allen served in several challenging assignments. He has been a Services Squadron Commander and Chief of Services, Civil Engineering Squadron Commander, and Base Civil Engineer. On retirement, he continued to work in the ICBM field in a civilian capacity. He currently works as a manager and supervisor for Northrop Grumman. His position is Director, Systems Engineering Integration and Test, for the Prime Integration Program for the ICBM Force at Hill AFB, Utah.

A graduate of the University of Oklahoma, Allen also holds a master's degree from Wichita State University.

He and his wife, Connie, have two children and three grandchildren.

James R. "Jim" Lauducci of Alexandria, Va., was nominated for his first term as Vice Chairman of the Board for Field Operations. He joined AFA in 1983 and is a Life Member. He has served AFA in many capacities. He is a past President of the Donald W. Steele Sr. Memorial Chapter in Northern Virginia, one of the largest AFA chapters and a key part of AFA in the National Capital Region. He has also served in various state positions, including VP for Programs, VP for Special Projects, and VP for Membership, as well as State President.

Lauducci has served at the national level as a member of the afa21 Governance Task Force, the Membership Committee, the Strategic Planning Committee, and the Nominating Committee. He is currently a National Director and is serving in his second year as Chairman of the Membership Committee. He is the recipient of the AFA Medal of Merit, Exceptional Service Award, and Presidential Citation. He has also won numerous chapter state and region awards, including Virginia AFA Member of the Year in 2003.

His 24-year Air Force career in communications and information included assignments at SAC, NORAD, the Joint Staff, NATO, and the Air Force Secretariat. Following his Air Force career, Lauducci joined the Armed Forces Communications and Electronics Association (AFCEA) professional staff as the Director of Cor-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porate and Chapter Operations. He then moved to private industry, where he has held positions in program management, government relations, and business development. He is currently Director of Air Force Field Marketing for Harris Corp. He has continued his service to AFCEA by serving on their International Executive Committee and Board of Directors.

In 1990, Lauducci was one of the Co-founders of the Air Force C4 Association and has served continuously as the association Treasurer since then.

In 2007, he was one of three persons inducted into the US Air Force Communications and Information Hall of Fame. The C&I Hall of Fame, established in 1999, recognizes the achievements of past Air Force leaders for their solutions to problems, innovation and creativity, and application of new technologies. Their achievements paved the way for the communications, command and control, and intelligence capabilities the Air Force now enjoys.

He is a graduate of LeMoyne College with a bachelor's degree in physics and holds a master's degree from Troy State University in counseling and guidance. He was also a Senior Executive Fellow at Harvard University's JFK School of Government.

He and his wife, Marie, have three children.

Judy K. Church of Lenexa, Kan., is completing her second year as National Secretary and has been nominated for a third one-year term. She is a Life Member and has been active in AFA since 1987. Her involvement with the association began through her late husband, National Treasurer Charles H. Church Jr. She was active at the chapter level and also gained national experience as she traveled with him to national meetings and events throughout the country.

She has served AFA in appointed and elected positions at all levels. She held the position of Chapter Treasurer of the Harry S. Truman Chapter and has served as Missouri State President, Vice President, and Vice President for Communications. She also served for two years as the Midwest Region President. At the national level, she served as a member of the Constitution Committee for four years and has served twice on the Nominating Committee. She was on the Credentials Committee for three years, serving twice as Chairman.

She has maintained a full commitment to other volunteer work through service on many civic boards. She is a current member of the NE Johnson County Kansas Republican Women's Board, past member of the Kansas City Symphony Board, and past member of the University of Missouri Kansas City Women's Council Board.

She was named the 2003 Midwest Member of the Year and was made a Charles H. Church Jr. Fellow by the state of Missouri. At the national level, she has received the Medal of Merit, Exceptional Service Medal, and a Presidential Citation.

Church graduated from Southland Girl's High School, Invercargill, New Zealand. She attended Otago University in Dunedin, New Zealand, and has a diploma in early childhood education. She has two children.

Steven R. Lundgren of Fairbanks, Alaska, has been nominated for his fourth one-year term as National Treasurer. He is a 26-year member, having begun as a Community Partner. He has served AFA in many leadership positions, including Chapter, State, and Region President. He currently chairs the AFA Finance Committee. Lundgren has received the AFA Exceptional Service Award and the Presidential Citation.

