

August 2004/\$4

AIR FORCE


JOURNAL OF THE AIR FORCE ASSOCIATION

MAGAZINE

A detailed satellite is shown in orbit above the Earth's surface. The satellite has a central black body with various instruments and antennas. Two long, rectangular solar panel arrays extend from the satellite, one pointing towards the top left and the other towards the bottom right. The Earth's surface below is a mix of blue oceans and brownish-green landmasses.

Space Almanac 2004

Longer Deployments
Operational Acquisition
Hercules Turns 50

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By Robert S. Dudley, Editor in Chief

The Guns of August 1964

AS OF this month, we can look back with 40 years of perspective at the Vietnam War, which began in earnest in August 1964.

Congress, responding to a clash of US and North Vietnamese naval vessels, passed the Gulf of Tonkin Resolution on Aug. 7, 1964. It empowered President Lyndon B. Johnson to take "all necessary steps, including the use of armed force" to halt armed aggression in Southeast Asia. The Air Force moved in force into South Vietnam and Thailand. By year's end, combat had begun.

It was a vast and sprawling war, a fact made clear by John T. Correll, a former Editor in Chief of *Air Force Magazine*, in a new statistical almanac prepared for the Air Force Association. We will publish his work in next month's issue, but herein we provide some important facts.

Vietnam was America's longest war, lasting nine years. By the time it ended in 1973, it had drawn in 3.4 million US servicemen and -women.

In the theater, the war resulted in 47,378 battle deaths, 10,799 other deaths, and 153,303 wounded who required hospital care. There are still 2,300 missing in action.

Hanoi acknowledges 1.1 million battle deaths among communist forces. South Vietnamese battle losses came to 254,000.

The conflict was predominantly a ground war. When the US armed presence peaked in 1968, there were 584,000 US troops in Vietnam, Thailand, and nearby offshore waters. The USAF complement numbered 94,000, 16 percent of the total. The Army and Marine Corps provided about 450,000 of the troops.

Because of the ground-air ratio, US attention tended to focus on land operations. Even after 40 years, the role of airpower in the Vietnam War is not always understood.

The overall Air Force effort in the Vietnam War was enormous.

Vietnam was twice as long as World War II, and the Air Force flew twice as many sorties in Southeast Asia as Army Air Forces carried out in World War II. A huge number of the

sorties—about 1.4 million—were of the ground attack type.

Air Force aircraft dropped 6.2 million tons of munitions, three times the amount in World War II.

The Air Force devoted a large share of its sorties to support ground forces operating in the South. USAF also mounted extensive attacks on North Vietnamese targets, despite

The overall Air Force effort in the Vietnam War was enormous.

heavy political restrictions. In the period 1965-68, the Air Force destroyed or damaged 9,000 military vehicles, 1,800 railcars, 2,100 bridges, and 2,900 anti-aircraft artillery guns.

By 1969, the Air Force had built within the theater a powerful fleet of 1,840 combat and support aircraft.

For the Air Force, the human cost was high. It suffered 1,741 battle deaths, 842 nonbattle deaths, and 1,000 seriously wounded airmen. Hundreds were held in squalid communist prison camps.

The Air Force lost 2,255 aircraft, of which 1,737 were combat losses.

Despite this, says noted airpower analyst Phillip S. Meilinger, "The Vietnam War has engendered more emotion, more loose talk, and more misunderstandings about airpower than any conflict since the 1940s." Some claim airpower was ineffective, killed excessive numbers of civilians, and was insufficiently responsive to Army needs.

Meilinger, among others, has exploded these and other myths (see Meilinger's "More Bogus Charges Against Airpower," October 2002), and they need not be taken up here.

What we know, with 40 years of hindsight, is that the Vietnam problem—for the Air Force and every other service—was much more basic. It was this: For America's political leaders, the objective was never victory.

Former Secretary of Defense Robert S. McNamara, in his 1995 book, *In Retrospect*, acknowledges that the service Chiefs told him in 1964 that

the Johnson Administration had not defined a "militarily valid objective" in Vietnam. He seemed not to care.

The war's purpose shifted year by year. Rather than fighting to defeat North Vietnam, Washington was bent on sending signals to Hanoi.

Correll itemizes seven officially declared bombing halts and pauses in air operations over North Vietnam by 1969. LBJ was attempting to entice Hanoi to negotiate, to no avail.

Incrementalism, gradualism, and hesitation vitiated the impact of airpower. Micromanagement ran rampant. Air Force operations were so tightly leashed that LBJ once boasted, "They can't even bomb an outhouse without my approval."

In the 1965-68 Rolling Thunder air campaign against the North, targets and even tactics were set in Tuesday luncheon meetings in the White House, with no airman present.

It is worth noting what happened on two occasions when airpower was unshackled. In early 1972, Hanoi's "Easter Offensive" with 40,000 troops and 600 armored vehicles was halted and then turned back largely by US air attack. In December 1972, the B-52-led Linebacker II raids on Hanoi and Haiphong forced North Vietnam to halt its aggression and reach peace terms with Washington. Said Adm. Thomas H. Moorer, the Chairman of the Joint Chiefs of Staff: "Airpower, given its day in court after almost a decade of frustration, confirmed its effectiveness as an instrument of national power—in just nine-and-a-half flying days."

James H. Webb, a former Marine, Vietnam veteran, and former Navy Secretary, has said that most Vietnam veterans believe the war was "justly begun, well-fought on the battlefield, and mindlessly bogged by the political process at home."

South Vietnam and Cambodia fell to communist forces in April 1975, bringing the long Southeast Asian war to an end. By that time, virtually all US military forces had been gone for two years. They, if not their political leadership, had performed with courage, competence, and honor. ■



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The Long-Range Strike Issue

Robert S. Dudney's June editorial [*"Long-Range Strike in Two Jumps,"* p. 2] describes the long-range strike study as being forced upon the service and essentially the only Air Force analysis of long-range capability. Air Force Space Command validated the Prompt Global Strike Mission Needs Statement through the Joint Requirements Oversight Council in May 2003.

Prompt Global Strike's focus is a global range capability achievable within minutes to hours through anti-access threats. Alternatives from all services are under consideration in the analysis. The Air Force has been examining the arena of long-distance combat effects. Air Force Space Command has been developing the idea for many years.

Maj. Anthony Ricci
Peterson AFB, Colo.

Talking About Doctrine

We at the Air Force Doctrine Center wanted to thank John Correll for his excellent article on Air Force basic doctrine in the June 2004 issue. [See *"Basic Beliefs,"* p. 42.] He tackled a difficult subject in expert fashion, making the history and issues involved understandable to lay readers in an entertaining way. We owe him a debt for informing readers of our latest Air Force Doctrine Document (AFDD) 1 and, we hope, generating interest in Air Force doctrine in general.

For the sake of clarity, we would like to expand on a couple of topics Mr. Correll brings up in his article. First, he points out that there is no longer a direct reference to the "center of gravity" concept (COG) in AFDD 1. Quite right; we made a conscious decision some time ago to move discussion of COGs—essentially a planning concept—into publications that dealt more directly with planning, like AFDD 2, "Organization and Employment for Air and Space Operations," and AFDD 2-1, "Air Warfare." There is also extensive discussion in our document on "Strategic Attack," AFDD 2-1.2, since the concept is central to that function.

Second, we moved much of the discussion concerning attack on enemy infrastructure to the strategic attack document as well. We consciously wanted to move our basic doctrine to a more effects-based focus and get away from doing such things as making laundry lists of "targets we usually hit." By focusing on effects—the full range of outcomes, events, or consequences that result from a specific action—commanders can concentrate on meeting objectives instead of managing target lists. We wanted to emphasize this in AFDD 1, and Mr. Correll was quite right to point out this new focus. No target is "off the table," however.

Nonetheless, we would like to emphasize that these minor points do not detract from an outstanding product—one fully in keeping with *Air Force Magazine's* tradition of high standards. Again, thanks for a job well done.

Col. Stephen G. Cullen,
Vice Cmdr., Air Force Doctrine Center,
Maxwell AFB, Ala.

Reagan Remembered

At the passing of one of the Air Force Association's early chapter officers, who later became the President of the United States, it might be appropriate to reflect on a meeting I had with President Reagan relative to the Cold War and the role he asked the members of the Military Coalition to play. [See *"Aerospace World: Remembering President Reagan,"* July, p. 11.] At the time I was the AFA president.

Many of President Reagan's critics insist his role in winning the Cold War was merely incidental and Russia's demise simply happened by chance on his watch. They say the Kremlin's collapse was inevitable and was not accelerated in any way by Reagan. Not true. Let me explain.

Soon after President Reagan was shot, he called the leaders of the Military Coalition to a private briefing in the Cabinet Room. There were about 20 of us. The press was permitted to come in and photograph us, but no discussions were held in their presence.

The President clearly and forcefully told us how he saw the Cold War situation and what he planned to do to resolve it in our favor. He agreed that discontent with the conditions in Russia was rising and feared that, as they had done so effectively in the past, Soviet leaders would seek out an external threat or enemy to focus a reunited Mother Russia against. To forestall this avenue, he told us he intended to make America so militarily strong and technologically superior that war with us would never be an option at a Kremlin staff meeting.

There were two things Reagan wanted us to understand and support: He intended to spend a tremendous amount of money on weapons of war, and he was sure the Russians would try to match us but would go broke trying. Their bankruptcy would only worsen the critical economical condition they already were in. He was dead right on both counts.

Reagan asked us all to explain to our membership why his plan, that was so expensive, was absolutely necessary. He had Elizabeth Dole at his side to explain that at least 30 percent of defense expenditures would return to the government in the form of taxes from a more rigorous economy, in which more people were employed, earning, and spending. She did caution that we were never to infer that to better the economy the government had only to spend money on defense. The purpose of the expenditures was national survival. The economic boost was only a bonus.

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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The President concluded the briefing by asking each of us to carry his message to our members and to our elected representatives in both houses of Congress. He said if we didn't see the need for his courageous programs, the general public never would. As the meeting ended, an aide came up to me and said the President would like a few words with me before I left.

As we left the room, Reagan stood at the door. He stuck out his hand to me and asked, "President Kregel, how is our association doing?" I told him it was somewhat bigger and stronger than it was when he was involved. Then I asked him how our country was doing. He replied, "It's not as big and strong as it needs to be, but, with your help, it will be."

Victor Kregel
AFA President (1980-81)
Colorado Springs, Colo.

Achilles' Heel

General Lord's proposal to establish a university to support the needs of space professionals is sound, and it must include the oft-ignored, mundane field of logistics. [See "The Space Cadre," June, p. 57.]

As long as crew members operate weapon systems composed of electronic and mechanical components, one thing is absolutely certain: The systems will fail. Then highly trained specialists must repair them with parts stored in anticipation of failure, transported over vast distances after being purchased by remote agents, all according to a plan to support the latest engineering marvel in a hostile environment.

It is trite, but still true, that the most brilliant operational strategies and the most elegant tactics are mere dreams without the resources needed to transform them into reality. Logistics will continue to be DOD's Achilles' heel

as USAF moves into space, and logisticians will be there to support those who actually perform the operational mission.

Col. Joseph E. Boyett Jr.,
USAF (Ret.)
Montgomery, Ala.

Those Space Events

While reading the article "50 Years of Space and Missiles" [June, p. 70], I noted an omission which I feel deserves to be [redressed].

The article omitted the name of Mae C. Jemison who was a mission specialist on *Endeavour* flight STS-47, Sept. 12, 1992, and became the first African American woman to fly in space.

Jemison is an outstanding individual with a background as chemical engineer, scientist, physician, teacher, and astronaut. I think she should be included in future lists of space flights.

Rod Horton
Kansas City, Mo.

■ *Mr. Horton indeed reports a noteworthy event. We have a more comprehensive listing on the Air Force Association Web site (www.afa.org) and plan to periodically update the Web listing as new items are identified.*—THE EDITORS

The article on the whole was very informative. I question how you compared achievements of the US space program vs. the former Soviet Union's program. The entries for the accomplishments of Alan Shepard, Gus Grissom, John Glenn, etc., were straightforward, historically accurate, and unambiguous. But the first sentence regarding Yuri Gagarin's flight states, "USSR stages world's first successful manned spaceflight." I question the use of the word "stages."

I never had any fond regards for

Letters

the Soviet Union and am fully aware that their space program was a key element in Khrushchev's propaganda machine. However, the use of the word "stages" introduces a subtlety and nuance which, compared to the other entries, leaves the accomplishment in question. Is that what you meant to convey?

MSgt. Joseph G. Fallon,
USAF (Ret.)
Hope Mills, N.C.

■ *No ambiguity intended. It was also used as the verb within an entry about an April 18, 1991, US Air Force event.—THE EDITORS*

McCain's Wisdom

We are fortunate to have such brave and wise men as Senator McCain. As he notes, failing in Iraq would be worse than failing in Mogadishu and simply would bring many more terrorist attacks. [See "Finishing the Job in Iraq," July, p. 68.]

In the view of al Qaeda, they've already scared mini-power Spain back home. They tried similar terror techniques against other allies in Iraq (kidnaping Italians, Koreans, Japanese, Turks, etc.) with less success. If we fail in Iraq, however, it will send a very different message: Terror pays.

Another of Senator McCain's observations is that it is going to take a "long time" to transition to democracy in Iraq. Let's look at other time lines. After World War II, it was four years before elections could be held in Germany in 1949. France started its transition to democracy in 1789 when it overthrew Louis XVI. They tried to write a constitution and get an elected assembly, but they got chaos instead. It was called the Reign of Terror, and 20,000 people were killed.

There are parallels between the Iraqi and French transitions to democracy. The French had not transitioned to democracy 26 years after they started. Maybe the Iraqis can beat the French time line.

William Allen Thayer
San Diego

"Easy Going Guy"

What a wonderful surprise to learn that my classmate [Capt. E. Alan Brudno] from pilot training class 64-G, Craig AFB, Ala., has finally had his name added to the Vietnam Veterans Memorial. [See "Aerospace World: Airman Named on 'The Wall,'" June, p. 18.] He was a warm, compassionate, easy going guy, whom

everyone enjoyed knowing. As I remember, Ed had hoped to one day become an astronaut and, with an aerospace engineering degree from MIT, he certainly had the credentials.

Additionally, it is heartwarming to see that the Air Force recognized that the treatment Ed endured during his captivity was directly related to his passing. I would like to thank everyone who worked toward getting him his rightful place on The Wall.

Lt. Col. Hugh D. Sims,
USAF (Ret.)
Fort Myers, Fla.

The Numbers Game

In the fine story of the 4th Fighter Wing, "When Eagles Strike," June [p. 48], a caption on p. 50 says, "They also destroyed more enemy aircraft than any other American unit." That may be true if you count aircraft destroyed on the ground, but the 354th Fighter Group shot more enemy aircraft from the skies than either the 4th or 56th, both of which had a six months head start in the European Theater of Operations.

Clayton Kelly Gross
Vancouver, Wash.

What's Where

On the last page, a great photograph and short article, "Sled Slider" ["Pieces of History," June, p. 88], reported that the John P. Stapp Air & Space Park is on Holloman AFB, N.M., when actually it is in Alamogordo, N.M. It is part of the New Mexico Museum of Space History in Alamogordo, some 15 miles from Holloman. The actual sled track, still in use today, is on Holloman.

CMSgt. Richard K. McElderry,
USAF (Ret.)
Alamogordo, N.M.

■ *Chief McElderry is correct. Retired Col. Leonard Sugarman of Las Cruces, N.M., also noted the error.—THE EDITORS*

Correction

In the article "50 Years of Space and Missiles" (June, p. 70), the photo caption on p. 75 of the first flight of *Columbia* should say "lifts off from Cape Canaveral, Fla." (Several readers noted the error.) As noted in the article, *Columbia* landed on Rogers Dry Lake, Edwards AFB, Calif., three days later.



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To promote aerospace education to the American people.

The Chart Page

By Tamar A. Mehuron, Associate Editor

Veterans and the VA

The US estimates that the veteran population numbers 25 million. Some 4.7 million this year will receive medical care through the Department of Veterans Affairs. That is more than twice the number (about 2.3 million) that used the VA health care system in 1991. (See Fig. 1.)

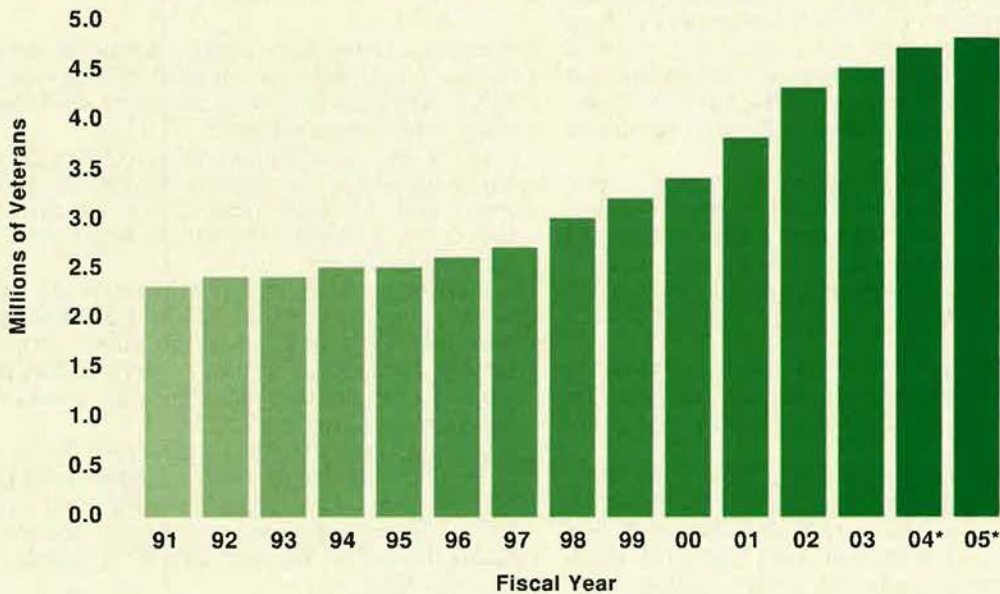
The increase in usage is attributed to two major factors. One is the

VA's shift in 1995 from hospital-based care to a system that features a full range of community-based health services. The second is 1996 legislation that directed establishment of a priority system and authorized the VA to open enrollment to all veterans.

VA projects that, over the next 20 years, the number of veterans in the

system will decline, but not as much as the overall veteran population. (See Fig. 2.)

Fig. 1 Growth in Number Receiving VA Medical Care



* Numbers for 2004 and 2005 are estimates.

Fig. 2 The 2022 Prognosis

	2007	2012	2017	2022
Veteran population	22.8 million	20.6 million	18.6 million	16.9 million ↓26%
Enrollment	6.3 million	6.3 million	6.1 million	5.7 million ↓9.5%

Source: Department of Veterans Affairs

Washington Watch

By John A. Tirpak, Executive Editor

The Air Boss's Plan; Moseley's Handshake Deal; the Bomb Catalog; BDA Fades Away

Moseley's Top Mission

In the second Gulf War, the air component's top-priority task was to prevent Iraq from using ballistic missiles and weapons of mass destruction.

"That was our No. 1 mission," said Gen. T. Michael Moseley, Air Force vice chief of staff. Had there been an attack, it would have been a "strategically dislocating event," he said, especially if Saddam Hussein had combined his missiles with chemical or biological warheads.

Moseley was the combined forces air component commander during much of Operation Enduring Freedom in Afghanistan and during Operation Iraqi Freedom. One year after the end of major combat operations in Iraq, Moseley spoke with *Air Force Magazine* about the conduct of the war, airpower's role in it, and lessons learned.

In the first Gulf War, Scud missiles had proved unexpectedly effective as terror weapons. They were launched at civilian areas, and no one knew whether they carried chemical or biological agents. The "great Scud hunt" of that war pinned down coalition airpower resources that otherwise could have been hammering Iraqi fielded forces. In Gulf War II, Moseley hoped airpower would be able to contain that threat quickly.