Lundgren is a member of the Alaskan Command Civilian Advisory Board, Vice Chairman of the Alaska State Committee for Employer Support of the Guard and Reserve (ESGR), and a member of the Greater Fairbanks Chamber of Commerce Military Affairs Committee. He is also active as a leader in other civic organizations, serving as Chairman of the Fairbanks Economic Development Corp. and on the Board of Directors of the Greater Fairbanks Chamber of Commerce. Lundgren has also served as a Director of the Interior Alaska Builders Association and the United Way of the Tanana Valley, as well as President of the Fairbanks Sunrisers Rotary Club. He has received numerous awards, including the Jim Messer Award for Community Support of the Military, the ESGR Spirit of Volunteerism Award, the ESGR 7-Seals Award, the 2006 Annual Honorary Iceman Award from Eielson AFB, Alaska, and the Alaska Commendation Medal in 2008.

Lundgren's entire professional career of 30 years has been in the financial services industry. He is currently Senior Vice President and a member of the Senior Management Committee for a large community bank in the Fairbanks area.

He graduated from Oregon State University with a bachelor's degree in business administration and has completed graduate studies at Portland State University and the University of Alaska. He completed the American Bankers Association National Commercial Lending School in 1991 and the ABA Graduate Commercial Lending School at the University of Oklahoma in 1992.

He and his wife, Susan, have three children.

The Nominating Committee is submitting two names—Joseph P. Bisognano and Scott P. Van Cleef—for consideration for the office of National Director to be elected from the East geographic area.

Joseph P. "Joe" Bisognano of Acton, Mass., has been a member of AFA since 1976. He has served as Chapter President, State President, and Region President. Nationally, he has served on the AFA Field Council since its inception. He has received AFA's Medal of Merit and Exceptional Service Award.

Bisognano retired after more than 25 years of service in USAF, principally in the area of financial management and acquisition management. He served in positions at wing, major command, and Air Staff levels. In 1983, he was selected for an Assistant Professor of Aerospace Studies position at the Massachusetts Institute of Technology.

In the community, Bisognano is a member of several military-oriented as-

sociations, including Military Officers Association of America, ROA, AFCEA, and the American Society of Military Comptrollers. He has served in a volunteer capacity as part of the local Little Youth Baseball and Softball League, serving as coach and manager for a variety of teams. He also worked part-time for more than 10 years as a reporter for the local community newspaper.

Bisognano currently works as a Program Manager for Engility Corp., a wholly owned subsidiary of L-3 Communications.

He has been married to his wife, Dee, for 37 years. They have four children.

Scott P. Van Cleef of Fincastle, Va., is a Life Member who joined AFA in 1972. He has served as the Roanoke Chapter President and Virginia State VP for Administration and is now the Virginia State President. Nationally, he has served on the afa21 Internal Review Committee and the afa21 Field Structure Team and currently serves on the Strategic Planning Committee and the AFA Field Council. He has received AFA's Medal of Merit and Exceptional Service Award.

Van Cleef retired after more than 29 years of service in USAF in various fighter (F-4, F-5, F-16) and staff assignments, including command of a fighter squadron and fighter wing, a joint tour in Cairo, Egypt, and staff tours at Hq. Air Combat Command and the Air Staff.

In retirement, Van Cleef has made his avocation his business by operating his own custom, hardwood furniture shop. He is an active member of Historic Fincastle, Inc., and a member of MOAA.

Van Cleef holds a bachelor's degree in business economics from Purdue University and a master's in political science from Auburn University at Montgomery, Ala.

He and his wife, Barbara, reside in Fincastle, Va.

The Nominating Committee is submitting four names—Louis A. Emond, Emil M. Friedauer, Fredrick K. Stein, and Leonard R. Vernamonti—for consideration for the office of National Director to be elected at-large. Two will be elected.

Louis A. Emond of Nashua, N.H., has been a member of AFA since joining as a cadet in 1964. He was active in the Paul Revere Chapter near Hanscom AFB, Mass., serving on the Chapter Executive Council and more recently as the President of the Brig. Gen. Harrison R. Thyng Chapter of New Hampshire. He has received AFA's Medal of Merit and Exceptional Service Award.

Emond is active in the local community through his work with the Lion's Club and his church parish. He is also a Founding Member of the New Hampshire Air Force Memorial Committee. He is also a member of the Greater Nashua Chamber of Commerce and was recognized as the 2005 Small Business of the Year.

Emond retired after 20 years of active duty with USAF, with duties as an Air Weapons Controller, Staff Officer, Air Force Station Commander, and Foreign Military Sales Officer. He has a bachelor's degree from Fordham University in French and a master's in education from the University of California at Los Angeles.

He and his wife, Kathleen, have two children.

Emil M. "Max" Friedauer of Mary Esther, Fla., is a Life Member of AFA and has been a member since 1976. He has served as President at the chapter and state level and is the immediate past President of the Florida Region. Nationally, he serves on the AFA Field Council. He has received AFA's George D. Hardy Memorial Award, Medal of Merit, three Exceptional Service Awards, and three Presidential Citations.

Friedauer is active in volunteer work with the Special Operations Warrior Foundation and the American Cancer Society. He serves on the Special Operations Warrior Foundation Annual Fund-Raiser Committee, and is the Founder and Treasurer/Database Manager for the 7th Air Commando Society.

He retired after 27 years of active duty with USAF, and had a wide variety of assignments, including Chief of the Exercise Division at a NAF and a MAJCOM, and Chief, Current Operations, at a MAJCOM. He then worked as a defense contractor for 15 years.

Friedauer has a bachelor's degree in secondary education from Ball State University and extensive additional training through the Air Force PME structure and in psychological operations, special operations, and airlift operations.

He and his wife, Lily, have two children.

Fredrick A. "Butch" Stein of Fairbanks, Alaska, has been a Life Member of AFA since 1985. He has served in several chapter positions, including Chapter President and now serves as the Alaska State President. He has received the AFA Medal of Merit.

Stein has served in numerous similar positions in civic organizations, including the US Jaycees, Rotary, United Way, and Fairbanks Chamber of Commerce. He is an active member of Employer Support of the Guard and Reserve. He has received the State of Alaska Commendation Medal from the Governor of Alaska.

He retired after a total of 21 years of service in both the Regular Air Force and the Alaska Air National Guard. After some 12 years of active duty service as an Air Traffic Controller, Stein moved on to work as an FAA Controller and later in private business before returning to the Air Force as a member of the Alaska Air National Guard, which he joined during Desert Storm in 1991. He was awarded the Meritorious Service Medal on retirement.

His education combines both formal college credit from a number of institutions, including the University of Alaska, and a variety of specialized training courses from the Air Force and in the civilian community.

A 35-year Alaskan resident, he and his wife, Shannon, have four children and seven grandchildren.

Leonard R. "Len" Vernamonti of Clinton, Miss., has been a member of AFA since 1967. He has served as Chapter and State President, and is the current South Central Region President. Nationally, he has served on the Science & Technology, Nominating, and Constitution Committees, afa21 Field Structure Team, and the AFA Field Council. He has received AFA's Medal of Merit twice and the Exceptional Service Award.

Vernamonti retired after 22 years of service in USAF, principally in the areas of acquisition, plans and programs, finance, and strategic planning, including assignments to the President's Reorganization Project, Executive Office of the President, as the Comptroller-Deputy for Computer Resources, USAF Ballistic Missile Organization, and as the Special Assistant to the Acting Defense Attaché, Saigon, Vietnam.

Vernamonti has also served as President of the United States Air Force Academy Association of Graduates National Capitol Chapter, as a Board member for Mississippi Baptist Health Systems and several other large organizations, and as President and CEO of a nonprofit research corporation.

Vernamonti has a bachelor's degree in economics from the United States Air Force Academy and a master's in systems engineering from the University of Florida. He is a graduate of the National War College, the Industrial College of the Armed Forces, Air Command & Staff College, and Squadron Officers School.

He and his wife, Betty, have two children. ■

AFA National Report

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By Frances McKenney, Assistant Managing Editor

Team of the Year

The Air Force Association held a reception and awards banquet in May to honor five enlisted personnel as the AFA 2008 Team of the Year. The team comes from the Air Force Office of Special Investigations, a field operating agency based at Andrews AFB, Md.

The Team of the Year members are: SSgt. Eric M. Ackerstrom, 7th Field Investigations Squadron, Andrews AFB, Md.; SSgt. Megan N. Fordham, Det. 102, Hanscom AFB, Mass.; MSgt. Lonnie R. Isaac II, Det. 207, Whiteman AFB, Mo.; TSgt. Wayne C. Pugh, 3rd Field Investigations Squadron, Lackland AFB, Tex.; and SSgt. Timothy J. Rivera, Det. 810, Los Angeles AFB, Calif.