He convinced Army Gen. Tommy R. Franks, commander of US Central Command, that the best defense was to find and destroy the missiles before they could deploy and shoot. Moseley noted, though, that, even if deployed, the missiles' unique configuration and known operating limits would allow airpower to find and destroy them quickly.

Franks told Moseley, "OK. Your mission." Moseley became the area air defense commander, supported by special operations teams from all members of the coalition.

During the period October 2002 through February 2003, Moseley's team on four occasions practiced the Scud hunt at Nellis AFB, Nev. The hunters used an integrated approach that blended sensor aircraft, bombers, fighters, and special operations forces on the ground. They relied on the lessons of Operation Desert Storm and 12 subsequent years of technological and conceptual advances.

Moseley's staff made an exhaustive study of Iraq's previous use of mobile Scuds—range, targets, and launch locations, including the type of terrain that could support such launchers. With those data in hand, operational planners were able to significantly reduce the possible areas from which Scuds could be launched.

"It's not an infinitely open problem, once you begin to scope this down," Moseley said. Based on the results of the rehearsals, Moseley and his planners developed rules of engagement that created geographic areas, or kill boxes, within which coalition aircraft were free to attack anything they encountered.

The ROE included one supreme operating rule: "If you see one of these things, and it is erected, shoot it," said



Moseley's "what if" drills paid off.

USAF photo by MSgt. Jim Varhegyi

Moseley. There were many "unknown unknowns," he noted. There was no reliable intelligence on whether Iraq possessed any more Scuds or whether they would work, if they were on hand.

In the end, Saddam did not launch any Scuds. According to Moseley, Iraq apparently had no functional systems, "but we didn't know that at the time." Had there been such a threat, trained coalition forces would have handled it.

Moseley and his staff conducted many "what if" drills to anticipate possible moves and countermoves. In one scenario, Saddam salvaged the entire Iraqi Air Force of several hundred aircraft in a mass raid at the outset of the war. The planners, said Moseley, concluded "it would not be a showstopper."

It would have "caused us some pain for 72 to 96 hours," he said, but the coalition would have been able to "work through this." To make certain he could deal with this threat, Moseley ordered in an extra dozen F-15Cs and additional British Tornado F3s for a possible large-scale air-to-air fight.

Who Killed the Republican Guard?

During OIF, much was made of the alleged "pause" in attacks on Iraqi forces when US ground troops ran into a blinding, week-long sandstorm. Moseley, however, said that coalition airpower did not let up on the Iraqis at all. Indeed, he believes that airpower was the chief reason that Iraq's defenses crumbled so quickly.

The Republican Guard divisions were Iraq's best-trained and best-equipped troops and were also the most loyal to Saddam. Sensor aircraft and satellites located them fairly quickly.

"The mission was to not let them dig in, to not let them engage the [US and coalition ground forces]," said Moseley. Beyond that, airpower was to prevent the Guard divisions from creating "fortress Baghdad."

"From the very beginning, we struck Republican Guard

national headquarters, corps, division, brigade, battalion, and laid on these guys with extremely lethal and heavy attack," Moseley said. In short order, the Republican Guard had been rendered "combat noneffective," he asserted.

That didn't mean that they couldn't fight, but their ability to fight coherently and cohesively, acting on centralized instructions, had been destroyed, he added.

The sandstorm limited ground visibility to 30 feet, but, from above, satellites and especially E-8 Joint STARS radar airplanes could see through the sand and detect wheeled or tracked moving vehicles. The B-1B bomber's moving target indicator radar mode—functioning much like a miniature Joint STARS—could also see vehicles on the move.

By integrating sensor data from these and other systems (such as Global Hawk reconnaissance drones), Moseley's combined air operations center (CAOC) was able to catalog the locations of Iraq's units.

"In the CAOC," said Moseley, "we knew more about where the Iraqi forces were than the Iraqis did."

Using Joint Direct Attack Munitions, which were oblivious to weather conditions because they homed in on surface coordinates, US aircraft pounded the Republican Guard relentlessly, Moseley noted.

He said that coalition ground forces had "some serious fights, ... but they did not fight the Republican Guard as a single entity."

Moseley said he had a handshake deal with Army Lt. Gen. David D. McKiernan, the ground forces commander, that McKiernan's troops would never have to fight a

goal was to be able to use airpower within city limits and not destroy the city in the process.

Moseley said he told McKiernan, "If you have to fight in that city, we'll fight in that city," meaning ground forces would not be forced to handle urban warfare without effective air support. Moseley attributed the concept of urban close air support to a Marine major working on his staff. (See "Marine Air in the Mainstream," June, p. 60.)



USAF photo SSgt. Matthew Hennen

The CAOC selected from "stacked" aircraft, as needed.

The plan developed by Moseley and his staff called for stacking a wide variety of aircraft over Baghdad. Each aircraft would have different weaponry, meaning something would be available for any given situation. The menu of weapons ranged from 5,000-pound bunker-buster bombs down to 500-pound inert weapons with seeker heads but no explosives. This last weapon could effectively collapse a small building by the sheer kinetic force of its fall, but it would not cause an explosion. Nearby structures would be largely unaffected.

A single B-1B cannot yet carry within its three bomb bays "10 or 15 kinds of munitions" that could be fuzed in the air, Moseley said, but the technology exists and will be tested soon, not just on bombers but on fighters as well.

For OIF, Moseley had to fly the catalog of munitions on a variety of platforms. The CAOC staff developed a means to "keep track of those weapons." They knew exactly which aircraft had what weapons and the position of that airplane in the stack. Ground commanders could call on virtually any type of explosive or kinetic effect and quickly receive it simply by sending a request to the CAOC, said Moseley.

In prosecuting urban operations, the first step was to gain air superiority, Moseley noted.

"We, sometimes, in the joint world, dismiss the notion of just how tough it is to get air superiority," he said, "but you've got to have it so you can have all these [other] things."

Doing Away With BDA

One supposed lesson learned from OIF is that the US does not do a good job at bomb damage assessment. The reality, Moseley said, is that the traditional practice of BDA no longer makes sense. The Air Force is focused on achieving certain effects rather than certain levels of destruction, he noted, suggesting that a new metric be developed.

Moseley explained that traditional BDA has been "almost a civil engineering function," which asked, "Did the building blow up? Did you crater the command

US AF Photo by MSgt. Terry L. Blevins



A sandstorm provided no sanctuary for Iraqis.

numerically superior foe. Airpower would pulverize such a force, causing it to break apart. He also told McKiernan, "You will not have to slow down or stop unless you want to." That promise was kept, said Moseley.

Who killed the Republican Guard? Everyone attacked it, said Moseley. However, he added, "the preponderance of Republican Guard losses were due to airpower."

Saddam's six Republican Guard divisions never engaged coalition ground forces as an organized force, he said.

Dial-a-Bomb

Starting with Desert Storm and continuing through subsequent campaigns, the US has made remarkable strides in reducing civilian casualties. Moseley said that, before OIF, his staff conducted extensive simulations and computer modeling to find the minimum force needed for the urban conflict everyone expected to see in Iraq. The

center? Did you crater the runway?" Such questions must be asked when the conflict is over, but the answers are of little use in a fast-moving campaign, where it's necessary to know whether a target must be struck again.

Moseley said the real question is, "Did we create the effect we were looking for?" That effect might be stopping the Iraqi Air Force from flying, taking the Ministry of Information off the air, or eliminating the central planning capability of the Ministry of Defense.

Those are tougher questions, he said. "We really need to think in terms of desired effect or effect analysis," said Moseley.

USAF wants to automate as much of the BDA pro-

USAF photo by Capt. Patricia Lang



Traditional BDA is not sufficient in a fast-moving war.

cess as possible, said Moseley. The goal is to create a machine-to-machine process whereby a database will "maintain custody" of a target and automatically note whether a certain munition has been used against it and whether the target is no longer active. The target would disappear from the CAOC "data wall" when it has been conclusively taken out of action, but humans should not have to make that subjective judgment, he emphasized.

Such a process is not that far-fetched. Many new munitions have optical terminal seekers that show whether they hit the target and fuzed at the right moment. Such data is a powerful indicator that a target has been destroyed.

Moseley also wants earlier capture of pilot debriefs. Right now, debriefings may wait till the end of a day, after several sorties against similar targets, by which time the pilot may not be able to remember what was hit. In the case of a B-2, the debrief doesn't occur until the pilot returns to Whiteman AFB, Mo.

Moseley believes there must be "a better way to stream that information." He suggested that perhaps the debrief could be done on the return tanker trip or with a pod on the airplane that records strike information and passes it directly to the CAOC.

Automating the Data Wall

For Iraqi Freedom, Moseley's staff in the combined air operations center at Prince Sultan AB, Saudi Arabia, had a data wall, currently a set of screens, that provided information about the battlespace.

One screen was devoted to weather over the region. Another showed the location of friendly ground forces. Yet another displayed the air picture, with moving symbols indicating aircraft en route to and from targets, as

well as intelligence-surveillance-reconnaissance aircraft and aerial refuelers.

"You're looking at a scheduling screen," Moseley explained, "where daylight and dark are depicted, where thermal crossovers are depicted, or where any special events are depicted. ... At any one time, you can look and see who's next into the airspace, how long do they have, where are the tankers."

The Air Force would like to automate many of the functions now performed by people looking at screens and verbally issuing orders based on what they see. Example: During the rescue of downed airman, a CAOC operator would be able to "run a cursor out over that spot" and let machines order up the right combination of rescue forces, including helicopters, fighters, and tankers.

"We're getting closer to that," Moseley said.

He added that, in an upcoming joint experiment/exercise, "we're going to be able to demonstrate that technology."

He also believes more effort needs to be put into "marrying information operations and information warfare." Air Force leaders will not discuss this in much detail because they don't want to give clues to enemies about defensive and offensive computer or information attacks. However, Moseley did say that computers, deception, and psychological operations together form one of the two new pillars of modern warfare. "That becomes your nonkinetic pillar," he said. "The kinetic pillar we understand very well."

Data Links: Keys to the Future

It is axiomatic that speed is the key to dealing with targets that reveal themselves only briefly. Moseley said he is looking forward to the day when the entire force is equipped with digital data links permitting "speed of light" information flow between shooters and the CAOC. He wants to reduce voice communications, which are time-consuming and error-prone. Such a capability isn't that far off, he said.

The new technology will eliminate the need for "grease pencils on maps" that "take hours to display" and will let the CAOC rapidly swing aircraft back and forth between types of missions, noted Moseley. Strategic attack may turn into close air support at a touch of a button from the CAOC—without any delays. Precise target coordinates, way points, even maps will be transferred instantly.

Moseley emphasized that this airpower data link advance also must be integrated with ground forces so that everyone has "a single, common operating picture."

It's a misconception, he added, that mere "coordination" will win future fights. The various forces involved must be integrated, Moseley said.

The "integration of the components" for OIF "was better than it's ever been," he added, but "you have to be looking at the same picture." The common operating picture must allow the land component commander to understand the priorities of the air component commander, and vice versa, said Moseley.

"You win wars with an integrated effort, because each of us brings an interesting ... and exclusive set of joint tools to the combatant commander," asserted Moseley.

"Each of those tools has limits and capabilities, so the art form in this is to minimize the deficiencies ... and maximize the operational utility. One way to do that is to have a trusting relationship amongst the components and the combatant commander." ■



insight action

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Aerospace World

By Adam J. Hebert, Senior Editor

Airman Killed in Iraq

SSgt. Dustin W. Peters, 25, was killed July 11 when the Army convoy in which he was riding in Iraq was hit by an "improvised explosive device," according to a USAF news release.

Peters, a native of El Dorado, Kan., was attached to the Army's 494th Truck Company at Balad AB, Iraq. He had deployed from Little Rock AFB, Ark., to the 332nd Air Expeditionary Wing in February. He was on his fourth deployment since arriving at Little Rock in November 2000.

Pilot Killed in Midair Collision

Air National Guard Maj. William E. Burchett, of Arlington, Tenn., died May 17 when his F-16 collided with another Falcon during a training mission over the Indiana-Illinois border.

The pilot of the second fighter, ANG Maj. Thomas R. Sims, was injured when he ejected, but he was treated and released.

Both pilots were with the Indiana ANG's 181st Fighter Wing, Hulman Arpt., Ind. Burchett, who was an Air Force Academy graduate, had more than 2,300 flying hours in F-4, F-16, and T-38 aircraft.

Officials are investigating the cause of the accident.

Missouri ANG First To Fly F-15Cs

The Missouri Air National Guard will become the first ANG unit to fly C model F-15s when the newer Eagles



Lockheed Martin photo by Tom Reynolds

Maj. Chris Hamilton, Joint Strike Fighter Integrated Test Force, pilots an F-16 fitted with a pod (underwing, foreground) designed for the F-35. The June 17 test over Edwards AFB, Calif., will help certify the pod for further use on F-16 test vehicles.

are sent to the 131st Fighter Wing at Lambert-St. Louis Airport this fall.

The F-15Cs will replace the A models the wing has flown since 1991.

"We're scheduled to get the first ones in the August-September time frame," Col. Mike G. Brandt, wing commander, told the *St. Louis Post-Dispatch*. He added that the dates have not yet been finalized.

Currently the 131st owns 17 F-15As,

which are nearly 30 years old. Florida, Hawaii, Louisiana, Massachusetts, and Oregon also have ANG units that fly F-15As.

DOD Creates New Space Office

The Defense Department on May 3 created a new National Security Space Office, combining three existing space offices into a single entity. The office is headed by Air Force Maj. Gen. C. Robert Kehler.

The office consolidates the National Security Space Integration, National Security Space Architect, and Transformational Communications offices.

Kehler, who previously led the NSSI, told *Inside the Pentagon* that the combination was the "next logical step" in continuing to meet the goals of the 2001 Space Commission.

Vermont May Gain Active Airmen

The Air Force may ask the Vermont Air National Guard to host active duty airmen at the state's F-16 wing, according to Maj. Gen. Ronald J. Bath, USAF director of strategic planning. Bath noted that Vermont "has an F-16 unit with enough ramp

US Returns Power to Iraqis

The United States on June 28 ceded power to the nascent Iraqi government, two days ahead of the declared deadline to transfer power. At an impromptu and low-key ceremony in Baghdad, L. Paul Bremer, head of the Coalition Provisional Authority, said he was confident the new Iraqi government "is ready to meet the challenges ahead."

Bremer left Iraq by Air Force C-130 shortly after the ceremony that marked the dissolution of the CPA and the end of direct US control over Iraqi affairs. The size of the US military force in Iraq is expected to remain steady for the foreseeable future while the nation attempts to stabilize.

space and infrastructure capacity for more planes."

The Air Force is considering moving active duty aircrews and maintainers to Vermont and increasing the number of aircraft at the 158th Fighter Wing, Burlington Arpt., Vt. The arrangement would be part of a USAF concept called Future Total Force that is designed to increase combat capability by utilizing active, Guard, and Reserve forces in a different way.

"You can call them blended, integrated, merged, affiliated, associated, or partnered units," said Bath. The end result is to make the best use of existing resources.

USAF has had associate units, where one component shares aircraft with another component, for several years and has a blended wing, comprised of active and Guard personnel, at Robins AFB, Ga. The Vermont proposal is unique because the state currently does not have any active duty USAF facilities.

Active duty airmen would "blend into the community, as opposed to having the big base infrastructure we are used to," said Bath.

"Hanoi Taxi" Flies Again

To highlight the end of his 44-year career, Reserve Maj. Gen. Edward J. Mechenbier flew the C-141 dubbed the "Hanoi Taxi" to Vietnam in late May to recover the remains of two servicemen who had been listed as missing in action during the Vietnam War.

The 62-year-old Mechenbier, who had flown aboard the Hanoi Taxi 31 years earlier as a newly released prisoner of war, was the last Vietnam-era POW still serving and the oldest Air Force pilot still flying. He retired June 30.

His POW ordeal began in June 1967 when, on his 113th combat mission, his F-4C Phantom was shot down. He had been targeting the Vu Chu railroad complex about 30 miles northeast of Hanoi on that mission, when he was a first lieutenant. He spent nearly six years in the Hoa Lo prison—the notorious "Hanoi Hilton."

Mechenbier, an Air Force Academy graduate, served in all three Air Force components. He left the active duty force in 1975 and flew with the Ohio Air National Guard for about 16 years, before transferring to the Air Force Reserve in 1991.

USAF Takes UH-1H Training

The Air Force is assuming control of its UH-1H helicopter undergraduate pilot training at Ft. Rucker, Ala. The Army is retiring its UH-1Hs at Ft.

Rumsfeld Opts for Shifts at Two Key Spots

Defense Secretary Donald H. Rumsfeld broke with tradition June 16 when he announced his choices to lead North American Aerospace Defense Command and US Strategic Command.

Navy Vice Adm. Timothy J. Keating was nominated for a fourth star and assignment as head of North American Aerospace Defense Command, a job that had been held by an Air Force general since NORAD's founding in 1957.

If confirmed by the Senate, Keating would replace USAF Gen. Ralph E. Eberhart, who has been NORAD chief since early 2000 and head of US Northern Command since it was established in 2002 in response to the 9/11 terrorist attacks. Eberhart will retire at the end of the year. Both headquarters operate out of Peterson AFB, Colo.

Keating previously served as director of the Joint Staff at the Pentagon. Rumsfeld announced the nomination of Marine Corps Lt. Gen. James E. Cartwright to receive a fourth star and lead STRATCOM, a job that previously always went to an Air Force or Navy four-star. The STRATCOM headquarters is at Offutt AFB, Neb.

The Senate, on June 8, confirmed Cartwright, who replaced Adm. James O. Ellis as STRATCOM chief in a July 9 ceremony at Offutt.

Cartwright previously served as director of force structure, resources, and assessment for the Joint Staff.

STRATCOM, which has been led by two Air Force and three Navy flag officers since its creation in 1992—after deactivation of USAF's Strategic Air Command—took over SAC's headquarters and facilities at Offutt. In October 2002, STRATCOM absorbed the functions of US Space Command, which had always been led by an Air Force general.

The 2002 merger expanded STRATCOM's role beyond its historical nuclear mission and added new, worldwide responsibilities, including planning for global strike, information operations, and missile defense.

ANG Pilot Found Guilty of Dereliction

More than two years after a deadly fratricide incident in Afghanistan, the Air Force found Illinois Air National Guard F-16 pilot Maj. Harry Schmidt derelict in performance of his duty during the April 17, 2002, bombing. Schmidt has said he will appeal the decision.

Lt. Gen. Bruce Carlson, 8th Air Force commander, issued his decision July 6, less than two weeks after Schmidt withdrew his request to contest the charges against him through a court-martial. A year earlier, on June 19, 2003, the Air Force had offered the pilot the option of a nonjudicial process rather than a court-martial, but, on June 25, 2003, Schmidt declared he wanted to be tried by court-martial.

However, on June 24 of this year, Schmidt told the Air Force he wanted to undergo a nonjudicial hearing instead. Carlson, who is the presiding officer in the case, accepted his request the same day.

Schmidt presented his case on July 1 in a one-hour appearance before Carlson.

In finding the pilot guilty, Carlson said that Schmidt had "flagrantly disregarded a direct order" and had "exercised a total lack of basic flight discipline" and "blatantly ignored the applicable rules of engagement and special instructions." As punishment, Carlson issued a written reprimand and ordered Schmidt to pay \$5,672, the maximum amount provided under Article 15 of the Uniform Code of Military Justice.

Schmidt could have faced 64 years of confinement had he been convicted at a court-martial. His flight lead, Maj. William Umbach, was previously cited for "leadership failures" and retired with a reprimand.

The attack on the Tarnac Farms area killed four Canadians and injured eight. (For additional background on this case, see "Aerospace World" news items: "ANG Pilot Seeks Court-Martial," August 2003, p. 11, and "Pilots Blamed in Canadian Deaths," August 2002, p. 16.)