AFOSI was selected for team recognition this year by CMSAF Rodney J. McKinley and other major command-level command chief master sergeants.

During their visit to Washington, the team members toured the city, the White House, and the Pentagon, where they met with Vice Chief of Staff Gen. Duncan J. McNabb, Brig. Gen. Dana A. Simmons, the AFOSI commander, and McKinley. The Air Force's top enlisted leader also hosted a reception for the team at his home.

While on Capitol Hill, team members visited the offices of Senators or Representatives from their home districts. They also had a luncheon on the Hill, with guest speaker Matt Chilbert from the FBI's counterintelligence task force.

Convention in South Carolina

Lt. Gen. Terry L. Gabreski, vice commander of Air Force Materiel Command, and AFA Chairman of the Board Robert E. "Bob" Largent were guests of honor at the South Carolina State Convention, hosted by the **Swamp Fox Chapter** in May at Shaw AFB, S.C.

At the awards luncheon, Gabreski spoke about USAF's R&D mission. "Air dominance is not something guaranteed to us," she said. "It's going to take advanced systems and technologies to reach our goals."

Awards went to the top squadron, logistician, aircraft technician, aviator, and mission support person from the state's three bases—Charleston, Shaw, and McEntire Air National Guard Station—as well as to AFROTC, AFJROTC, and Civil Air Patrol units. Vickie Davis received the State Teacher of the Year award. She is a seventh-grade math teacher at Irmo (S.C.) Middle School.

USAF photo by TSgt. Josef Cole

At Shaw AFB, S.C., AFA Board Chairman Bob Largent speaks to a gathering of airmen about AFA's mission. See "Convention in South Carolina."

Attending the convention in Sumter provided Largent with an opportunity to call on Maj. Gen. William L. Holland, 9th Air Force vice commander at Shaw and the deputy commander of US Air Forces Central. Largent also addressed Shaw personnel at the Airman Leadership School and at an AFA-sponsored luncheon for company-grade officers. He told the airmen that his goal "is to make sure you have the tools, resources, people, and dollars to do your job."

Stand-down for Vets

Harry S. Truman Chapter volunteers took part in the annual Heart of America Stand-down for veterans in Kansas City, Mo., in June. The stand-down aided homeless veterans by providing them with food, clothing, medical screening, legal counseling, and information on services and benefits.

The Department of Veterans Affairs and other agencies sponsor stand-downs in cities nationwide. In Kansas City, it was Truman Chapter member James Lannigan who suggested that the chapter get involved with the event. As a first step, the chapter set out a 55-gallon barrel in the lobby of the Disabled American Veterans building, to collect donations. The AFA group of volunteers included Missouri State President Patricia J. Snyder, Chapter President James Snyder, Programs VP Joan M. Boyd, Treasurer Robert E. Seibolt, Anita Seibolt, Amy Johnson, Valerie Walls, and Mark Edwards.

The group set up 50 large folding tables and pitched tents to cover them. Chapter President Snyder called this phase "hard labor." His volunteers sorted donated items—everything from military surplus clothing to personal hygiene items to packets of stationery—and manned these donation stations from noon to 4:30 p.m. on the first day of the stand-down.

The *Kansas City Star* reported that more than 400 veterans received help during the stand-down and that about 1,800 homeless vets live in the area.

Into the Hall of Fame

With several members of the **Richard I. Bong Chapter (Minn.)** looking on, Raymond T. Klosowski, chapter vice president for government relations, was inducted into the Minnesota Aviation Hall of Fame in May.

Klosowski told a Duluth newspaper, "This is probably the biggest honor I've ever had."

James A. Armstrong, chapter treasurer, had submitted the nomination package on Klosowski. It was a big job, since Armstrong had a lot of material to work with: Klosowski began his military career in 1963 with the 179th Fighter-Interceptor Squadron, Minnesota Air National Guard, in Duluth. In 1996, he was promoted to brigadier general and became commander of the Minnesota ANG. In his civilian career, he has been executive director of the Duluth Airport Authority.

Some 400 guests gathered for the induction ceremony for Klosowski and five other aviation pioneers who were honored for the year 2007. Portraits of all 117 hall of fame aviators hang at Duluth's airport.

More Chapter News

■ The 29th annual Focus on Defense symposium in Layton, Utah—sponsored by the state's **Northern Utah Chapter, Salt Lake Chapter,** and **Ute-Rocky Mountain Chapter**—took place in mid-June. Its theme, "Integrated Life Cycle Management," focused on strategies for cradle-to-grave stability in weapon systems programs. Lt. Gen. Kevin J. Sullivan, a former Ogden Air Logistics Center commander and now the deputy chief of staff for logistics, installations, and mission support, was among the speakers for the June 18 event.

■ Four members of the **Cochise Chapter (Ariz.)** served as science fair judges in Sierra Vista, Ariz., in March. Chapter President Ross B. Lampert; Susan R. Struck, aerospace education vice president; Harold W. Thomas, VP for membership; and TSgt. Dwight L. Bechel took part in the 25th annual Youth Engineering and Science Fair. The chapter sponsored two awards for projects having an Air Force connection. An entry on wind energy garnered one of the awards for Hannah Carignan from Colonel Smith Middle School at Ft. Huachuca. Michael Clark and Manuel Galaz from Bowie School in Bowie received the other award for their project on hot air balloons.

■ The **Cochise Chapter** also named Sandra Trevino as Teacher of the Year. She took home the State Teacher of the Year award a week later at the Southwest Region Conference in Tucson, Ariz. Trevino heads the math department at Buena High School.

■ The **Hurlburt Chapter (Fla.)** donated $1,000 to the Air Force Enlisted Village in May. The funds will be used for a video camera to capture oral histories from residents of the retirement facility in Shalimar, Fla. President Dann D. Mattiza presented the chapter donation to James C. Binnicker, president and CEO of the facility and the ninth Chief Master Sergeant of the Air Force. The oral history project began last fall as an initiative of chapter member SMSgt. Francis Dailey II, and the collection will be submitted to the Library of Congress.

■ The **Gen. Joseph W. Ralston Chapter** in Cincinnati received a guided tour of General Electric's Brian H. Rowe Learning Center at Evendale, Ohio, as part of its April membership meeting. Rick Kennedy, a GE Aircraft Engines spokesman, led the chapter members through the center, where engines familiar to Air Force personnel were displayed along with commercial airliner power plants. AFAers on hand for the tour included John W. McCance, Ohio state president; Robert L. Brewster, chapter president; Howard E. Hiler, chapter secretary; and Ronald Thompson, from the **Wright Memorial Chapter** in Dayton.

■ **Long Island Chapter** members attended a Cradle of Aviation Museum lecture in Garden City, N.Y., in May, featuring retired USAF Maj. Gen. Frederick C. Blesse. A two-tour Korean War ace, Blesse also flew 108 combat missions in the Vietnam War. Before his lecture at the Long Island museum, Blesse joined Northeast Region Director Maxine Rauch and Alphonse A. Parise, the Long Island Chapter's aerospace education VP, in presenting the chapter's Teacher of the Year award. Diana Soehl received the honor for her work as a science teacher at Robert Moses Middle School in North Babylon, N.Y.

■ The executive director of the Florida Department of Veterans' Affairs was guest speaker for the May meeting of the **Col. H. M. "Bud" West Chapter** in Tallahassee, Fla. Retired Navy Reserve Rear Adm. LeRoy Collins Jr. spoke about legislation affecting the state's 1.7 million veterans—particularly those now returning from the War on Terror—and

AFA Conventions

Aug. 2	**Massachusetts State Convention,** Boston
Aug. 9	**Georgia State Convention,** Robins AFB, Ga.
Aug. 9	**Pennsylvania State Convention,** State College, Pa.
Aug. 12	**Michigan State Convention,** Mount Pleasant, Mich.
Sept. 13-14	**AFA National Convention,** Washington, D.C.
Sept. 14-17	**AFA Air & Space Conference,** Washington, D.C.

of the Year. At the ANG's 167th Airlift Wing in Martinsburg, Triggs directs a Starbase educational program. The Office of the Assistant Secretary of Defense for Reserve Affairs sponsors Starbase programs at several military facilities nationwide. The programs give students 20 to 25 hours of hands-on activities at a base. The activities cover science, technology, engineering, math, space, and aviation.