Rucker and plans to transfer some to Air Education and Training Command, but the aircraft and flight training mission will remain at the post, where USAF helicopter pilots have trained for 35 years.

AETC officials, who announced the change in June, expect the transfer of helicopters to be complete in September. The Air Force began using a "blue" curriculum in late May. Previously, USAF pilots had been taught using an



Thousands of spectators at Mojave Apt., Calif., witness the departure of SpaceShipOne on its historic June 21 venture into space. See "Private Spaceflight Succeeds," at right.

Army curriculum for half the course, said Maj. Larry Walker, AETC's program manager for helicopter undergraduate training.

The first phase featured Army contract instructor pilots (IPs) using Army instructions and procedures, said Walker. During the second phase, Air Force IPs took over, using USAF instructions and procedures.

The training will still come in two blocks, but the Army contract IPs will now use Air Force procedures. The change eliminates the transition phase from Army to Air Force procedures that preceded Block II, enabling USAF to add more mission training such as night vision goggle flights.

Walker emphasized: "We're not doing things better than the Army. The Army trains great pilots. We just train our pilots for different missions."

Roché Eyes European Systems

Air Force Secretary James G. Roché said recently that US defense industry consolidations left DOD too reliant on a few contractors; consequently, he wants to see increased competition from European manufacturers.

London's *Financial Times* reported in June that Roché said EADS previously "was not prepared" to compete with Boeing for USAF's aerial refueling aircraft business—but now the European conglomerate is.

"I have always wanted to have a situation where you take this trans-Atlantic thing seriously," Roché said. "It's the only way we're going to dis-

cipline the big airframe makers in the United States."

Private Spaceflight Succeeds

On June 21, *SpaceShipOne*, a privately financed, piloted vehicle competing for the \$10 million Ansari X-Prize, reached an altitude of approximately 62 miles. The event marked the first manned spaceflight not backed by a government.

The 90-minute flight originated and ended at Mojave Arpt., Calif. The spacecraft, which was flown by test pilot Michael W. Melvill, was carried aloft by a mother ship named *White Knight*, a twin turbojet research aircraft, which first flew in August 2002. *White Knight* released *SpaceShipOne* at nearly 50,000 feet.

After separation, Melvill fired the hybrid rocket on the bug-shaped spacecraft, which then ascended at Mach 3 to 62.2 miles, as verified by ground-based radar. A trim problem

Protocols Not Ready, Air Defenders Scrambled

In mid-June, a report on the immediate response to the Sept. 11, 2001, terrorist attacks concluded that the US government's existing hijack protocol "was unsuited in every aspect for what was about to happen." Neither the FAA nor NORAD was trained to handle such an event; yet, according to the report, the individuals involved were "proactive" and thought "outside the box."

The National Commission on Terrorist Attacks Upon the United States, otherwise known as the 9/11 commission, on June 16-17, held its final public hearing, during which it released staff statement No. 17. The commission also heard testimony from various military and FAA officials.

The staff report, which detailed the events of Sept. 11 as developed from documents, interviews, voice recordings, and other material, represented "work to date" that could be revised "in light of new information."

According to the report, there have been some "conflicting accounts" of how and when actions by the FAA and NORAD transpired on Sept. 11. Those "inaccurate accounts" have "created questions about supposed delays in the military's interception of the hijacked aircraft," stated the report. The report went on to say that such inaccurate accounts also deflected questions about "the military's capacity to obtain timely and accurate information from its own resources" and "overstated the FAA's ability to provide the military timely and useful information that morning."

However, the staff report maintains that "an accurate understanding" of the events reflects no discredit on the operational personnel.

DOD and FAA officials admitted that they did not have procedures to handle a hijacked aircraft being used as a weapon. "Our air defense posture was aligned to look outward to counter external threats to North America," USAF Gen. Ralph E. Eberhart, NORAD commander, told the commission in June.

Eberhart said since then, NORAD forces "remain at a heightened readiness level." And, he said, the President and Secretary of Defense have created new rules of engagement to respond to hostile acts within domestic airspace.

Pr or to 9/11, the FAA's traditional communications channel with the military during a crisis was through the National Military Command Center at the Pentagon, a retired FAA official, Monte R. Belger, told the commission. There was no formal direct channel to NORAD.

Now, said Belger, there are direct communications links between FAA facilities and NORAD.

According to the 9/11 commission staff report, NORAD personnel "made the best decisions they could, based on the information they received."

during the flight caused Melvill to begin his descent 22 miles off course, but he was able to correct and return to Mojave. He became the first private pilot to earn astronaut wings.

The spacecraft was designed by Burt Rutan's Scaled Composites company, and the project was financed by Microsoft co-founder Paul G. Allen, who said he had invested about \$20 million in the effort.

Although a true spaceflight, the altitude of 62.2 miles missed the X-prize target of 62.5 miles. Rutan said the ship would fly at least two more times to fulfill the prize requirements.

The Ansari X-Prize was established in 1996 to spur the creation of a civilian spaceflight industry. About a dozen teams have been competing for the X-prize, using a wide variety of approaches.

US Drops Immunity Resolution

The United States on June 23 withdrew its effort to secure an extension of immunity from prosecution by the United Nations' International Criminal Court.

The draft resolution would have covered military personnel from the US and other nations that have not ratified the treaty that created the court, which was set up in 2002. The US secured such a resolution in 2002 and again in 2003, but it expired June 30.

The 2003 resolution had 12 yes votes out of the 15-member UN Security Council. However, this year, the news of the Iraqi prisoner abuses by US personnel created reservations among many council members, according to a State Department news release.

The US decided to forgo "action on the draft at this time in order to avoid a prolonged and divisive debate," said James B. Cunningham, deputy US ambassador to the UN.

The US had long been concerned that the ICC, as laid out, could leave troops vulnerable to spurious or revenge-motivated trials for alleged war crimes. (See "Disorder in the Court," October 2002, p. 36.)

Without a new resolution, said Cunningham, the US must "take into account the risk of ICC review when determining contributions to UN authorized or established operations."

Army Chief Says NK "Vulnerable"

Army Chief of Staff Gen. Peter J. Schoomaker said in June that South Korea is "exactly the place you don't want Cold War-style stuff," because a large, garrison-style army plays to North Korea's strengths. That is why he favors the proposed cuts to the US presence in South Korea.

"The last thing you want to do with

Army Also Improving Air-Land Coordination

Army Lt. Gen. Franklin L. "Buster" Hagenbeck, who commanded Operation Anaconda in Afghanistan in 2002, said in June that his service has taken to heart the lessons of that campaign and is working to improve the coordination between its ground forces and air elements.

Anaconda was notable partly for the lack of coordination between the Air Force and Army during the first three days of the battle.

The Army has "instituted some training programs, joint training efforts, to ensure that we know how each other [the Air Force and Army] think and ... work on a battlefield," Hagenbeck told the Defense Writers Group. He added that the Army also is conducting "more robust air support" training.

Hagenbeck said the subsequent experience in Iraq has shown these efforts to be "very effective."

Hagenbeck initially was critical of Air Force actions in Anaconda. (See "Aerospace World: After Leaving USAF Out of Anaconda Planning, Army General Blasts Air Support," November 2002, p. 14.) In comments in an internal Army publication, Hagenbeck said fixed-wing aircraft were largely ineffective against fleeting targets.

Although Anaconda had been in planning for weeks, the Air Force was not notified of the operation until 24 hours before its start. Hagenbeck's comments inspired the Air Force and Army leadership to work together more closely at the highest levels.

Better coordination at the general-officer level was not the only improvement to come from Anaconda, Hagenbeck said in June. After 72 hours, "the people on the ground and the pilots all figured out how to make these things work," he noted.

The Army is now trying to institutionalize those lessons and is also increasing the resources it devotes to the air-to-ground mission—much as the Air Force is doing through its recent focus on battlefield airmen.

Hagenbeck said air-to-ground coordination is now "a major point of emphasis," for the Army.

Moorman To Head New Look at Space Future

Retired USAF Gen. Thomas S. Moorman Jr. will head a new study of the military and commercial launch market to help the service better plan for its future rocket needs. The study will reprise one that Moorman performed in the mid-1990s that led to the creation of the Evolved Expendable Launch Vehicle program.

Moorman, now a principal with Booz Allen Hamilton, was tapped to do the study by Michael W. Wynne, undersecretary of defense for acquisition, technology, and logistics.

Peter M. Teets, undersecretary of the Air Force and DOD's executive agent for space, told reporters at the Pentagon in June that Moorman is charged with evaluating whether "through process discipline, ... you can have low launch rates and still have ... efficiency and moderate cost." He said Moorman will do "a fine job of relooking at the launch business."

The study was to begin in June, and a final report is due in December, but Teets said some interim reports will be used by those working the 2006 defense budget.

Moorman's previous study forecast a growing market for commercial and military launch services that could support two competing rocket programs—Boeing's Delta and Lockheed Martin's Atlas programs. However, soon after the study was completed, the "tech bubble" burst, new emphasis was given to fiber-optic land lines, and satellites proved unusually long-lived, greatly curtailing the demand for launch services.

Teets has said that he wants to preserve competition between two prime contractors in the launch arena. "We need to maintain both those families [of launch vehicles] to protect against uncertainties, not just in terms of failure of a [particular] rocket," said Teets.

He noted that, while the US is enjoying a run of good luck with its space launches, "launch failures tend to go in cycles." Eventually, added Teets, "we'll lose another one."

However, the House Appropriations Committee has suggested that maintaining two rocket producers is unnecessarily expensive. The Air Force admits that the cost of maintaining two companies in the launch business exceeds \$50 million per year.

Also, given Boeing's current debarment for ethical lapses in its rocket program, Teets said he would likely have to award a single rocket contract to Lockheed in the next few months to support a classified payload launch. He hopes that Boeing will be cleared to resume doing rocket business with the government in time for the next competition this fall, which will cover 24 launches.

—John A. Tirpak

somebody who's got a million people under arms is to go and try to meet them symmetrically," Schoomaker told the Defense Writers Group June 15. "What you want to do is make that [standing army] a huge disadvantage for them," he said. "You want to fight them differently. That's what we've got the capability of doing."

The US has announced it may re-

duce its 37,000 troops in South Korea by 12,500. However, the Pentagon is in the process of spending \$11 billion to upgrade its force on the Korean peninsula and has made other moves to increase combat power in the region, such as stationing bombers on Guam, within easy striking distance of North Korea.

"The best way to fight is on our

terms," Schoomaker asserted. North Korea's communist regime is "hugely vulnerable if we fight it our way," he said.

New Reserve Pay Center Opens

All Guard and Reserve payroll functions will be handled in one location with the opening of the new Reserve Center of Excellence in Cleveland.

News Notes

By Tamar A. Mehuron, Associate Editor

■ Gen. Paul V. Hester, Air Force Special Operations Command commander, took command of Pacific Air Forces on July 2, replacing Gen. William J. Begert, who retired. Hester was commander of Air Force Special Operations Command, where he was replaced by Lt. Gen. (sel.) Michael W. Wooley on July 1.

■ President Bush, on June 18, nominated Army Lt. Gen. Bantz J. Craddock, currently serving as senior military assistant to the Secretary of Defense, as commander of US Southern Command, Miami. If confirmed, Craddock would replace Army Gen. James T. Hill.

■ PACAF airmen on deployment to the US Central Command theater now have dedicated, contract flights to take them directly to Southwest Asia. Previously, the airmen were routed from Japan through Atlanta or Baltimore on the East Coast, then on through to the theater, a journey that took as long as five days.

■ Northrop Grumman began assembly of the F-35's center fuselage in May, officials announced. The company is scheduled to deliver the first center fuselage to Lockheed Martin, the prime contractor for the Joint Strike Fighter, in May 2005.

■ In a related F-35 development, Northrop Grumman delivered a crucial avionics system to Lockheed Martin two weeks ahead of schedule. Based on software-defined radio technology, the F-35 avionics system is much lighter and smaller and features multiple functions capability vs. the traditional single function radios.

■ Air Combat Command has been conducting final operational testing of a software upgrade slated to be fielded on F-16s this summer. The software works with the new Link 16 data link system to connect pilots

with other aircraft, command and control aircraft, and air operations centers. At the same time, European allies flying F-16s will receive upgrades with compatible capabilities.

■ The remains of Col. Lester E. Holmes, a pilot listed as missing in action during the Vietnam War, were returned to his family on May 18 for burial. On May 22, 1967, enemy fire downed Holmes' O-1E aircraft while he was on a forward air control mission over Quang Binh Province, North Vietnam. The aircraft spiraled to the ground, according to another forward air controller who saw it. There was no emergency radio beacon, and intense enemy activity in the area prevented a search and rescue operation. In July 1998, US officials recovered human remains that subsequently were identified as Holmes.

■ An F-15 with the 325th Fighter Wing, Tyndall AFB, Fla., crashed into the Gulf of Mexico while on a training mission May 21. The pilot, Lt. Col. Patrick Marshall, ejected and was reported in good condition. USAF will investigate the accident.

■ The collision of two F-16s March 9 was caused by pilot error, concluded an accident board report released June 15. The collision occurred during a basic fighter maneuver training engagement over the Atlantic Ocean. Both pilots landed their aircraft safely at Shaw AFB, S.C., and were unharmed. Both were assigned to 79th Fighter Squadron at Shaw.

■ A safety board is investigating the cause of a June 14 crash of an MQ-1 Predator unmanned aerial vehicle. It crashed while returning from a training mission at the Nevada Test and Training Range. There were no injuries or property damage.

■ USAF estimated engine damage caused by two separate mechanical

failures Feb. 3 on an E-4E National Airborne Operations Center aircraft at nearly \$4 million, according to an investigation report released June 7. The crew declared an in-flight emergency and landed safely. A turbine blade had fractured and moved through sections of the turbine, damaging an engine. In a second, unrelated failure, the casing that surrounds the turbine blades to increase air flow dropped into the turbine air path. There was no indication of which happened first.

■ USAF officials are investigating the June 18 crash of an F-15C at the Nevada Test and Training Range while on a training mission. The pilot ejected and was taken to the hospital for evaluation. Both the pilot and the aircraft were assigned to the Air Force Weapons School at Nellis AFB, Nev.

■ The 2003 Air Force Battlelab Project Officer and Enlisted Project Officer of the Year awards went to 1st Lt. Brian Herman, Information Warfare Battlelab, Lackland AFB, Tex., and TSgt. Ronald Newpher, Air and Space Expeditionary Force Battlelab, Mountain Home AFB, Idaho, respectively.

■ USAF pararescueman SSgt. Joshua A. Swartz, now stationed at Pope AFB, N.C., received the 2004 Non Commissioned Officers Association Vanguard Award for heroic action in Bayji, Iraq, on April 8, 2003, when he pulled an injured Army ranger from the hood of a burning vehicle, took him to safety, and treated the severe wounds. Swartz was wounded and under fire at the time. His efforts saved the ranger's life and helped in rescuing the rest of the team.

■ Exceptional leadership displayed by four airmen during their Air University course work earned them the Secretary of the Air Force Leadership Award. The four are: Lt. Col. James Vechery, US Transportation Command, Scott AFB, Ill.; Maj. Mitchell Monroe, 721st Air Mobility Squadron, McGuire AFB, N.J.; Capt. Patrick Farrell, 33rd Fighter Squadron, Seymour Johnson AFB, N.C.; and MSgt. Sharif Rahim, 335th Training Squadron, Keesler AFB, Miss.

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Defense Finance and Accounting Service officials formally opened the new center June 29.

Payroll actions that were conducted in Denver and Indianapolis are moving to the new center. All pay actions for Guard and Reserve forces, regardless of service, will be under one roof.

Officials noted that the consolidation of reserve payroll operations did not eliminate any jobs in the Denver or Indianapolis facilities.

Navy To Replace P-3s

DOD on June 14 announced selection of Boeing to develop a replacement for the Navy's fleet of P-3 Orion aircraft. The Lockheed Martin P-3s are used for maritime surveillance and patrol, with antisubmarine operations a primary mission.

The \$3.9 billion award puts the Multimission Maritime Aircraft (MMA) program into its initial development phase. Ultimately, a buy of 108 operational aircraft could be worth as much as \$20 billion for Boeing. The new aircraft is supposed to enter service in 2013. Boeing plans to derive the MMA from its 737 commercial platform.

In announcing the decision, Navy acquisition executive John J. Young Jr. said that it's "becoming urgent" to replace the aging P-3 fleet with a new airframe and "enhanced capability." He added that both Boeing and Lockheed Martin "produced high quality proposals," but the Navy determined that Boeing could deliver the aircraft sooner. "That helped tip the scales," said Young.

Academy Cadet Pleads Guilty

On June 8, Air Force Academy Cadet 3rd Class Douglas L. Meester pleaded guilty to charges of dereliction of duty, conduct unbecoming an officer, and indecent acts. Originally, he had been accused of raping a freshman female cadet in October 2002.

Academy officials dropped the original charges, including rape and forcible sodomy, in return for a pretrial agreement that called for Meester to enter a guilty plea on the remaining charges. (For background on this news item, see "Upheaval at the Academy," January, p. 56.)

Meester received a reprimand and a \$2,000 fine. He remains a cadet at the academy.

Russians Begin Open Skies Work

In early June, according to the State Department, Russia and Belarus con-

The Iraq Story Continues

Casualties

By June 25, a total of 850 Americans had died while officially supporting Operation Iraqi Freedom—848 troops and two Defense Department contractors.

Of those casualties, 629 were killed by hostile action, while the other 221 died in noncombat incidents, such as accidents.

President Bush declared major combat operations in Iraq complete on May 1, 2003. Since that time, 710 troops have died in Iraq: 518 in combat and 192 in nonhostile incidents. The two DOD civilians were killed in the line of duty earlier this year.

Command Changes in Iraq

Army Gen. George W. Casey, on June 24, was confirmed by the Senate to take over command of US forces in Iraq. President Bush announced Casey's nomination June 15.

Replacing Army Lt. Gen. Ricardo S. Sanchez as the top military official on the ground, Casey is the first four-star commander to operate out of Iraq. During the major combat phase of Iraqi Freedom, Army Gen. Tommy R. Franks ran the war primarily from US Central Command headquarters in Florida.

Casey previously served as Army vice chief of staff, and his appointment is expected to clarify an in-country command structure that had Sanchez commanding while just one of several three-star generals working in Iraq.

Yankee Go Home?

A survey by the US-led Coalition Provisional Authority, which administered Iraq until the June 28 power transfer, found that Iraqi confidence in coalition forces had dwindled markedly by the summer. Results of the survey of 1,093 Iraqis were obtained by *Newsweek*.

Pollsters sponsored by the CPA found that 55 percent of Iraqis said they would feel safer if the coalition forces left Iraq immediately. Also, about 80 percent of the respondents said they had "no confidence" in the civilian or military forces overseeing the nation.

According to the poll, 71 percent of the respondents depended upon other Iraqis for their sense of security. Coalition forces provided a sense of security for only one percent of those polled, while 18 percent said the Iraqi police were their primary source of protection.