■ We organized it, managed it, and led it. So said Alfred E. Smith, president of the **Genesee Valley Chapter** in New York, describing his group's role in the city of Rochester's Memorial Day parade. Smith served as grand marshal for the parade. In addition, the chapter sponsored two units in the parade. ■

Reunions

reunions@afa.org

39th TCS Assn (WWII to present). Oct. 1-5 at the Hilton East in Tucson, AZ. **Contact:** Frank Morton, 6981 E. Calle Cerca, Tucson, AZ 85715 (520-790-8613) (famorton@cox.net).

40th BG Assn, 20th AF, including members from the Caribbean, US, CBI, and Pacific. Oct. 16-20 in St. Louis. **Contact:** Jean Suitt, 10366 Brangus Dr., Crowley, TX 76036 (1-800-959-2582) (jsuitt@crescent.com).

312th BG Assn, SWPA (WWII). Sept. 18-21 at the Memphis Hilton in Memphis, TN. **Contact:** John Happy, PO Box 848, Haines City, FL 33845 (863-439-6657) (jthappy@juno.com).

459th BG Assn (WWII), Guilia Field, Cerignola, Italy, including 756th, 757th, 758th, and 759th BS and Gp Hq. Sept. 25-28 at the Airport Marriott, Atlanta. **Contact:** Susan Rawlston (770-934-5067) (slrga@aol.com).

B-26 Marauder Historical Society. Oct. 27-29 at the Ramada Gateway Hotel, Kissimmee, FL. **Contact:** MHS Hq. (520-322-6226) (admin@b-26mhs.org) (http://b26mhs.bizland.com).

China-Burma-India Hump pilots. Oct. 28-Nov. 3 at the Hyatt Regency in Boston. **Contact:** Nick Hudson, P.O. Box 489, Deer Park, WA 99006 (800-233-1234) (qwantumconf@aol.com).

Pilot Tng Class 56-D. Oct. 3-5 at the Hope Hotel at Wright-Patterson AFB, OH. **Contact:** Dick Drake, 303 East St., Radcliffe, IA 50230 (515-899-2168) (drakehld@netins.net).

Pilot Tng Class 66-A (Reese AFB). Oct. 12-14 at the Crockett Hotel in San Antonio, TX. **Contact:** Ed Blum (714-281-9171) (eblum@usa.net).

Schilling AFB Maintenance Personnel. Oct. 7-9 at the Westwood Inn Motel in Branson, MO. **Contact:** Arthur Cook (580-864-7780) (pacook@pldi.net).

USAF Military Tng Instructor Assn. Oct. 22-24 at Lackland AFB, TX. **Contact:** John Pavey Jr. (828-226-2409) (j.pavey@mchsi.com).

Westover AFB AF Special Projects Production Facility, including 8th Recon Tech Sq, 497th Recon Tech Gp, 6594th Test Sq, 7405th Support Gp, and 7499th Support Gp. Oct. 2-6 at the Holiday Inn Select Hotel-Opryland Airport in Nashville, TN. **Contact:** Dick Temple (703-786-4743) (dicktemple4951@hotmail.com). ■

Raymond Klosowski of the Richard I. Bong Chapter shows the audience his plaque at his induction ceremony into the Minnesota Aviation Hall of Fame. A dozen chapter members attended the ceremony to honor Klosowski, a former fighter pilot and commander of the Minnesota Air National Guard.

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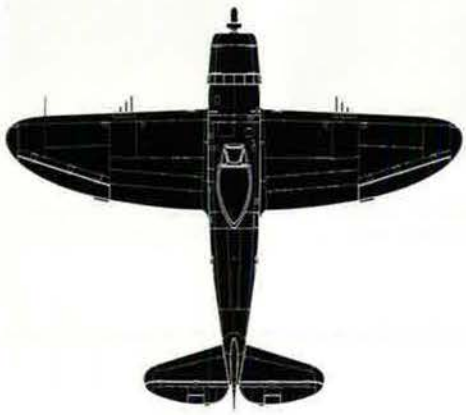
P-47 Thunderbolt



The P-47 Thunderbolt, known as the "Jug" and beloved by its pilots, was built to be an interceptor, but it became the dominant USAAF close air support fighter of World War II. The versatile Republic Aviation combat aircraft featured heavy armament and a phenomenally rugged structure, all of which helped it wreak havoc on enemy forces—in the air or on the ground, in Europe or the Pacific. Although somewhat overshadowed in the public mind by the glamorous P-51 Mustang, the P-47 had then and still has today a fanatically loyal following.