Iraqi Air Force Gets First Two Aircraft

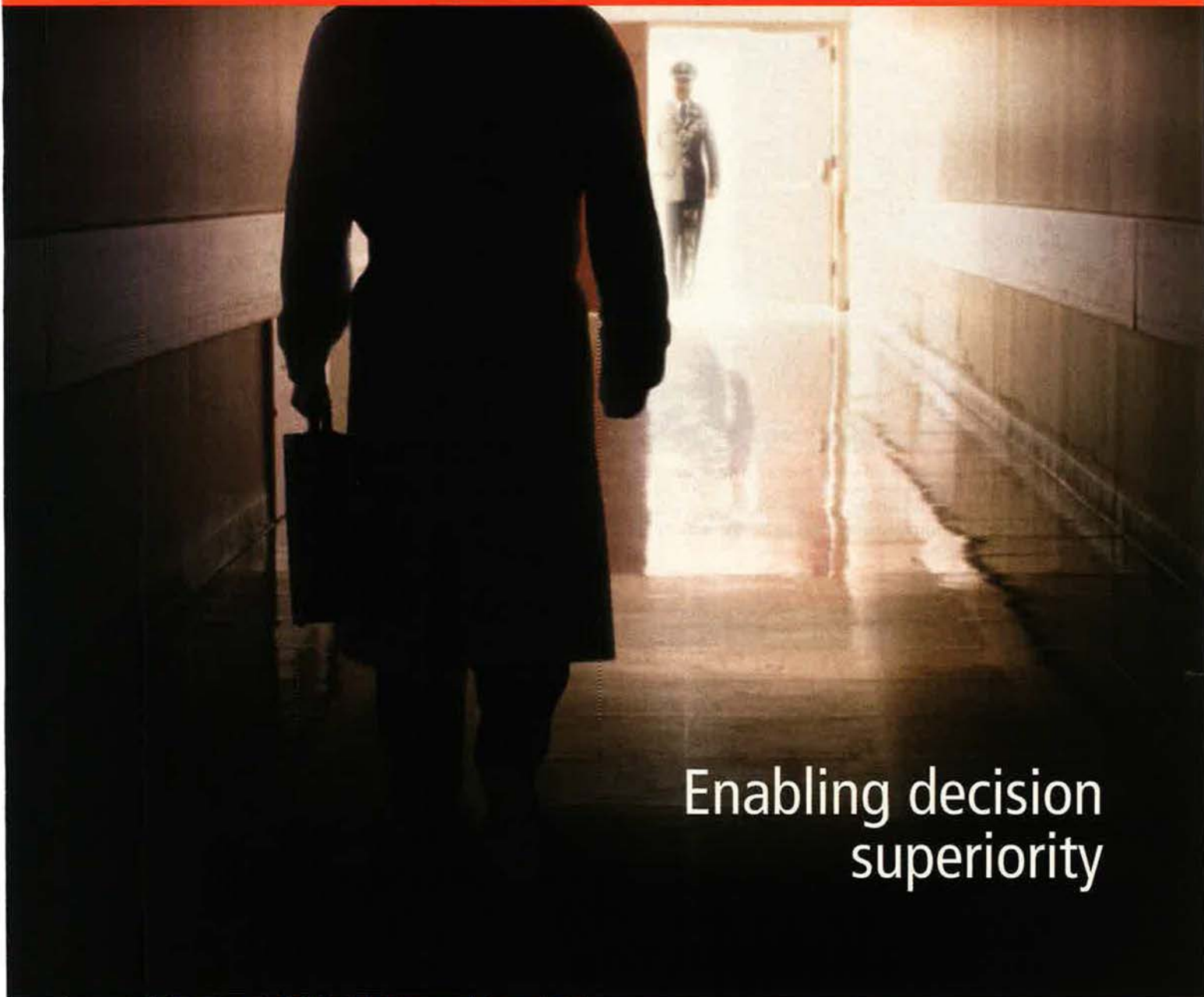
The nascent Iraqi Air Force purchased its first two airplanes in June, US Central Command announced. The Australian-built SB7L-360 Seekers are reconnaissance aircraft that will be used to help protect energy infrastructure and "aid in border and coastal security," according to a CENTCOM news release.

The airplanes are "fitted with high-resolution surveillance systems, digital video recording hardware, and other reconnaissance technology," CENTCOM said. The Seekers were purchased from Jordan, which has offered Iraq "a gift of 16 helicopters and two C-130 aircraft to augment the force," the statement continued.

"This purchase represents a significant leap forward in ... [Iraq's] ability to surgically find and respond to sabotage on infrastructure," said Marine Corps Capt. Jeremy DeMott, a security transition officer.

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Air Force aircrew members on June 5 brief Army paratroopers on local weather conditions before they jump into France on the 60th anniversary of the Normandy invasion during World War II. Some 700 airmen and soldiers jumped from USAF C-17 and C-130 aircraft to commemorate the June 5, 1944, paratroop drop into Nazi-controlled France.

ducted their first Open Skies Treaty observation flight over the United States. The US has already flown 10 observation missions over Russia and Belarus since the treaty went into force Jan. 1, 2002.

The Russia-Belarus team's TU-154 aircraft arrived at Travis AFB, Calif., from which it flew to Elmendorf AFB, Alaska, to begin its overflight of the US.

Russia and Belarus were slated to fly a second mission sometime this year. A US escort team accompanies the Russia-Belarus team during the flights.

The Open Skies Treaty, which currently has 30 participating nations, originally was negotiated between members of NATO and the Warsaw Pact and signed in 1992. It allows all participants to gather information about military forces and activities in what the State Department calls "one of the most wide-ranging international efforts to date to promote openness and transparency." ■

Senior Staff Changes

RETIREMENTS: Gen. William J. **Begert**, Maj. Gen. Paul D. **Nielsen**, Brig. Gen. David A. **Wagie**.

PROMOTION: To **General:** Paul V. **Hester**.

CHANGES: Lt. Gen. (sel.) John A. **Bradley**, from Asst. to the Chairman, JCS, Reserve Matters, Pentagon, to Chief, AF Reserve, Pentagon ... Maj. Gen. (sel.) Roger W. **Burg**, from Dir., Nuclear Policy & Arms Control, NSC, Washington, D.C., to Dir., Nuclear & Counterproliferation, DCS, Air & Space Ops., USAF, Pentagon ... Maj. Gen. Bob D. **Dulaney**, from Dir., Plans, NORAD Peterson AFB, Colo., to Dir., Air & Space Ops., USAF, Ramstein AB, Germany ... Maj. Gen. Robert J. **Elder Jr.**, from Spec. Asst. to Cmdr., AU, AETC, Maxwell AFB, Ala., to Commandant, AWC, AETC, Maxwell AFB, Ala. ... Maj. Gen. Michael C. **Gould**, from Dir., Operational Plans & Jt. Matters, DCS, Air & Space Ops., USAF, Pentagon, to Cmdr., 3rd AF, USAFE, RAF Mildenhall, UK ... Maj. Gen. Jonathan S. **Gration**, from Asst. Dep. Under SECAF, Intl. Affairs, Pentagon, to Dir., P&P, EUCOM, Stuttgart-Vaihingen, Germany ... Maj. Gen. William F. **Hodgkins**, from Dep. Cmdr., CAOC 7, Air South, NATO, Larissa, Greece, to Dir., Plans, NORAD, Peterson AFB, Colo. ... Maj. Gen. John L. **Hudson**, from Dir., JSF Prgm. Office, OSD, Pentagon, to Asst. Dep. Under SECAF, Intl. Affairs, Pentagon ... Lt. Gen. Jeffrey B. **Kohler**, from Dir., P&P, EUCOM, Stuttgart-Vaihingen, Germany, to Dir., Defense Security Cooperation Agency, Arlington, Va. ... Maj. Gen. Maurice L. **McFann Jr.**, from Dir., Ops., NORTHCOM, Peterson AFB, Colo., to Chief of Safety, USAF, Pentagon ...

Lt. Gen. Duncan J. **McNabb**, from DCS, P&F, USAF, Pentagon, to Dir., Log., Jt. Staff, Pentagon ... Lt. Gen. (sel.) Henry A. **Obering III**, from Dep. Dir., Missile Defense Agency, Arlington, Va., to Dir., MDA, Arlington, Va. ... Maj. Gen. Bentley B. **Rayburn**, from Commandant, AWC, AETC, Maxwell AFB, Ala., to Cmcr., AF Doctrine Center, Maxwell AFB, Ala. ... Lt. Gen. John F. **Regni**, from Cmdr., 2nd AF, AETC, Keesler AFB, Miss., to Cmdr., AU, AETC, Maxwell AFB, Ala. ... Maj. Gen. (sel.) Marc E. **Rogers**, from Dir., Strat. Rqmts. & Integration, JFCOM, Norfolk, Va., to Dir., Transformation, AFMC, Wright-Patterson AFB, Ohio

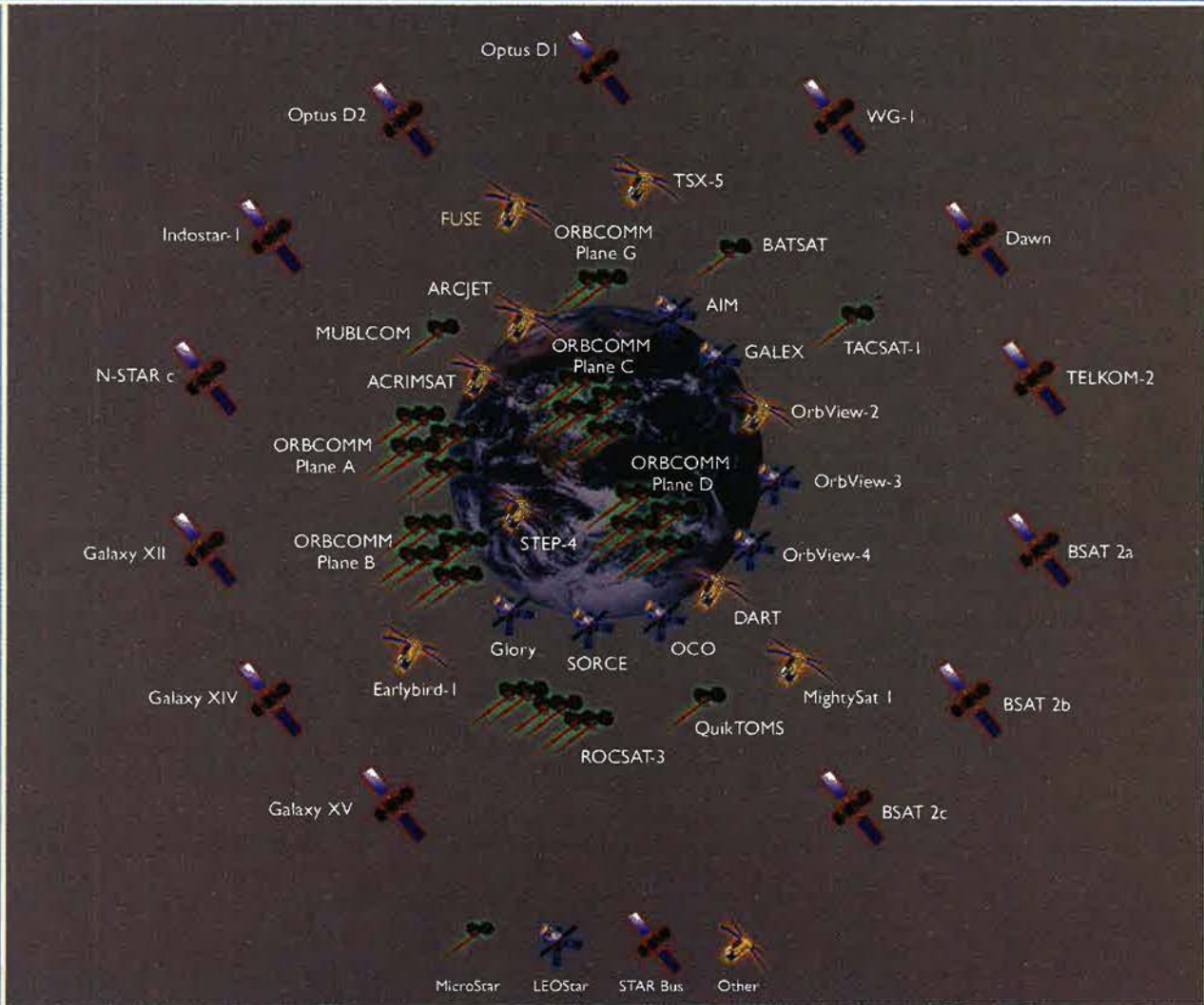
... Maj. Gen. (sel.) Arthur J. **Rooney Jr.**, from Cmdr., 82nd Tng. Wg., AETC, Sheppard AFB, Tex., to Cmdr., AF Security Assistance Center, AFMC, Wright-Patterson AFB, Ohio ... Lt. Gen. Norton A. **Schwartz**, from Dir., Ops., Jt. Staff, Pentagon, to Dir., Jt. Staff, Pentagon ... Maj. Gen. Charles N. **Simpson**, from Dir., Air & Space Ops., USAF, Ramstein AB, Germany, to Dir., Strat. Rqmts. & Integration, JFCOM, Norfolk, Va. ... Maj. Gen. Robert L. **Smolen**, from Dir., Nuclear & Counterproliferation, DCS, Air & Space Ops., USAF, Pentagon, to Dir., Nuclear & Policy Arms Control, NSC, Washington, D.C. ... Maj. Gen. (sel.) Loyd S. **Utterback**, from Dep. Dir., Strat. Planning & Policy, PACOM, Camp H.M. Smith, Hawaii, to Cmdr., 2nd AF, AETC, Keesler AFB, Miss. ... Lt. Gen. (sel.) Michael W. **Wooley**, from Cmdr., 3rd AF, USAFE, RAF Mildenhall, UK, to Cmdr., AFSOC, Hurlburt Field, Fla.

SENIOR EXECUTIVE SERVICE RETIREMENT: Carl C. **McRorie**.

SES CHANGES: Donald L. **Cazel II**, to Dep., Sustainment, Ogden ALC, AFMC, Hill AFB, Utah ... Robert J. **Conner**, to Exec. Dir., AFMC, Wright-Patterson AFB, Ohio ... Alok **Das**, to Chief Scientist, Space Vehicles, AFRL, AFMC, Kirtland AFB, N.M. ... Lisa J. **Dybvad**, to Dir., Office of Mgmt. Ops., DARPA, Arlington, Va. ... Michael A. **Gill**, to Regional Dir., Tricare Regional Office-South, ASD (Health Affairs), TMA, San Antonio ... Brendan B. **Godfrey**, to Dir., AFOSR, AFMC, Arlington, Va. ... Michael A. **Noll**, to Dir., Intel., NORAD and NORTHCOM, Peterson AFB, Colo. ... Gerald F. **Pease Jr.**, to Dep. Asst. Secy., Basing & Infrastructure Analysis, OSAF (Instl., Environment, & Log.), Pentagon ... Leif E. **Peterson**, to Dep. Dir., Personnel, AFMC, Wright-Patterson AFB, Ohio ... Garry B. **Richey**, to Dep. for Spt., Oklahoma City ALC, AFMC, Tinker AFB, Okla. ... Brenda L. **Romaine**, to Dep. Dir., Log., AMC, Scott AFB, Ill. ... Joseph D. **Rouge**, to Assoc. Dir., Natl. Security Space Office, OSAF, Pentagon ... Eric L. **Stephens**, to Dep. Dir., 311th Human Systems Wg., AFMC, Brooks City-Base, Tex. ... David **Tillotson III**, to Dir., Architecture & Operational Spt. Modernization, DCS, Warfighting Integration, USAF, Pentagon ... Virginia L. **Williamson**, to Dep., C4I Systems Directorate, TRANSCOM, Scott AFB, Ill. ■

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Action in Congress

By Tom Philpott, Contributing Editor

Lawmakers Endorse SBP Changes; Full Concurrent Receipt for Severely Disabled?; Congress Divided Over Reserve Health Care ...

Congress Advances SBP Reform

In a long-sought victory for current and future surviving military spouses, the House and Senate have agreed to phase out a sharp drop in benefits that most widows and widowers see at age 62 under the Survivor Benefit Plan. It is the first time both chambers have endorsed SBP enhancements.

Still to be decided by a House-Senate conference committee working on the 2005 defense authorization bill: how long the phaseout will take and how costly it will be to enroll in the improved SBP plan for retirees who previously declined spouse coverage.

SBP benefits drop at 62 when surviving spouses become eligible for Social Security. They typically fall from 55 percent of covered retired pay down to as low as 35 percent, depending upon when enrollment began. Some retirees avoid the drop by purchasing supplemental SBP at retirement time. But the supplemental SBP is not a government-subsidized program, so premiums are high.

The House in mid-May approved its defense bill with a provision to phase out by April 2008 the age-62 offset. Payments would be raised to 40 percent of covered retired pay on Oct. 1, 2005, 45 percent in April 2006, 50 percent in April 2007, and be fully restored, to 55 percent, a year later.

The House plan also calls for a one-year open season that could be attractive to retirees who declined SBP earlier. Premiums would be set higher than for retirees who elected coverage at retirement, but the penalty for late enrollment would be modest, capped at 4.5 percent of covered retired pay atop regular premiums of 6.5 percent.

Sen. Mary Landrieu (D-La.) initially proposed an amendment to the Senate's defense bill that echoed the House plan. In late night negotiations, Senate leaders worked a compromise with Landrieu, and, on June 23, she accepted two changes.

One, an amendment from Sen.

John Ensign (R-Nev.), would require open-season enrollees to pay all premiums (plus interest) that they would have paid had they elected SBP coverage at retirement. To do otherwise, Ensign said, would be unfair to current participants, when comparing lifetime costs.

The other change was a 10-year phaseout vs. three-and-a-half years under the House plan.

Defense officials argued that the case made for ending the offset was based largely on misperceptions. One such misperception, they said, was that the government promised to subsidize 40 percent of SBP costs for the typical retiree. The percentage has fallen over the past decade to below 20 percent.

Many Senators seriously considered the Administration's arguments, as well as the cost estimate for the change, which is \$5 billion over 10 years plus a \$20 billion increase in unfunded liabilities for the military retirement fund, but chose to support the legislation.

House-Senate conferees began work in July to resolve differences between the two versions of the bill. Service associations were pressing lawmakers to support the House version.

Concurrent Receipt May Expand

The Senate approved an amendment offered by Sen. Harry Reid (D-Nev.) that would restore full retired pay next January to 30,000 retirees who are 100 percent disabled.

Military retirees for decades have seen their service annuities reduced, dollar for dollar, by VA compensation for service-connected disabilities. Last year Congress authorized what is now known as the Concurrent Disability Pay (CDP) program to ease the ban on concurrent receipt of full military retiree pay and VA disability pay.

It will restore over 10 years any retired pay offset for disabilities of 50 percent or more. It applies only to retirees who completed 20 or more years of service or left service under Temporary Early Retirement Author-

ity available during the Cold War drawdown.

The Senate bill, as amended, would switch to full CDP benefits in January 2005 for those retirees who are 100 percent disabled. If the House agrees, the monthly CDP would rise by amounts that fully restore retirement payment in addition to VA disability compensation. Current legislation calls for gradual CDP increases, which, next January, for those 100 percent disabled, amounts to a rise from \$750 a month to \$900.

Reid said 10 years is just too long to wait for the most severely disabled to win full relief from what critics describe as the "veterans disability tax."

Full restoration, estimated to cost \$900 million over 10 years, is high enough to leave doubts whether House conferees will agree to accelerated payments.

Reserve Retirement: Still at 60

Both the House and Senate have rejected proposals to lower the reserve retirement age from 60 down to 55.

The House Armed Services Committee declined to include such a provision in its version of the defense bill. In the Senate, an amendment put forth by Sen. Jon Corzine (D-N.J.) made it to the Senate floor, but it did not survive.

Corzine had urged starting reserve retirement benefits five years earlier, arguing the move was warranted because of the expanded role of Guard and Reserve forces in the war on terrorism. He said it would help boost reserve retention and readiness.

Sen. John Warner (R-Va.), a key opponent of the measure, maintained that the retirement rollback would have little impact on readiness or retention. It would, he said, cost almost \$2 billion a year and would immediately only reward those reservists who have completed their service under different rules and are just awaiting their annuities.

Warner warned that if Congress

continues to "narrow differences" between reserve and active duty benefits, "pretty soon people will say, 'Let's opt for the Reserve and the Guard—all of us—rather than spend 20 years of our lives [on active duty] to gain those benefits.'"

Conferees To Settle Other Issues

House and Senate authorization conferees still must iron out differences over several other military personnel issues in their respective defense bills. The issues include:

Reserve health care: Senators adopted, on 70-to-25 vote, an amendment from Tom Daschle (D-S.D.) and Lindsey Graham (R-S.C.) that would open Tricare to selected (or drilling) reservists and their families.

Guard and Reserve members who elect to buy into Tricare would pay premiums equal to 28 percent of program costs, roughly \$530 annually for individuals or \$1,860 for family coverage. For those who opt to keep their employer-provided health coverage, DOD would pay part or all of the employee share of premiums during mobilization.

The amendment, with a price tag of \$5.4 billion over five years, replaced a low-cost Senate Armed Services Committee alternative, called Tricare Reserve Select, that would have opened Tricare to drilling reservists if their employers, rather than the government, picked up the 72 percent cost share and premiums covered the rest.

However, the House has a significantly different viewpoint. The House defense bill calls for a three-year test that would offer Tricare only to those drilling reservists and their families who lack employer-provided health care. Legislators in the House say they want to confirm whether access to Tricare improves reserve force readiness or manning before spending billions of dollars.

End strength: The Army will grow, but by how much? The House bill would direct a 30,000 increase in active duty soldiers and a 9,000 increase in Marines, both phased in over three years. The Senate bill, on a floor amendment from Sen. Jack Reed (D-R.I.), would mandate only an increase of 20,000 soldiers.

Base closings: House and Senate authorization conferees in July tackled whether to buck a threatened Presidential veto over a proposed delay for the 2005 base realignment and closure (BRAC) round.

Legislators in the House called for a two-year delay, defeating, by a vote of 259 to 162, an amendment to knock the provision from the bill. Senators refused to add a similar

two-year delay. The defeat came on a narrow 49-to-47 vote.

Both Republicans and Democrats say uncertain force requirements from wars in Iraq and Afghanistan and a planned restructuring of US basing overseas argue against holding BRAC in 2005.

Tax Relief Update

Freshman Sen. Mark Pryor (D-Ark.) took a first step toward remedying an inequity in income tax rules for lower-income military families whose service members served combat tours last year in Afghanistan and Iraq.

Combat-zone tax exclusions actually lowered incomes for 5,000 to 10,000 of these troops by affecting their eligibility for more valuable tax breaks, such as the Earned Income Tax Credit. (See "Action in Congress: Combat Tax Penalty," July, p. 20.)

The net income loss for some families surpassed \$4,000, and the number of affected families could be even higher in 2004 given the longer combat tours being served, defense officials said. A Defense Department initiative to address the combat-zone tax problem failed to clear the White House's Office of Management and Budget earlier this year.

Pryor, joined by Sen. Max Baucus (Mont.), ranking Democrat on the Senate Finance Committee, introduced the Tax Relief for Americans in Combat Act (S. 2419) to allow service members "to continue receiving their rightful combat pay exclusions, while having the ability to take full advantage of other tax credits."

By law, tax bills must originate in the House, so Pryor worked an arrangement with the House Ways and Means Committee that will enable him to attach his combat tax relief provision to the Senate version of the unrelated Guardsmen and Reservists Financial Relief Act of 2004 (H.R. 1779), sponsored by Rep. Bob Beauprez (R-Colo.). The Beauprez measure cleared the House last April and is awaiting Senate action.

Divorced Retirees File Lawsuit

Over the last decade, Congress has shown little interest in amending a 1982 law that permits state courts to divide military retirement as marital property in divorce settlements. That lack of action prompted a group of divorced service members and retirees to file a lawsuit, challenging the Uniformed Services Former Spouses Protection Act (USFSPA) as unconstitutional.

The lawsuit (Adkins, ULSG, et al. vs. Rumsfeld), filed in US District Court (Eastern Division of Virginia),

argues that USFSPA violates divorced military members' rights to due process and to equal protection. ULSG stands for USFSPA Litigation Support Group, formed last year specifically to challenge the law in court after legislative remedies failed.

ULSG claims the law:

- Violates due process guarantees under the Fifth and 14th Amendments, because it was applied retroactively to persons who first entered service before it took effect.

- Leaves service members with "inadequate procedural protections" as to whether: divorce courts have proper jurisdiction; members receive proper notice and opportunity to be heard; finance centers exercise "due diligence" in authenticating divorce decrees; funds that are improperly paid to ex-spouses can be recouped.

- Violates a constitutional mandate, inherent in the Supremacy Clause of Article VI, for uniformity of treatment of military personnel across the United States.

- Denies retirees equal protection guarantees under the Fifth and 14th Amendments through "unfavorable and discriminatory treatment," compared with laws governing treatment in divorce of other federal retirement plans, and treats military spouses more favorably than military retirees.

Jonathan L. Katz, a lawyer for the plaintiffs, said the lawsuit might be the first brought on these constitutional challenges. Plaintiffs include more than 40 divorced retirees and 15 divorced active duty members.

DIC Deadline Approaches

Congress expanded the law regarding Dependency and Indemnity Compensation (DIC) payments to include remarried surviving military spouses, if they do not remarry until age 57 or older. DIC payments go to spouses of service members whose deaths were service connected.

The Veterans Benefits Act of 2003, enacted late last year, set Dec. 15 as the deadline for surviving spouses who remarried before Dec. 16, 2003, to apply to have DIC restarted. At stake is about \$967 a month.

Applicants should complete VA Form 21-686c, Declaration of Status of Dependents, which can be downloaded from the VA Web site (www.va.gov). For more information, contact a VA regional office at 1-800-827-1000.

Because the VA has no way of knowing who is eligible or where they live, readers are urged to share this information with potential applicants in their communities before the open season ends. ■

Verbatim

By John T. Correll, Contributing Editor

Speed Over Mass

"In general, in capabilities, you can just basically look at the lessons learned out of Iraqi Freedom and Enduring Freedom, that speed is more important than mass."—**Senior Administration official, speaking on background, Pentagon news briefing, June 9.**

Long-Term Proposition

"Simply put, the demands on our deployable forces have not diminished and are not expected to decline for some time. We have a new rotational requirement for nearly 20,000 airmen—about three times the demand prior to Sept. 11, 2001."—**Gen. John P. Jumper, Air Force Chief of Staff, "Chief's Sight Picture," June 4.**

Colonial War

"No matter how exalted the aims of the US in the war, in the final analysis it was a colonial war very similar to the wars conducted by the ex-colonial powers when they went out to conquer the rest of the world—either in the name of Christianity, or bringing civilization to underdeveloped countries, or bringing the rule of law to uncivilized populations."—**Prince Turki al-Faisal, Saudi ambassador to Britain, statement to Irish Independent, cited by Washington Times, May 25.**

France Remembers

"France will never forget. She will never forget that sixth of June 1944, the day hope was reborn and rekindled. She will never forget those men who made the ultimate sacrifice to liberate our soil, our native land, our continent, from the yoke of Nazi barbarity."—**French President Jacques Chirac at D-Day ceremonies June 6, Washington Post, June 7.**

Bouncing Back

"My own military career started out at Kansas State University, ... where ROTC was at that time mandatory. When I went through summer camp, the officer who wrote my evaluation gave me a pretty mediocre write-up. In fact, it wasn't mediocre; it was really bad. As I recall,

the words on my training report were, 'Cadet Myers doesn't have much of a future in the military.' Maybe he was right. After 39 years, here I am in a dead-end job."—**Air Force Gen. Richard B. Myers, Chairman of the Joint Chiefs of Staff, Naval Academy commencement speech, May 28.**

Come See the Cows

"I've never been angry at the French. France has been a longtime ally. ... If [Chirac] wants to come and see some cows, he's welcome to come out [to Crawford, Tex.] and see some cows."—**President Bush, Paris Match interview, May 28.**

Sir Tommy

"General Franks has been a sterling friend. ... This award is to recognize his exceptional and inspirational leadership of British forces during operations both in Afghanistan and Iraq."—**British defense ministry spokesman on the knighting of retired US Army Gen. Tommy R. Franks, New York Times, May 26.**

Don't Hold Your Breath

"It's an idea whose time may never come."—**Charles Moskos, noted sociologist on military issues, about a return to the military draft, Associated Press, June 1.**

Less Safe

"There's no one who deals with the global community who doesn't understand the degree to which we've isolated ourselves, and I think we're less safe because of that."—**Sen. John F. Kerry, Democratic Presidential candidate, New York Times, May 30.**

No Trailer Hitch

"Comanche was \$4.6 billion over the program—\$14.6 billion. That was going to buy 121 helicopters—121 helicopters. [Comanche] had yet to fully lift its mission load and was not protected against the threats to which we have lost scores of aircraft in the current fight, the IR threat. It has some counter-radar capability, but we hadn't in a long time seen a radar on the battlefield shooting at one of our aircraft. So,

what we have ... is what I call a Porsche without a trailer hitch when we are in the cattle-hauling business."—**Gen. Peter J. Schoomaker, Army Chief of Staff, Defense Writers Group, June 15.**

Other Side of the News

"The American people do not get to see all the times our troops are mobbed by supportive villagers wishing to show their appreciation."—**Spec. Stan Matlock, Army medic serving in Iraq, letter to Defense News, June 7.**

Realistic Expectations

"It seems to me, our expectations have to be recast and be realistic. It is a tough, ugly business to get from a dictatorship to a freer system, and our task is to help them do it."—**Secretary of Defense Donald H. Rumsfeld on progress in Iraq, meeting with sailors on USS Essex, June 4.**

Tester's View of Technology

"Every time you have a conflict, it's an opportunity to go show off these systems. I might call them toys."—**Thomas P. Christie, Pentagon director of operational test and evaluation, Government Executive, June 1.**

All Bids Welcome

"I don't care if the planes are made by Martians."—**Air Force Secretary James G. Roche, welcoming European contractors to compete on aircraft programs, London Financial Times, June 10.**

CIA Knows Best

"For those agencies that have military as well as intelligence responsibilities—like the National Security Agency and the National Geospatial-Intelligence Agency—the Secretary of Defense should have to send his nomination of their leaders to the [Central Intelligence Agency] director, who would decide whether to appoint them. Their tenure, too, would be determined by the director of central intelligence."—**Robert M. Gates, former CIA director, New York Times op-ed, June 8.** ■

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Rolls-Royce
Smiths Aerospace
Vought Aircraft

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Team Osprey



2004 Space Almanac

ON the following pages appears a variety of information and statistical material about space—particularly military activity in space. This almanac was compiled by *Air Force Magazine*, with assistance and information from Steve Garber, NASA History Office; Phillip S. Clark, Molniya Space Consultancy; Joseph J. Burger, Space Analysis and Research, Inc.; and US Strategic Command and Air Force Space Command Public Affairs Offices.

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

A photograph taken from space showing a satellite component. The component has a gold-colored rectangular panel and a long, black, tapered boom extending horizontally across the frame. Below the boom, there are several circular black structures and a blue strip. The background is the Earth's surface, showing blue oceans and brownish-yellow landmasses under a clear sky.

By Tamar A. Mehuron, Associate Editor

Introduction



What's Up There

As of May 31, 2004

Country/Organization	Satellites	Space Probes	Debris	Total
CIS (Russia/former USSR)	1,349	35	2,618	4,002
US	903	52	2,872	3,827
European Space Agency	35	4	301	340
People's Republic of China	40	0	285	325
Japan	84	7	51	142
India	27	0	104	131
Intl. Telecom Sat. Org.	60	0	0	60
Globalstar	52	0	0	52
France	33	0	16	49
Orbcomm	35	0	0	35
European Telecom Sat. Org.	26	0	0	26
Germany	20	2	1	23
United Kingdom	22	0	1	23
Canada	21	0	1	22
Italy	10	0	3	13
Luxembourg	13	0	0	13
Australia	9	0	2	11
Sea Launch	1	0	10	11
Brazil	10	0	0	10
Sweden	10	0	0	10
Indonesia	9	0	0	9
Intl. Maritime Sat. Org.	9	0	0	9
NATO	8	0	0	8
South Korea	8	0	0	8
Arab Sat. Comm. Org.	7	0	0	7
Argentina	7	0	0	7
Mexico	6	0	0	6
Spain	6	0	0	6
Czech Republic	5	0	0	5
Israel	5	0	0	5
Netherlands	5	0	0	5
Turkey	5	0	0	5
AsiaSat Corp.	4	0	0	4
Intl. Space Station	1	3	0	4
Thailand	4	0	0	4
Denmark	3	0	0	3
Malaysia	3	0	0	3
Norway	3	0	0	3
Saudi Arabia	3	0	0	3
China/Brazil	2	0	0	2
Egypt	2	0	0	2
France/Germany	2	0	0	2
Philippines	2	0	0	2
UAE	2	0	0	2
Algeria	1	0	0	1
Chile	1	0	0	1
EUVE	1	0	0	1
Greece	1	0	0	1
NICO	1	0	0	1
Nigeria	1	0	0	1
Pakistan	1	0	0	1
Portugal	1	0	0	1
PRES (China/ESA)	1	0	0	1
Republic of China (Taiwan)	1	0	0	1
Saudi Arabia/France	1	0	0	1
Singapore/Taiwan	1	0	0	1
US/Brazil	1	0	0	1
Total	2,884	103	6,265	9,252

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Worldwide Orbital Launch Sites, 1957-2003

Launch Site	Owner	Total Launches
Plesetsk	Russia	1,542
Tyuratam/Baikonur, Kazakhstan	Russia	1,204
Vandenberg AFB, Calif.	US	626
Cape Canaveral AFS, Fla.	US	599
Kourou, French Guiana	ESA	170
JFK Space Center, Fla.	US	134
Kapustin Yar	Russia	101
Tanegashima	Japan	37
Xichang	China	36
Shuang Cheng-tsu/Jiuquan	China	32
Kagoshima	Japan	31
Wallops Flight Facility, Va.	US	30
Edwards AFB, Calif.	US	20
Sriharikota	India	18
Taiyuan	China	18
Pacific Ocean Platform	Sea Launch	11
Indian Ocean Platform	US	9
Palmachim	Israel	5
Hammaguir, Algeria	France	4
Svobodny	Russia	4
Woomera, Australia	Australia	4
Alcantara	Brazil	3
Barents Sea	Russia	1
Gando AB, Canary Islands	Spain	1
Kodiak, Alaska	US	1
Kwajalein, Marshall Islands	US	1
Musudan ri	North Korea	1
Total		4,643

Space on the Web

(Some of the space-related sites on the World Wide Web)

Defense	Web address
US Strategic Command	www.stratcom.mil
Air Force Space Command	www.peterson.af.mil/hqafspc
21st Space Wing	www.peterson.af.mil/21sw
30th Space Wing	www.vandenberg.af.mil
45th Space Wing	https://www.patrick.af.mil
50th Space Wing	www.schriever.af.mil
Space & Missile Systems Ctr.	www.losangeles.af.mil

Industry	Web address
Boeing Integrated Defense Systems	www.boeing.com/ids
Lockheed Martin Space Systems Co.	www.ast.lmco.com
Northrop Grumman Space Technology	www.st.northropgrumman.com
Orbital Sciences	www.orbital.com

NASA	Web address
Integrated Launch Schedule	www-pao.ksc.nasa.gov/kscpao/schedule/mixfleet.htm
Jet Propulsion Laboratory	www.jpl.nasa.gov
NASA Human Spaceflight	spaceflight.nasa.gov
Science @ NASA	science.nasa.gov
Space Center Houston	spacecenter.org

Other	Web address
Florida Today	www.floridatoday.com/news/space/index.htm
Space.com, Inc.	www.space.com
Spaceweather.com	www.spaceweather.com

Space and Missile Badges



Space/Missile Badge



Astronaut Pilot*

* The astronaut designator indicates a USAF rated officer qualified to perform duties in space (50 miles and up) and who has completed at least one operational mission. Pilot wings are used here only to illustrate the position of the designator on the wings.

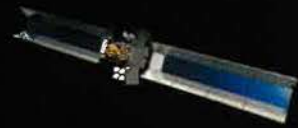


Missile Badge



Missile Badge with Operations Designer

The Year in Space



July 15, 2003

US Broadcasting Board of Governors claims Cuba jammed Voice of America satellite TV broadcasts into Iran. Jamming was first detected July 6, and Telstar 12 service providers quickly found the source of the jamming to be located near Havana. Cuba issued a denial but said it would investigate.

Aug. 29

USAF launches last Defense Satellite Communications System III spacecraft into orbit aboard a Boeing Delta IV Evolved Expendable Launch Vehicle (EELV) from Cape Canaveral AFS, Fla.

Sept. 29

Lockheed Martin announces Northrop Grumman has joined with it and Orbital Sciences to compete for full-scale development of NASA's Orbital Spaceplane. Boeing is also vying for the OSP project.

Oct. 1

Air Force Reserve Command activates the 26th Space Aggressor Squadron, Schriever AFB, Colo., the third AFRC space squadron and first to serve in the space control mission area. It works with the active duty 527th SAS in Air Force Space Command's Space Warfare Center.

Oct. 16

China completes a manned space mission and joins the exclusive club of the US and Russia when it becomes the third country to send a person into space. Chinese officials said China plans to conduct space walks and space vehicle docking, establish a space lab, and begin exploring the moon within three years.

Oct. 18

USAF launches its final Titan II from Vandenberg AFB, Calif. The booster, which carried a Defense Meteorological Satellite Program spacecraft into orbit, was the 13th of 14 Cold War Titan II ICBMs Lockheed Martin refurbished for space launch. The 14th is expected to go into a museum.

Nov. 4

The 45th Space Wing announces transfer of Launch Complex 47 to the Florida Space Authority. The pad was slated for deactivation, but a licensing agreement under the Commercial Space Transportation Act permitted its continued operation and upkeep by FSA.

Nov. 19

The National Oceanic and Atmospheric Administration (NOAA) declares operational the first fully upgraded Block 5D-3 DMSP spacecraft, dubbed F16, after it undergoes a 30-day checkout, following its Oct. 18 launch (see above). NOAA is the designated operator for DMSPs, which provide data for strategic

and tactical weather prediction for US military forces.

Nov. 24

The National Imagery and Mapping Agency changes its name to the National Geospatial-Intelligence Agency (NGA).

Dec. 1

The 30th Space Wing, Vandenberg, and 45th SW, Patrick AFB, Fla., undergo realignments to streamline launch operations at each wing. The moves align former acquisition detachments at each base with some wing operations units to form the 30th Launch Group and 45th Launch Group, respectively.

Dec. 2

Lockheed Martin's final Atlas IIAS rocket carries a classified NRO payload into orbit from Vandenberg's Space Launch Complex-3 East, slated to undergo refurbishment to launch the new Atlas V EELV, beginning in fall 2005.

Dec. 2

NASA taps a USAF Reservist, Lt. Col. Michael E. Fossum, as a mission specialist for space shuttle flight STS-121, slated to fly no earlier than November 2004.

Jan. 5, 2004

USAF advances work toward the next generation Global Positioning Satellite, called GPS III, by awarding two system requirement contracts, one to Boeing and one to Lockheed Martin. Space and Missile Systems Center, Los Angeles AFB, Calif., expects to select one contractor in December 2005 for the GPS III development contract.

Jan. 14

President Bush unveils a new space exploration program with three major goals: first, completion of the ISS by 2010; second, development and testing of the Crew Exploration Vehicle (CEV) by 2008, with a manned flight by 2014; third, return to the moon by 2015, if possible, but not later than 2020. The CEV is expected to transport astronauts to the ISS after the space shuttle retires, but its main purpose is to carry spacefarers to other worlds.

Jan. 15

Schriever Air Force Base officials declare GPS IIR-10, launched Dec. 21, 2003, from Cape Canaveral Air Force Station, to be fully operational. The new satellite has an enhanced antenna panel to increase power output of the navigation signal, making it less susceptible to interference.

Jan. 30

USAF receives a prototype integrated air and space command and control (C2) capability developed by Lockheed Martin. The prototype, delivered to the C2 Transformation Center at Langley AFB, Va., provides a significant step

toward automated availability of space information for air operations centers worldwide and machine-to-machine data exchange for more cohesive planning between air and space command centers.

Feb. 14

A Boeing inertial upper stage launched atop a Titan IVB from Cape Canaveral boosts DSP-22 into orbit. It is the last launch in the 22-year run of the IUS program. The Titan IV-IUS combination is being replaced by EELVs.