The Jug was an outgrowth of years of aviation work by aeronautical pioneer Alexander P. de Seversky. It was designed by a team led by Alexander Kartveli, who built it around the potent new Pratt & Whitney R-2800 engine. The 12,000-pound prototype was to that point in history the heaviest single-engine USAAF fighter ever built.

Weight and performance both went up over time. The 56th Fighter Group undertook development work as a unit. The P-47 initially was thought to have poor climb and maneuverability, but it had great diving capability. Water injection, new propellers, and other improvements increased its combat capability, and ever larger drop tanks extended its bomber escort range.

The P-47 entered combat on April 8, 1943 in Europe. Eventually, it saw action in every war theater. When sufficient numbers of air combat Mustangs arrived in theater, the P-47s would specialize in close air support. Jugs flew more than 546,000 combat sorties. They were credited with damaging or destroying almost 12,000 enemy aircraft in the air or on the ground, 9,000 locomotives, and 6,000 armored vehicles. Through fire and flak, its loss rate was less than one percent per sortie, a tribute to its great strength.

—Walter J. Boyne

This aircraft: P-47 Thunderbolt—#44-20473—as it looked in late 1944 when assigned to the 353rd Fighter Squadron in France. It was flown by the squadron commander, Maj. Glenn T. Eagleston.

In Brief

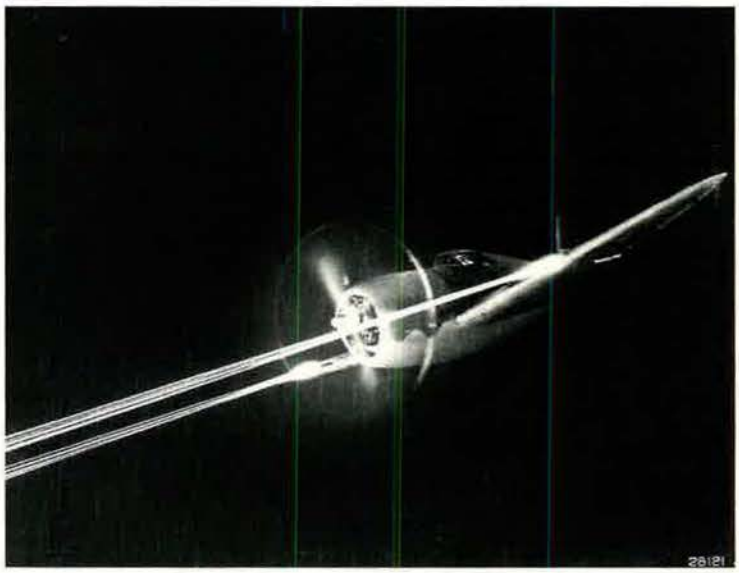
Designed by Republic ★ built by Republic, Curtiss-Wright ★ first flight May 6, 1941 ★ crew of one ★ number built, 15,683 ★ **Specific to P-47D:** one Pratt & Whitney R-2800 radial engine ★ armament eight .50-cal machine guns, two 1,000-lb bombs, 10 rockets ★ max speed 428 mph ★ cruise speed 350 mph ★ max range 475 mi ★ weight (loaded) 19,400 lb ★ span 40 ft 9 in ★ length 36 ft 1 in ★ height 14 ft 2 in.