March 20

The 50th GPS launches into orbit aboard a Boeing Delta II rocket from Cape Canaveral. The launch of GPS IIR-11 was dedicated to the late Ivan A. Getting, considered the father of GPS.

March 30

Boeing and Ball Aerospace announce win of the Space Based Surveillance System (SBSS) contract to develop a satellite and ground segment, provide launch services, and initially operate the new system. Northrop Grumman, as SBSS prime contractor, made the award to the Boeing-Ball team.

April 16

USAF begins first major step toward creation of the Space Based Radar (SBR) system by awarding concept development contracts to Lockheed Martin and Northrop Grumman. USAF expects to make final selection in 2006.

May 6

USAF Maj. James P. Dutton Jr., an F/A-22 test pilot, is named as one of two new space shuttle pilots. NASA also selects three other military personnel as new astronauts: Marine Maj. Randolph J. Bresnik, Lt. Cmdr. Christopher J. Cassidy, and Army Maj. Robert S. Kimbrough.

May 18

A space-based launch range moves a step closer to reality when USAF and Lockheed Martin successfully use a range instrumentation payload carried on an unmanned aircraft to track a Delta II rocket launched from Vandenberg. Lockheed's Range Systems Transformational Laboratory (RSTL) program tracked and recorded several minutes of telemetry data. USAF hopes the RSTL will prove the mobile launch range concept and lead to a space-based range that will eliminate the need for costly fixed range infrastructures.

June 23

US and European Union officials announce they have agreed on terms to make the EU's new Galileo satellite navigation system compatible with GPS. The agreement ended a long-running dispute. (See "Aerospace World: US, EU Set for NavSat Deal," March, p. 15.) ■

Military & Civilian Space Budgets

US Space Funding, Current Dollars

(In millions)

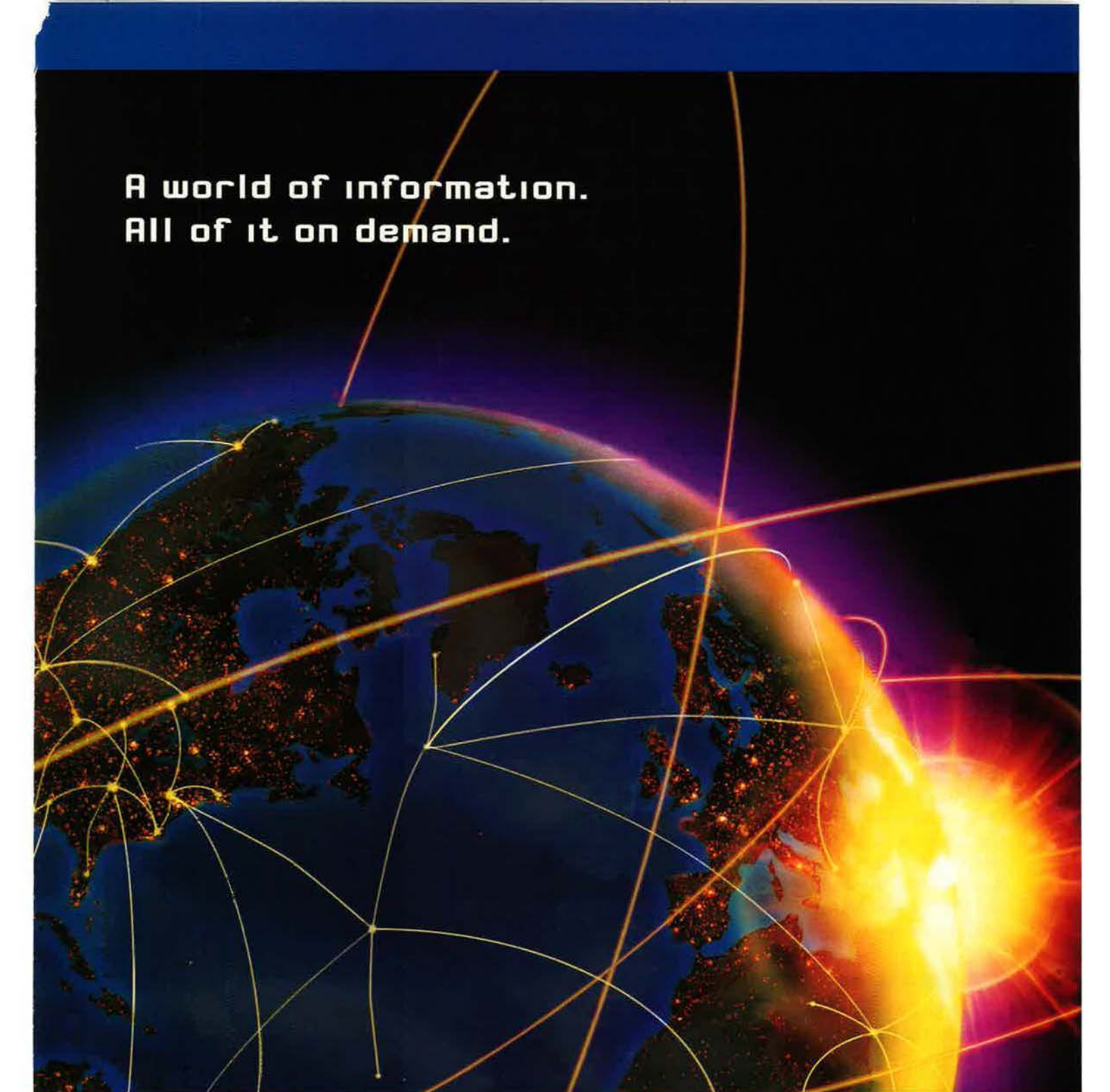
FY	NASA	DOD	Other	Total
1959	\$261	\$490	\$34	\$785
1960	462	561	43	1,066
1961	926	814	68	1,808
1962	1,797	1,298	199	3,294
1963	3,626	1,550	257	5,433
1964	5,016	1,599	213	6,828
1965	5,138	1,574	241	6,953
1966	5,065	1,689	214	6,968
1967	4,830	1,664	213	6,707
1968	4,430	1,922	174	6,526
1969	3,822	2,013	170	6,005
1970	3,547	1,678	141	5,366
1971	3,101	1,512	162	4,775
1972	3,071	1,407	133	4,611
1973	3,093	1,623	147	4,863
1974	2,759	1,766	158	4,683
1975	2,915	1,892	158	4,965
1976	3,225	1,983	168	5,376
1977	3,440	2,412	194	6,046
1978	3,623	2,738	226	6,587
1979	4,030	3,036	248	7,314
1980	4,680	3,848	231	8,759
1981	4,992	4,828	234	10,054
1982	5,528	6,679	313	12,520
1983	6,328	9,019	327	15,674
1984	6,858	10,195	395	17,448
1985	6,925	12,768	584	20,277
1986	7,165	14,126	477	21,768
1987	9,809	16,287	466	26,562
1988	8,322	17,679	741	26,742
1989	10,097	17,906	560	28,563
1990	11,460	15,616	506	27,582
1991	13,046	14,181	772	27,999
1992	13,199	15,023	798	29,020
1993	13,064	14,106	731	27,901
1994	13,022	13,166	632	26,820
1995	12,543	10,644	759	23,946
1996	12,569	11,514	828	24,911
1997	12,457	11,727	789	24,973
1998	12,321	12,359	839	25,519
1999	12,459	13,203	982	26,644
2000	12,521	12,941	1,056	26,518
2001	13,304	14,326	1,062	28,692
2002	13,871	15,740	1,196	30,807
2003	14,360	19,388	1,305	35,053
Total	\$319,077	\$342,490	\$20,144	\$681,711

US Space Funding, Constant FY05 Dollars

(In millions)

FY	NASA	DOD	Other	Total
1959	\$1,795	\$3,202	\$222	\$5,129
1960	2,958	3,604	276	6,849
1961	5,891	5,178	433	11,501
1962	11,318	8,175	1,253	20,746
1963	22,544	9,637	1,598	33,779
1964	30,736	9,814	1,307	41,908
1965	31,039	9,509	1,456	42,003
1966	29,735	9,916	1,256	40,907
1967	27,503	9,475	1,213	38,191
1968	24,209	10,503	952	35,664
1969	19,797	10,427	883	31,107
1970	17,332	8,223	691	26,296
1971	14,556	7,097	760	22,413
1972	13,958	6,400	607	20,974
1973	13,247	6,951	631	20,829
1974	10,645	6,814	610	18,069
1975	10,309	6,691	558	17,558
1976	10,730	6,629	563	17,972
1977	10,797	7,571	607	18,975
1978	10,538	7,987	659	19,214
1979	10,532	7,957	650	19,169
1980	10,807	8,886	534	20,226
1981	10,451	10,107	490	21,049
1982	10,897	13,166	616	24,680
1983	12,037	17,228	625	29,940
1984	12,530	18,671	723	31,954
1985	12,242	22,571	1,032	35,844
1986	12,430	24,506	827	37,763
1987	16,425	27,273	780	44,478
1988	13,387	28,438	1,192	43,016
1989	15,498	27,484	860	43,841
1990	16,689	22,741	736	40,166
1991	18,233	19,819	1,079	39,130
1992	17,909	20,384	1,082	39,375
1993	17,210	18,582	963	36,755
1994	16,720	16,904	812	34,436
1995	15,666	13,294	948	29,908
1996	15,241	13,962	1,004	30,207
1997	14,766	13,900	936	29,602
1998	14,375	14,419	979	29,773
1999	14,223	15,072	1,121	30,416
2000	13,823	14,287	1,165	29,276
2001	14,288	15,385	1,141	30,814
2002	14,662	16,638	1,264	32,564
2003	14,838	20,033	1,348	36,219
Total	\$675,736	\$595,509	\$39,443	\$1,310,688

Figures may not sum due to rounding. NASA totals represent space activities only. "Other" category includes the Departments of Energy, Commerce, Agriculture, Interior, and Transportation and the National Science Foundation.



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People & Organizations



Space Leaders

(As of July 9, 2004)

US Strategic Command

Adm. James O. Ellis Jr. Oct. 1, 2002-July 9, 2004
Gen. James E. Cartwright, USMC July 9, 2004-

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 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-

Army Space & Missile Defense Command*

Lt. Gen. John F. Wall July 1, 1985-May 24, 1988
Brig. Gen. Robert L. Stewart May 24, 1988-July 11, 1988 (acting)
Lt. Gen. Robert D. Hammond July 11, 1988-June 30, 1992
Brig. Gen. William J. Schumacher (acting) 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 (acting) Aug. 6, 1998-Oct. 1, 1998
Lt. Gen. John Costello Oct. 1, 1998-March 28, 2001
Brig. Gen. John M. Urias (acting) March 28, 2001-April 30, 2001
Lt. Gen. Joseph M. Cosumano Jr. April 30, 2001-Dec. 16, 2003
Lt. Gen. Larry J. Dodgen Dec. 16, 2003-

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

National Reconnaissance Office

Joseph V. Charuk 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
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
Jeffrey K. Harris May 19, 1994-Feb. 26, 1996
Keith R. Hall (acting) Feb. 27, 1996-March 27, 1997
Keith R. Hall March 28, 1997-Dec. 13, 2001
Peter B. Teets Dec. 13, 2001-

Naval Network & Space Operations Command

RAcm. John P. Cryer July 12, 2002-

Naval Space Command*

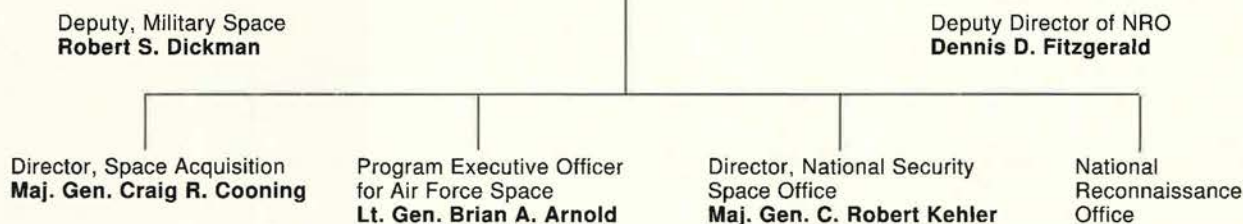
RAcm. Richard H. Truly Oct. 1, 1983-Feb. 28, 1986
Col. Richard L. Phillips, USMC March 1, 1986-April 30, 1986 (acting)
RAcm. D. Bruce Cargill April 30, 1986-Oct. 24, 1986
RAcm. Richard C. Macke Oct. 24, 1986-March 21, 1988
RAcm. David E. Frost March 21, 1988-April 2, 1990
Col. Charles R. Geiger, USMC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

*Naval Space Command and Naval Network Operations Command merged July 12, 2002.

USECAF/DNRO Organization

(As of July 1, 2004)

Undersecretary of the Air Force and
Director, National Reconnaissance Office
Peter B. Teets



Air Force Space Command, Peterson AFB, Colo.

(As of July 1, 2004)

Commander
Gen. Lance W. Lord

Space and Missile Systems Center
Hq., Los Angeles AFB, Calif.
Cmdr.: **Lt. Gen. Brian A. Arnold**

- DMSP Program Office
- Evolved Expendable Launch Vehicle PO
- Launch Programs PO
- MILSATCOM Joint Program Office
- Navstar Global Positioning System JPO
- Satellite and Launch Control PO
- Space Based Infrared Systems PO
- Space Based Radar JPO
- Space Superiority System Program Office

Space Warfare Center
Schriever AFB, Colo.
Cmdr.: **Maj. Gen. (sel.) Daniel J. Darnell**

14th Air Force
Hq., Vandenberg AFB, Calif.
Cmdr.: **Maj. Gen. Michael A. Hamel**

- 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 Air Base Wing**, Buckley AFB, Colo.

20th Air Force
Hq., F.E. Warren AFB, Wyo.
Cmdr.: **Maj. Gen. Frank G. Klotz**

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

Major Military Space Commands

Unified Command	Personnel	FY05 Budget	Functions
US Strategic Command Offutt AFB, Neb.	3,738	\$497 million	Establishes and provides full-spectrum global strike, coordinated space and information operations capabilities to meet both deterrent and decisive national security objectives. Provides operational space support and integrated missile defense. Provides global C4ISR, as well as specialized planning expertise to the joint warfighter.
Service Commands			
Air Force Space Command Peterson AFB, Colo.	26,550	\$9.4 billion	Operates military space systems, ground-based missile-warning radars and sensors, missile-warning satellites, national launch centers, and ranges; tracks space debris; operates and maintains the USAF ICBM force.
Naval Network & Space Operations Command Dahlgren, Va.	4,834	\$273 million	Operates and maintains the Navy's space and global telecommunications systems and services, directly supports warfighting operations and command and control of naval forces, and promotes innovative technological solutions to warfighting requirements.
Army Space & Missile Defense Command Arlington, Va.	1,832	\$678.5 million	Manages Army space and information operations and global strike, integrated missile defense, and C4ISR capabilities; provides worldwide space support, including employment of satellite communications and theater missile warning to warfighters; oversees Army space and missile R&D and development of Army space doctrine and concepts.

Central Intelligence Agency (CIA)

Headquarters: McLean, Va.
 Established: 1947
 Director: John E. McLaughlin (acting)

Mission, Purpose, Operations

The CIA's Directorate for Science and Technology includes the Office of Development and Engineering, which develops systems from requirements definition through design, testing, and evaluation to operations. Works with systems not available commercially. Disciplines include laser communications, digital imagery processing, real-time data collection and processing, electro-optics, advanced signal collection, artificial intelligence, advanced antenna design, mass data storage and retrieval, and large systems modeling and simulations. Work includes new concepts and systems upgrades.

Structure

Classified.

Personnel

Classified.

National Geospatial-Intelligence Agency (NGA)

Headquarters: Bethesda, Md.
 Established: Nov. 24, 2003
 Director: James R. Clapper Jr.

Mission, Purpose, Operations

NGA is both a national intelligence and a combat support agency whose mission is to provide timely, relevant, and accurate geospatial intelligence in support of national security. Geospatial intelligence is the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth.

Structure

Major facilities in Washington D.C., Northern Virginia, and St. Louis areas, with NGA support teams worldwide.

Personnel

Classified.

Formerly National Imagery and Mapping Agency (NIMA).

National Reconnaissance Office (NRO)

Headquarters: Chantilly, Va.
 Established: September 1961
 Director: Peter B. Teets

Mission, Purpose, Operations

Design, build, and operate reconnaissance satellites to support global information superiority for the US. It has operated hundreds of satellites since it was formed in 1960 and officially recognized in 1961. Responsible for innovative technology; systems engineering; development, acquisition, and operation of space reconnaissance systems; and related intelligence activities. Supports monitoring of arms control agreements, military operations and exercises, natural disasters, environmental issues, and worldwide events of interest to the US.

Structure

NRO is a DOD agency, funded through part of the National Foreign Intelligence Program, known as the National Reconnaissance Program. Both the Secretary of Defense and Director of Central Intelligence have approval of the program. The NRO has one office (space launch) and four directorates (signals intelligence systems acquisition and operations, communications systems acquisition and operations, imagery intelligence systems acquisition and operations, and advanced systems and technology) that report to the director.

Personnel

Staffed by CIA (41 percent), USAF (49 percent), Navy/Marines (nine percent), Army (one percent). Exact personnel numbers are classified.

National Security Agency (NSA)

Headquarters: Ft. Meade, Md.
 Established: 1952
 Director: USAF Lt. Gen. Michael V. Hayden

Mission, Purpose, Operations

Protect US communications and produce foreign intelligence information. Tasked with two primary missions: an information assurance mission and a foreign signals intelligence mission. To accomplish these missions, the director's responsibilities include: prescribing security principles, doctrines, and procedures for the government; organizing, operating, and managing certain activities and facilities to produce foreign intelligence information; and conducting defensive information operations.

Structure

Established by a Presidential directive in 1952 as a separately organized agency within DOD under the direction, authority, and control of the Secretary of Defense, who serves as the executive agent of the US government for the foreign signals intelligence and communications security activities of the government. A 1984 Presidential directive charged the agency with an additional mission: computer security. An operations security training mission was added in 1988. The Central Security Service was established in 1972 by a Presidential memorandum to provide a more unified cryptological organization within DOD. The NSA director also serves as chief of the CSS.

Personnel

Approx. 30,000 worldwide.



A Titan IVB rocket launches a classified payload for USAF and NRO from Complex-4 East at Vandenberg AFB, Calif.

Space Operations



US Space Launch Sites

Military Sites (Orbital)

Cape Canaveral AFS, Fla.

Location: 28.5° N, 80° W.

Mission/operations: USAF's East Coast launch site. Launches satellites into geosynchronous orbit via ELVs. Hub of Eastern Range operations for civil, military, and commercial space launches and military ballistic missile tests.

Launches: 599.

Launch vehicles: Athena I, II; Atlas II, III, V; Delta II, III, IV; Titan IV.

History: Designated simply as Operating Sub-Division #1 in 1950, it became Cape Canaveral Missile Test Annex and, for a time, Cape Kennedy Air Force Station, then Cape Canaveral Air Force Station in 1974.

Acres: 15,700.

Vandenberg AFB, Calif.

Location: 35° N, 121° W.

Mission/operations: USAF's West Coast launch site. Launches satellites into polar orbits via ELVs; sole site for test launches of USAF ICBM fleet; basic support for R&D tests for DOD, USAF, and NASA space, ballistic missile, and aeronautical systems; facilities and essential services for more than 60 aerospace contractors on base.

Launches: 626

Launch vehicles: Athena I; Atlas II, III, V; Delta II, III, IV; Pegasus; Taurus; Titan II, IV.

History: Originally Army's Camp Cooke, turned over to Air Force January 1957. Renamed Vandenberg Oct. 4, 1958.

Acres: 98,400.

Civil/Commercial Sites (Orbital)

Alaska Spaceport

Location: 57.5° N, 153° W.

Mission/operations: Commercial launch facility for polar and near-polar launches of communications, remote sensing, and scientific satellites up to 8,000 pounds.

Launches: Six.

Launch vehicles: Athena I, suborbital.

History: Established in 1998; funded through Alaska Aerospace Development Corp.

Acres: 3,100.

Florida Space Authority

Location: 28.5° N, 80° W.

Mission/operations: Various launch complexes and support facilities developed, operated, or financed by the state of Florida at the Cape Canaveral Spaceport (comprising Cape Canaveral Air Force Station and Kennedy Space Center). FSA developed or owns infrastructure at launch complexes 37, 41, 46, and 47 and manages a multiuser launch control facility, space experiments research and processing laboratory, and other facilities.

Launches: N/A

Launch vehicles: Athena I, II; Minotaur; Minuteman III; Taurus; Terrier.

History: Established in 1989.

John F. Kennedy Space Center, Fla.

Location: 28° N, 80° W.

Mission/operations: NASA's primary launch base for space shuttle.

Launches: 134.

Launch vehicles: Pegasus, space shuttle, Taurus.

History: NASA began acquiring land across the Banana River from Cape Canaveral in 1962. By 1967, its first launch complex—Complex 39—was operational. KSC facilities were modified in the mid to late 1970s to accommodate the space shuttle program.

Acres: 140,000 (land and water).

Mid-Atlantic Regional Spaceport

Location: 38° N, 76° W (at NASA

Wallops Flight Facility).

Mission/operations: State-owned launch facility cooperatively operated by Virginia and Maryland for access to inclined and sun-synchronous orbits; recovery support for ballistic and guided re-entry vehicles; vehicle and payload storage and processing facilities; two commercially licensed launchpads and suborbital launch rails for commercial,

military, scientific, and experimental launch customers.

Operator: CSC-DynSpace.

Launches: 13 (since 1995).

Launch vehicles: Athena I, II; Black Brant; Falcon; Lockheed Martin HYSR; Minotaur; Orion; Pegasus; Taurus; Terrier.

Sea Launch

Location: Equator, 154° W, Pacific Ocean.

Mission/operations: Provide heavy lift GTO launch services for commercial customers worldwide. Sea Launch is owned by an international partnership: Boeing, RSC Energia, Anglo-Norwegian Kvaerner Group, and SDO Yuzhnoye/PO Yuzhmash.

Launches: 11.

Launch vehicles: Zenit-3SL.

History: Established in April 1995; demonstration launch March 1999.

Spaceport Systems Intl., L.P.

Location: 34.70° N, 120.46° W.

Mission/operations: Polar and near-polar LEO launches from Vandenberg; payload processing and launches for commercial, NASA, and USAF customers; small to medium launch vehicles up to one million pound thrust; payload processing facility for small and heavy satellites.

Launches: Two.

Launch vehicles: MM II class.

History: SSI, a limited partnership formed by ITT and California Commercial Spaceport, Inc., achieved full operational status of the spaceport in May 1999.

Wallops Flight Facility, Va.

Location: 38° N, 76° W.

Mission/operations: East Coast launch site and research a port.

Launches: 30.

Launch vehicles: 14 suborbital sounding rockets.

History: Established in 1945, it is one of world's oldest launch sites.

Acres: 6,166.

Note: Launches 1957-2003, except where noted.

Military Functions in Space

Communications

Provide communications from national leaders to joint force commander and from JFC to squadron-level commanders. Allow beyond-line-of-sight command and control of forces. Support transmission of situational awareness and imagery to tactical-level operations. Permit rapid transmission of JFC intent, ground force observations, and adaptive planning.

Environmental/Remote Sensing

Use space systems to create topographical, hydrographic, and geological maps and charts and to develop systems of topographic measurement.

Force Application

US Strategic Command is identifying potential future roles, missions, and systems, which, if authorized by civilian leadership for development and deployment, could attack terrestrial and space targets from space in support of national defense.

Missile Defense

Employ space assets to support identification, acquisition, tracking, and destruction of ballistic and cruise missiles launched against forward deployed US forces, allied forces, or US territory.

Navigation and Timing

Provide highly accurate time and three-dimensional position and velocity information to an unlimited number of suitably equipped military users any-

where on or above the Earth's surface, in any weather. Enable weapons guidance. Provide a common time reference for network and communications synchronization. Provide precise timing and location information aids in navigation, situational awareness, and combat search and rescue.

On-Orbit Support

Track and control satellites, operate their payloads, and disseminate data from them.

Reconnaissance and Surveillance

Observation of space, air, and surface areas through visual, electronic, photographic, or other means to provide situational awareness of a given area or activity. Access to specific targets, allowing data collection focused on specific events of interest. Enhance the reaction time of information users and cue other systems. Support the full range of intelligence activities and operational mission planning and execution.

Space Control

Control and exploit space using offensive and defensive measures to ensure that friendly forces can use space capabilities, while denying their use to the enemy. The ability to execute offensive and defensive measures is predicated on precise space situational awareness. Space situational awareness is an understanding of all space-related activity, both on the ground and in space. This mission is assigned to

commander, STRATCOM, in the Unified Command Plan.

Space-Based Global Environmental Monitoring

Collect global high-resolution cloud imagery and other critical air, land, sea, and space environment data to optimize war planning and execution.

Spacelift

Oversee satellite and booster preparation and integration. Conduct launch countdown activities. Operate Eastern and Western Ranges to support the safe conduct of spacelift missions, ballistic missile test and evaluations, and aeronautical/guided weapons test and evaluations.

Strategic and Theater Early Warning

Operate satellites to give national leaders early warning of all strategic missile events and combatant commanders/warfighters early warning of all theater ballistic missile events. Provide timely, accurate data on launch times, locations, and predicted impact areas. Cue passive and active missile defense systems.

Tactical Warning/Attack Assessment

Execute the NORAD mission calling for use of all sensors to detect and characterize an attack on US or Canadian territory. STRATCOM carries out similar tactical warning in other theaters.

Boeing photo



The Florida coastline is visible below this Delta II rocket as its solid-fuel boosters fall away while the launch vehicle continues on. This photo, taken from a Boeing video, depicts the launch of NASA's Mars Odyssey payload.

US Military/Civil Launches

(As of Dec. 31, 2003)

Launch Year	Military	Civil*	Total
1958	0	7	7
1959	6	5	11
1960	11	5	16
1961	19	10	29
1962	32	20	52
1963	25	13	38
1964	33	24	57
1965	34	29	63
1966	35	38	73
1967	29	29	58
1968	23	22	45
1969	17	23	40
1970	18	11	29
1971	16	16	32
1972	14	17	31
1973	11	12	23
1974	8	16	24
1975	9	19	28
1976	11	15	26
1977	10	14	24
1978	14	18	32
1979	8	8	16
1980	8	5	13
1981	7	11	18
1982	6	12	18
1983	8	14	22
1984	11	11	22
1985	4	13	17
1986	4	2	6
1987	6	2	8
1988	8	4	12
1989	11	7	18
1990	11	16	27
1991	6	12	18
1992	11	17	28
1993	12	11	23
1994	11	15	26
1995	9	18	27
1996	11	22	33
1997	9	28	37
1998	5	29	34
1999	7	23	30
2000	11	17	28
2001	7	14	21
2002	1	16	17
2003	11	16	27
Total	578	706	1,284

US Satellites Placed in Orbit and Deep Space

(As of Dec. 31, 2003)

Launch Year	Military	Civil*	Total
1958	0	7	7
1959	6	5	11
1960	12	5	17
1961	20	12	32
1962	35	20	55
1963	33	22	55
1964	44	25	69
1965	49	39	88
1966	52	47	99
1967	51	34	85
1968	35	26	61
1969	32	27	59
1970	23	8	31
1971	26	18	44
1972	18	14	32
1973	14	10	24
1974	11	8	19
1975	12	16	28
1976	17	12	29
1977	14	6	20
1978	16	17	33
1979	10	7	17
1980	12	4	16
1981	7	10	17
1982	8	9	17
1983	16	12	28
1984	17	16	33
1985	13	17	30
1986	7	4	11
1987	10	1	11
1988	11	9	20
1989	15	9	24
1990	22	16	38
1991	17	18	35
1992	12	17	29
1993	12	18	30
1994	18	19	37
1995	15	24	39
1996	16	24	40
1997	10	82	92
1998	7	90	97
1999	8	73	81
2000	12	40	52
2001	8	23	31
2002	2	25	27
2003	11	12	23
Total	816	957	1,773

Note: Data changes in prior years in the table above are based on recategorization of civil to military launches.

*Includes some military payloads.

Upcoming Shuttle Flights

Month/Year*	Mission	Name
March 2005	STS-114	Discovery
TBD	STS-121	TBD
TBD	STS-115	TBD
TBD	STS-116	TBD

*Flight dates beyond March 2005 are under review following the February 2003 loss of *Columbia* and its crew.

US Military Payloads by Mission, 1958-2003 (Orbital only)

Category	Number
Applications	345
<i>Communications</i>	125
<i>Weather</i>	44
<i>Navigation</i>	91
<i>Launch vehicle/spacecraft tests</i>	3
<i>Other military</i>	82
Weapons-Related Activities	46
<i>SDI tests</i>	11
<i>Antisatellite targets</i>	2
<i>Antisatellite interceptors</i>	33
Reconnaissance	436
<i>Photographic/radar imaging</i>	250
<i>Electronic intelligence</i>	49
<i>Ocean surveillance</i>	46
<i>Nuclear detection</i>	12
<i>Radar calibration</i>	40
<i>Early warning</i>	39
Total	827

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
Total	143	736

USAF photo by 1st Lt. Warren Comer



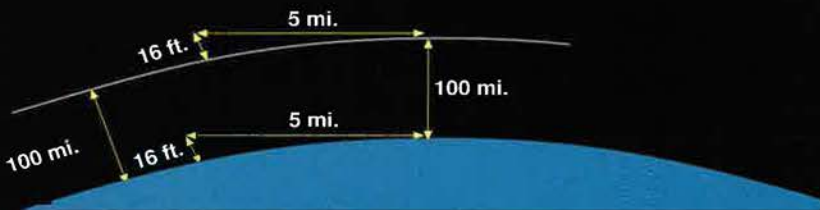
A Titan IVB rocket is unloaded from a C-5 at Cape Canaveral AFS, Fla. This booster is scheduled for launch in late 2004.



This Boeing Delta II rocket is lifting off from Cape Canaveral AFS in Florida. It carries into orbit a replacement satellite for USAF's Global Positioning System.

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.

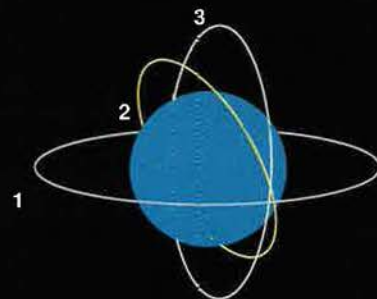
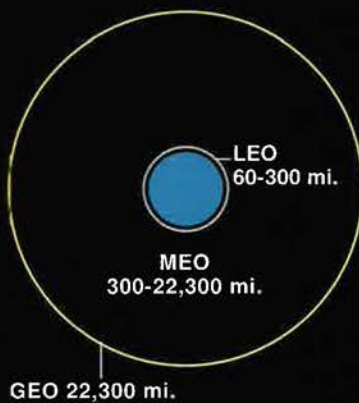


Orbital Altitude

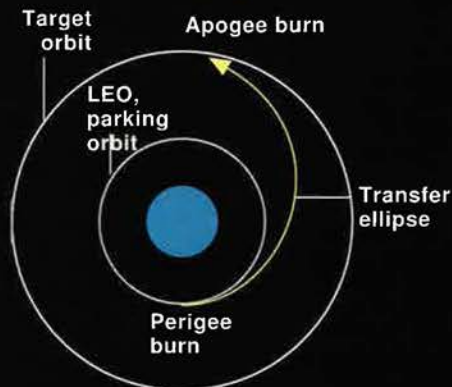
- LEO Low Earth orbit
- MEO Medium Earth orbit
- GEO Geosynchronous Earth orbit
- HEO High Earth orbit

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.

Space Shuttle Flights, 1981-2004

(As of June 19, 2004)

Flight	Mission	Launch	Return	Flight	Mission	Launch	Return
1	STS-1	4/12/81	4/14/81	58	STS-58	10/18/93	11/1/93
2	STS-2	11/12/81	11/14/81	59	STS-61	12/2/93	12/13/93
3	STS-3	3/22/82	3/30/82	60	STS-60	2/3/94	2/11/94
4	STS-4*	6/27/82	7/4/82	61	STS-62	3/4/94	3/18/94
5	STS-5	11/11/82	11/16/82	62	STS-59	4/9/94	4/20/94
6	STS-6	4/4/83	4/9/83	63	STS-65	7/8/94	7/23/94
7	STS-7	6/18/83	6/24/83	64	STS-64	9/9/94	9/20/94
8	STS-8	8/30/83	9/5/83	65	STS-68	9/30/94	10/11/94
9	STS-9	11/28/83	12/8/83	66	STS-66	11/3/94	11/14/94
10	STS-10	2/3/84	2/11/84	67	STS-63	2/3/95	2/11/95
11	STS-11	4/6/84	4/13/84	68	STS-67	3/2/95	3/18/95
12	STS-12	8/30/84	9/5/84	69	STS-71	6/27/95	7/7/95
13	STS-13	10/5/84	10/13/84	70	STS-70	7/13/95	7/22/95
14	STS-14	11/8/84	11/16/84	71	STS-69	9/7/95	9/18/95
15	STS-15*	1/24/85	1/27/85	72	STS-73	10/20/95	11/5/95
16	STS-16	4/12/85	4/19/85	73	STS-74	11/12/95	11/20/95
17	STS-17	4/29/85	5/6/85	74	STS-72	1/11/96	1/20/96
18	STS-18	6/17/85	6/24/85	75	STS-75	2/22/96	3/9/96
19	STS-19	7/29/85	8/6/85	76	STS-76	3/22/96	3/31/96
20	STS-20	8/27/85	9/3/85	77	STS-77	5/19/96	5/29/96
21	STS-21*	10/3/85	10/7/85	78	STS-78	6/20/96	7/7/96
22	STS-22	10/30/85	11/6/85	79	STS-79	9/16/96	9/26/96
23	STS-23	11/26/85	12/3/85	80	STS-80	11/19/96	12/7/96
24	STS-24	1/12/86	1/18/86	81	STS-81	1/12/97	1/22/97
25	STS-25	1/28/86	No Landing	82	STS-82	2/11/97	2/21/97
26	STS-26	9/29/88	10/3/88	83	STS-83	4/4/97	4/8/97
27	STS-27*	12/2/88	12/6/88	84	STS-84	5/15/97	5/24/97
28	STS-29	3/13/89	3/18/89	85	STS-94	7/1/97	7/17/97
29	STS-30	5/4/89	5/8/89	86	STS-85	8/7/97	8/19/97
30	STS-28*	8/8/89	8/13/89	87	STS-86	9/25/97	10/6/97
31	STS-34	10/18/89	10/23/89	88	STS-87	11/19/97	12/5/97
32	STS-33*	11/22/89	11/27/89	89	STS-89	1/22/98	1/31/98
33	STS-32	1/9/90	1/20/90	90	STS-90	4/17/98	5/3/98
34	STS-36*	2/28/90	3/4/90	91	STS-91	6/2/98	6/12/98
35	STS-31	4/24/90	4/29/90	92	STS-95	10/29/98	11/7/98
36	STS-41	10/6/90	10/10/90	93	STS-88	12/4/98	12/15/98
37	STS-38*	11/15/90	11/20/90	94	STS-96	5/27/99	6/6/99
38	STS-35	12/2/90	12/10/90	95	STS-93*	7/22/99	7/27/99
39	STS-37	4/5/91	4/11/91	96	STS-103	12/19/99	12/27/99
40	STS-40	6/5/91	6/14/91	97	STS-99	2/11/00	2/22/00
41	STS-43	8/2/91	8/11/91	98	STS-101	5/19/00	5/29/00
42	STS-48	9/12/91	9/18/91	99	STS-106*	9/8/00	9/19/00
43	STS-44*	11/24/91	12/1/91	100	STS-92	10/11/00	10/24/00
44	STS-39*	4/28/91	5/6/91	101	STS-97	11/30/00	12/11/00
45	STS-42	1/22/92	1/30/92	102	STS-98*	2/7/01	2/20/01
46	STS-45	3/24/92	4/2/92	103	STS-102*	3/8/01	3/20/01
47	STS-49	5/7/92	5/16/92	104	STS-100	4/19/01	5/1/01
48	STS-50	6/25/92	7/9/92	105	STS-104*	7/12/01	7/24/01
49	STS-46	7/31/92	8/8/92	106	STS-105*	8/10/01	8/22/01
50	STS-47	9/12/92	9/20/92	107	STS-108	12/5/01	12/17/01
51	STS-52	10/22/92	11/1/92	108	STS-109	3/1/02	3/9/02
52	STS-53*	12/2/92	12/9/92	109	STS-110	4/8/02	4/19/02
53	STS-54	1/13/93	1/19/93	110	STS-111	6/5/02	6/19/02
54	STS-56	4/8/93	4/17/93	111	STS-112	10/7/02	10/18/02
55	STS-55	4/26/93	5/6/93	112	STS-113	11/23/02	12/7/02
56	STS-57	6/21/93	7/1/93	113	STS-107	1/16/03	No Landing
57	STS-51	9/12/93	9/22/93				

*DOD payload.

Space Systems



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 five times the capacity of Milstar II but in a smaller package.

Function: EHF communications.

Operator: MILSATCOM JPO (acquisition); AFSPC.

First launch: December 2006, planned.

Constellation: three-five.

Orbit altitude: 22,300 miles.

Contractor: Lockheed Martin, Northrop Grumman team for system development and demonstration.

Power plant: N/A.

Dimensions: N/A.

Weight: approx 13,000 lb.

Advanced Polar System

Common name: APS

In brief: next generation polar communications to replace interim polar system (see Polar Military Satellite Communications, p. 44), which provides only a fraction of the 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 2004.

Function: EHF communications.

Operator: MILSATCOM JPO (acquisition); AFSPC.

First launch: circa 2010.

Constellation: two.

Orbit altitude: 22,300+ miles.

Contractor: TBD.

Power plant: TBD.

Dimensions: TBD.

Weight: TBD.

Advanced Wideband System

Common name: AWS

In brief: successor to the Defense Satellite Communications System (see at right) and the Wideband Gap-Filler System (see p. 44). Current concept calls for commercial-like satellites, with high-capacity SHF, Internet protocols, and laser crosslink (possible), to provide greatly increased tactical communications capability for aircraft and mobile ground forces.

Function: wideband communications.

Operator: MILSATCOM JPO (acquisition); AFSPC.

First launch: 2009, planned.

Constellation: three-six, planned.

Orbit altitude: 22,300 miles.

Contractor: TBD.

Power plant: TBD.

Dimensions: TBD.

Weight: TBD.

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: May 23, 1962.

Constellation: two (primary).

Orbit altitude: approx 575 miles.

Contractor: Lockheed Martin, Northrop Grumman.

Power plant: solar arrays, 1,200-1,300 watts.

Dimensions: 4 x 20.2 ft deployed.

Weight: 2,545 lb (including 592-lb sensor).

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.

Constellation: five.

On orbit: 13.

Orbit altitude: 22,000+ miles.

Contractor: Lockheed Martin.

Power plant: solar array, avg. 1,269 watts (pre-system life enhancement program); avg. 1,500 watts (SLEP; first SLEP satellite launched Jan. 20, 2000).

Dimensions: 6 x 6 x 7 ft; 38 ft deployed.

Weight: 2,580 lb (pre-SLEP); 2,716 lb (SLEP).

Defense Support Program

Common name: DSP

In brief: early warning spacecraft whose infrared sensors detect heat generated by a missile or booster plume.

Function: strategic and tactical missile launch detection.

Operator: AFSPC.