Famous Fliers

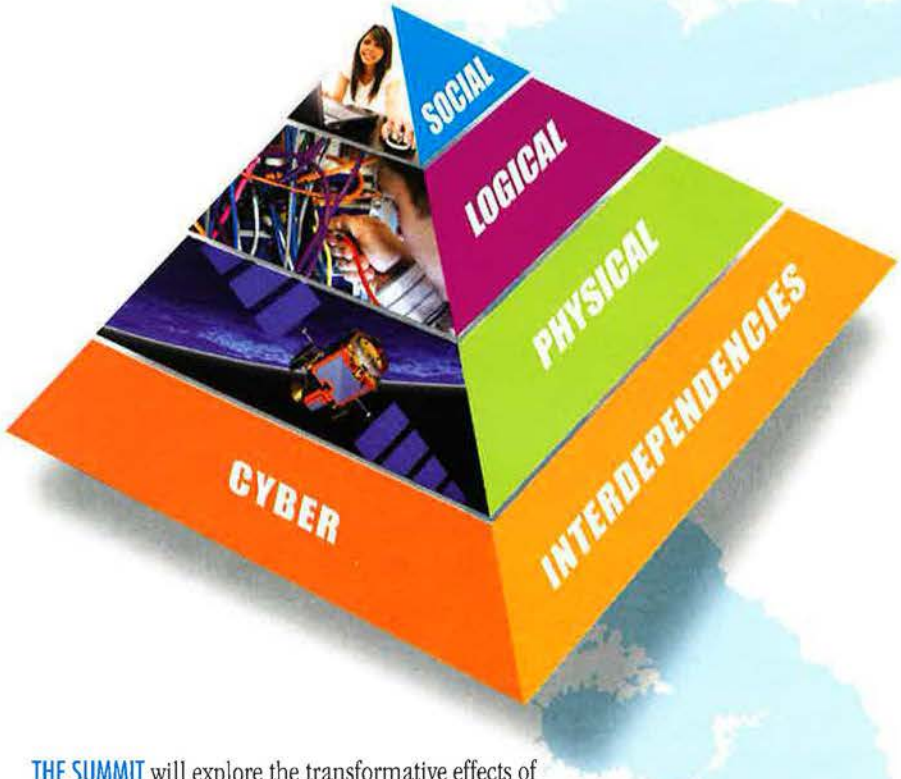
Medal of Honor: Neel Kearby (WWII), Raymond L. Knight (WWII), George Davis Jr. (Korea). **Aces:** Gerald W. Johnson, Donald Blakeslee, Fred Christensen, Glenn Duncan, Francis Gabreski, Dominic Gentile, Herschel Green, Walker Mahurin, David Schilling, Hubert Zemke, Duane Beeson, William Dunham, James Goodson, Robert Johnson. **Notables:** Carroll McColpin, Benjamin O. Davis, Jimmy Doolittle.

Interesting Facts

Built in greater numbers than any USAAF fighter ★ 5,222 lost in action ★ launched by catapult from carriers in action near Saipan ★ led to XP-72 and F-84 Thunderjet ★ more than 40 variants ★ featured in 1948 film "Fighter Squadron" ★ often confused with German FW 190 in combat ★ flown by air forces of Soviet Union, Nationalist China, five European allies, and 13 Latin American-Caribbean nations ★ named "Jug" either for its rotund shape or as short for "juggernaut."



A Thunderbolt blazes away.



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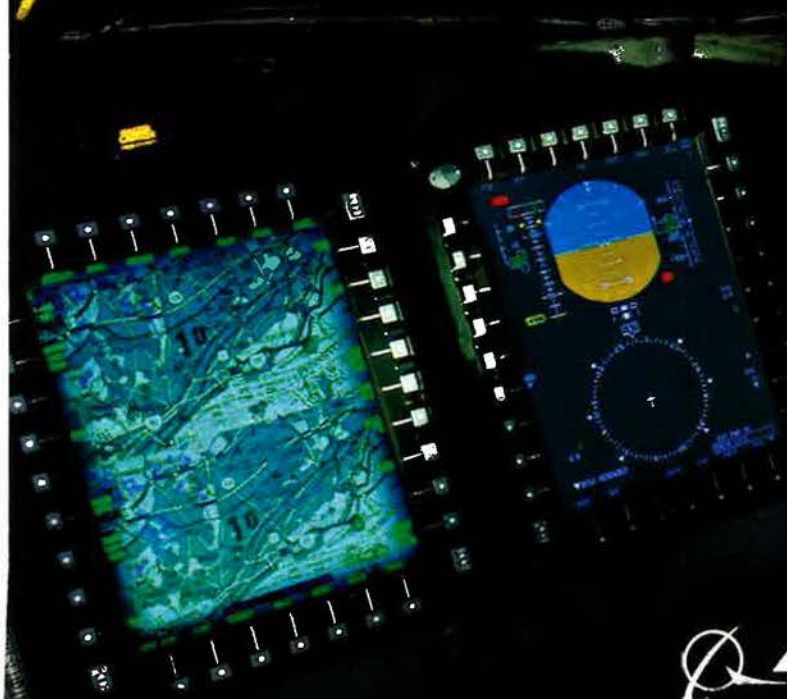

The search and rescue mission of the U.S. Air Force has never been more urgent. It's not surprising then that the HH-47, with its combat-proven capabilities, was first selected to fulfill this critical requirement. Offering superior range, speed and payload, the HH-47 also takes advantage of existing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

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