First launch: November 1970.

Constellation: classified.

On orbit: classified.

Orbit altitude: 22,000+ miles.

Contractor: Northrop Grumman.

Power plant: solar array, 1,485 watts.

Dimensions: 22 x 32.8 ft deployed.

Weight: approx 5,000 lb.

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).

Constellation: three; commercial augmentation.

On orbit: three.

Orbit altitude: 23,230 miles.

Contractor: Raytheon (Phase 2).

Power plant: (interim host satellite: UHF Follow-On) 3,800 watts.

Dimensions: numerous items integrated throughout host.

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 (M-code) on two channels launches in 2004. Next generation Block IIF with extended design life, faster processors, and new civil signal on third frequency launches in 2006. Generation after next GPS III with advanced anti-jam and higher quality data is slated for initial launch in 2012.

Function: worldwide navigation.

Operator: AFSPC.

First launch: Feb. 22, 1978 (Block I).

Constellation: 28.

Orbit altitude: 12,600 miles.

Contractor: Boeing (I, IIA, IIF); Lockheed Martin (IIR, IIR-M).

Power plant: solar array, 1,136 watts (IIR/IIR-M); up to 2,900 watts (IIF).

Dimensions: 5 x 6.3 x 6.25 ft; 38 ft deployed (IIR/IIR-M); 12.9 x 43.1 ft deployed (IIF).

Weight: 2,370 lb (IIR/IIR-M); 3,407 lb (IIF).

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.

Constellation: five.
On orbit: five.
Orbit altitude: 22,300 miles.
Contractor: Lockheed Martin (prime), with Boeing, Northrop Grumman.
Power plant: solar array, 8,000 watts.
Dimensions: 51 ft; 116 ft deployed.
Weight: approx 10,000 lb.

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 at right). Concept study contracts awarded in 1999; production award expected in summer 2004; initial launch in 2007.
Function: UHF tactical communications.
Operator: Navy.
First launch: 2009, planned.
Constellation: four, plus spare.
On orbit: none.
Orbit altitude: 22,300 miles.
Contractor: TBD.
Power plant: TBD.
Dimensions: TBD.
Weight: TBD.

Polar Military Satellite Communications

(also known as Interim Polar and Adjunct Polar)
Common name: Polar MILSATCOM
In brief: USAF deployed a modified Navy EHF payload on a host polar-orbiting satellite to provide an interim solution to ensure warfighters have protected polar communications capability. Polars 2 and 3 slated for launch in 2004 and 2006, respectively.
Function: EHF polar communications.
Operator: Navy.
First launch: 1997.
Constellation: three.
On orbit: one.
Orbit altitude: 25,300 miles (apogee).
Contractor: classified.
Power plant: 410 watts consumed by payload (power from host solar array).
Dimensions: numerous items integrated throughout host.
Weight: 470 lb.

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. 43).
Function: infrared space surveillance.
Operator: AFSPC.
First launch: 2007, planned.
Constellation: four GEO sats, plus one on-orbit spare, and two sensors in highly elliptical orbit.
On orbit: none.
Contractor: Lockheed Martin, Northrop Grumman.
Power plant: solar array, 2,435 watts.
Dimensions: 6 x 7 x 17 ft.
Weight: 5,442 lb.



Pictured is an artist's conception of the Wideband Gap-Filler System, meant to bridge the gap between current and future communication satellites.

Space Based Radar

Common name: SBR
In brief: spaceborne capability to track moving targets in operational theater.
Function: track moving ground targets.
Operator: SMC/NRO JPO (development; acquisition); AFSPC.
First launch: 2012, planned.
Constellation: TBD.
On orbit: none.
Contractor: Lockheed Martin and Northrop Grumman leading concept development efforts. Final selection planned for 2006.
Power plant: TBD.
Dimensions: TBD.
Weight: TBD.

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: 2007 for R&D, planned.
Constellation: two.
On orbit: none.
Contractor: Northrop Grumman, Raytheon.
Power plant: TBD.
Dimensions: TBD.
Weight: TBD.

Transformational Satellite Communications System

Common name: TSAT
In brief: joint communications satellite being designed to provide Internet-like connectivity to warfighters at the tactical level. 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. 43), it is

slated for launch around 2012. Currently in design and risk-reduction phase.
Function: EHF communications.
Operator: MILSATCOM JPO (acquisition); AFSPC.
First launch: 2012, planned.
Constellation: five.
On orbit: none.
Orbit altitude: 22,300 miles.
Contractor: TBD.
Power plant: TBD.
Dimensions: TBD.
Weight: TBD.

UHF Follow-On Satellite

Common name: UFO
In brief: new generation satellite providing secure, antijam 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.
Contractor: Boeing Satellite Systems.
Power plant: solar array, 2,500-3,800 watts.
Dimensions: 60 ft deployed (F-2-F-7); 86 ft deployed (F-8-F10).
Weight: 2,600-3,400 lb.

Wideband Gap-Filler System

Common name: WGS
In brief: high data rate satellite broadcast system (primarily commercial product) meant to bridge the communications gap between current systems—DSCS and GBS—and AWS (see above).
Function: wideband communications and point-to-point service (Ka-band, Ku-band, X-band frequencies).
Operator: AFSPC.
First launch: 2006, planned.
Constellation: three-five.
Orbit altitude: GEO.
Contractor: Boeing.
Power plant: solar arrays, 9,934 watts.

Dimensions: based on Boeing 702 bus.
Weight: 13,000 lb.

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. Using a page from the Soviet book on naming satellites, the US government started in the 1980s calling all government satellites "USA" with a sequential number. This allowed them to keep secret the names of satellites which

monitor the Earth with radar, optical sensors, and electronic intercept capability.

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. However, the move to declassify space systems has led to the release of selected information on some systems. Pictures of the Lacrosse radar imaging satellite have been released without details on the system.

Recently, NRO revealed that it is developing a new satellite system, dubbed ORCA for Optical Relay Communications Architecture. ORCA will be a next generation communications satellite with laser and radio frequency communications, providing at least 10 times the capacity of current systems. Specific details, including a launch time frame, currently are classified, but DOD and NRO include ORCA in the Transformational Communications Architecture, as a complement to TSAT and other next generation systems.

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.

Contractor: Space Systems/Loral.

Power plant: solar array, 1,050 watts.

Dimensions: 6.6 x 6.9 x 7.5 ft; 15.8 x 8.9 ft deployed. (GOES-10).

Weight: 4,600 lb.

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.

Contractor: Space Systems/Loral.

Power plant: solar array, 1,100 watts.

Dimensions: 4.9 x 35.3 ft deployed.

Weight: 990 lb.

Ikonos

Common name: Ikonos

In brief: one-meter resolution Earth imaging. Slated for shutdown in 2007.

Function: remote sensing.

Operator: Space Imaging, Inc.

First launch: Sept. 24, 1999.

Constellation: one.

Orbit altitude: 423 miles.

Contractor: Lockheed Martin.

Power plant: solar array.

Dimensions: 5.9 x 5.9 x 5.2 ft.

Weight: 1,600 lb.

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.

Contractor: Lockheed Martin (Inmarsat 3).

Power plant: solar array, 2,800 watts.

Dimensions: 6.9 x 5.9 x 57.8 ft deployed.

Weight: 4,545 lb (Inmarsat 3).

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: 20.

Orbit altitude: 22,300 miles.

Contractor: Space Systems/Loral

(Intelsat 9 series).

Power plant: solar array, 8,500 watts (Intelsat 902).

Dimensions: 9.2 x 11.55 x 18.5 ft; 102.3 ft deployed (Intelsat 902).

Weight: 10,390 lb (Intelsat 902).

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.

Contractor: Lockheed Martin, Motorola.

Power plant: solar array, 590 watts.

Dimensions: 3.3 x 13.5 ft.

Weight: 1,516 lb.

Landsat

Common name: Landsat

In brief: imagery use includes mapping and planning for tactical operations.

Function: remote sensing.

Operator: NASA.

First launch: July 23, 1972.

Constellation: one.

Orbit altitude: 438 miles (polar).

Contractor: Lockheed Martin.

Power plant: solar array, 1,550 watts.

Dimensions: 9 x 14 ft.

Weight: 4,800 lb.

National Polar-orbiting Operational Environmental Satellite System

Common name: NPOESS

In brief: advanced joint civil-military polar environmental satellite that provides weather, atmosphere, ocean, land, and near-space data. Managed by tri-agency (DOD, Department of Commerce, and NASA) integrated program office. Designed to replace USAF's DMSP and NOAA's Polar-orbiting Operational Environmental Satellite (POES) (see below).

Function: worldwide environmental forecasting.

Operator: IPO (AFSPC for acquisition and launch; NOAA for operations).

First launch: 2008, planned.

Constellation: two.

On orbit: none.

Orbit altitude: 22,300 miles.

Contractor: Northrop Grumman.

Power plant: TBD.

Dimensions: TBD.

Weight: TBD.

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: 35.

Orbit altitude: 500-1,200 miles.

Contractor: Orbital Sciences.

Power plant: solar array, 160 watts.

Dimensions: 7.3 x 14.2 ft.

Weight: 90 lb.

Pan Am Sat

Common name: Pan Am Sat

In brief: routine communications providing telephone, TV, radio, and data.

Function: communications.

Operator: Pan Am Sat.

First launch: 1983.

Constellation: 21.

Orbit altitude: 22,300 miles.

Contractor: Boeing.

Power plant: solar array, 4,800 watts.

Dimensions: 16.2 x 8.8 x 12 ft; 86 ft deployed (Galaxy III-R).

Weight: 6,760 lbs (Galaxy III-R).

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 (slated for launch 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.
Contractor: Lockheed Martin.
Power plant: solar array, 1,000+ watts.
Dimensions: 6.2 x 13.8 ft (NOAA-15).
Weight: approx 4,900 lb (NOAA-15).

Quickbird 2

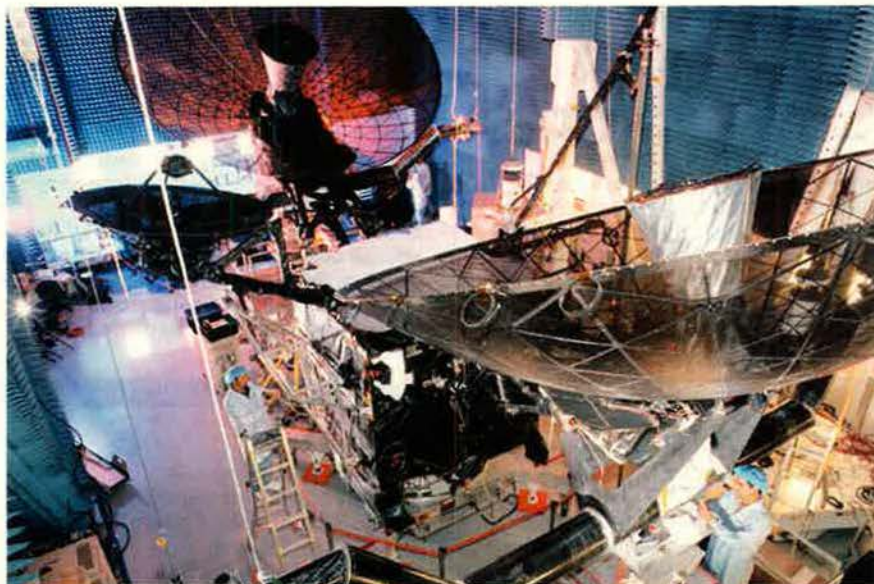
Common name: Quickbird 2
In brief: high-resolution imagery for mapping, military surveillance, weather research, and other uses.
Function: remote sensing.
Operator: DigitalGlobe.
First launch: Oct. 18, 2001.
Constellation: one.
Orbit altitude: 279 miles.
Contractor: Ball Aerospace.
Power plant: solar array.
Dimensions: 9.8 x 5.2 x 5.2 ft.
Weight: 2,088 lb.

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.
Contractor: Matra Marconi Space France.
Power plant: solar array, 2,100 watts (SPOT 4).
Dimensions: 6.6 x 6.6 x 18.4 ft (SPOT 4).
Weight: 5,940 lb (SPOT 4).

Telstar

Common name: Telstar
In brief: commercial satellite-based, rooftop-to-rooftop communications for



A Tracking and Data Relay Satellite System spacecraft undergoes factory testing, prior to shipment to Cape Canaveral, Fla.

US Army and other DOD agencies.
Function: communications.
Operator: Loral Skynet.
First launch: November 1994.
Constellation: three.
Orbit altitude: 22,300 miles.
Contractor: Space Systems/Loral.
Power plant: solar array, 7,000 watts.
Dimensions: 28.3 x 18.5 x 102.6 ft deployed (Telstar 12).
Weight: 3,514 lb (Telstar 12).

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: six.
Orbit altitude: 22,300 miles.
Contractor: Boeing.
Power plant: solar array, 2,042 watts (TDRSS H, I, J).
Dimensions: 43.5 x 68.1 ft (H, I, J).
Weight: approx 3,300 lb (H, I, J).

Major US Launchers in US Military Use

Athena I

Function: lift low to medium weights.
First launch: Aug. 22, 1997.
Launch site: CCAFS, VAFB.
Contractor: Lockheed Martin.

Athena II

Function: lift low to medium weights.
First launch: Jan. 6, 1998.
Launch site: CCAFS, VAFB.
Contractor: Lockheed Martin.

Atlas II

Function: lift medium weights.
Variants: IIA and IIAS.
First launch: Dec. 7, 1991.
Launch site: CCAFS, VAFB.
Contractor: Lockheed Martin.

Atlas III

Function: lift medium to heavy weights.
Variants: IIIA and IIIB.
First launch: May 24, 2000 (IIIA).
Launch site: CCAFS, VAFB.
Contractor: Lockheed Martin.

Atlas V

Function: lift medium to heavy weights.
First launch: Aug. 21, 2002.
Launch site: CCAFS, VAFB.
Contractor: Lockheed Martin.

Delta II

Function: lift medium weights.
First launch: Feb. 14, 1989.
Launch site: CCAFS, VAFB.
Contractor: Boeing.

Delta III

Function: lift medium weights.
First launch: Aug. 26, 1998.
Launch site: CCAFS.
Contractor: Boeing.

Delta IV

Function: lift medium to heavy weights.
First launch: Nov. 20, 2002.
Launch site: CCAFS, VAFB.
Contractor: Boeing.

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 to cut launch costs by 25 to 50 percent. These systems will eventually replace Delta II, Atlas II, Titan II, and Titan IV launch vehicles.

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.

Space shuttle

Function: lift heavy weights.
First launch: April 12, 1981.
Launch site: Kennedy Space Center, Fla.
Contractor: Boeing (Launch).

Taurus

Function: lift low weights.
Variants: Standard and XL.
First launch: March 13, 1994.
Launch site: CCAFS, VAFB, Wallops Is.
Contractor: Orbital Sciences.

Titan II

Function: lift low to medium weights.
First launch: April 8, 1964 (NASA).
Launch site: VAFB.
Contractor: Lockheed Martin.

Titan IVB

Function: lift heavy weights.
First launch: (IVB) Feb. 23, 1997.
Launch site: CCAFS, VAFB.
Contractor: Lockheed Martin.

Foreign Space Activities



Foreign Orbital Launches (As of Dec. 31, 2003)

Year	China	ESA	France	India	Israel	Japan	Russia	UK
1965				1			48	
1966				1			44	
1967				2			66	
1968							74	
1969							70	
1970	1			2		1	81	
1971	1			1		2	83	1
1972						1	74	
1973							86	
1974						1	81	
1975	3			3		2	89	
1976	2					1	99	
1977						2	98	
1978	1					3	88	
1979			1			2	87	
1980					1	2	89	
1981	1	2		1		3	98	
1982	1					1	101	
1983	1	2		1		3	98	
1984	3	4				3	97	
1985	1	3				2	98	
1986	2	2				2	91	
1987	2	2				3	95	
1988	4	7			1	2	90	
1989		7				2	74	
1990	5	5			1	3	75	
1991	1	8				2	59	
1992	4	7		1		1	54	
1993	1	7				1	47	
1994	5	6		2		2	48	
1995	2	11			1	1	32	
1996	3	10		1		1	25	
1997	6	12		1		2	28	
1998	6	11				2	24	
1999	4	10		1			28	
2000	5	12					35	
2001	1	8		2		1	25	
2002	4	11		1	1	3	25	
2003	6	4		2		2	24	
Total	76	152	10	14	4	59	2,628	1

Russian Military vs. Civil Launches (As of Dec. 31, 2003)

Year	Military	Civilian	Total
1957	0	2	2
1958	0	1	1
1959	0	3	3
1960	0	3	3
1961	0	6	6
1962	5	15	20
1963	7	10	17
1964	15	15	30
1965	25	23	48
1966	27	17	44
1967	46	20	66
1968	49	25	74
1969	51	19	70
1970	55	26	81
1971	60	23	83
1972	53	21	74
1973	58	28	86
1974	52	29	81
1975	60	29	89
1976	74	25	99
1977	69	29	98
1978	60	28	88
1979	60	27	87
1980	64	25	89
1981	59	39	98
1982	68	33	101
1983	58	40	98
1984	63	34	97
1985	64	34	98
1986	63	28	91
1987	62	33	95
1988	53	37	90
1989	42	32	74
1990	45	30	75
1991	30	29	59
1992	32	22	54
1993	26	21	47
1994	26	22	48
1995	15	17	32
1996	8	17	25
1997	10	18	28
1998	9	15	24
1999	6	22	28
2000	7	28	35
2001	9	16	25
2002	7	18	25
2003	7	17	24
Total	1,659	1,051	2,710

Russian Military Launches for 2003

	Launches	Spacecraft
Communications	3	4
Early warning	1	1
Electronic intelligence (ocean recon)	0	0
Navigation	2	4
Photoreconnaissance	1	1
Total	7	10

Russian Operational Military Spacecraft

(As of Dec. 31, 2003)

Mission	Type	Number
Communications	Kosmos (Geizer)	1
	Kosmos (Strela-3)	6
	Molniya-1T	5
	Molniya-3	5
	Raduga/Raduga-1	6
Early warning	Kosmos (Oko)	3
	Kosmos (Prognoz)	1
Electronic intelligence	Kosmos (Tselina-2)	1
Navigation	Kosmos (GLONASS)*	10
	Kosmos (Parus)	6

*Kosmos (GLONASS) is both civilian and military.

Russian Military/Civil Payloads by Mission, 1957-2003

(As of Dec. 31, 2003)

Antisatellite target tests	18
Antisatellite interceptor tests	20
Communications	334
Early warning	83
Earth orbital science	212
Earth resources	100
Electronic intelligence	133
Fractional orbital bombardment system tests	18
General engineering and materials processing	16
Geodesy	34
Navigation	236
Ocean electronic intelligence	85
Photographic reconnaissance	809
Theater communication	535
Undefined military operations	162
Weather	75
Total	2,870

Russian Launch Site Activity for 2003

Vehicle	Number of launches
Baikonur Cosmodrome, Tyuratam, Kazakhstan	
Proton-K/Blok DM-2	1
Proton-K/Blok DM-2M	2
Proton-K/Briz-M	2
Soyuz-FG	2
Soyuz-FG/Fregat	2
Soyuz-U	4
Strela 1	1
Total	14
Odyssey Platform, Pacific Ocean (Sea Launch)	
Zenit-3SL	3
Total	3
Plesetsk Cosmodrome, Plesetsk, Russia	
Kosmos-3M	3
Molniya-M	2
Rokot/Briz-KM	2
Total	7

Russian Manned Spaceflights

(As of Dec. 31, 2003)

Year	Flights	Persons*
1961	2	2
1962	2	2
1963	2	2
1964	1	3
1965	1	2
1966	0	0
1967	1	1
1968	1	1
1969	5	11
1970	1	2
1971	2	6
1972	0	0
1973	2	4
1974	3	6
1975	4	8
1976	3	6
1977	3	6
1978	5	10
1979	2	4
1980	6	13
1981	3	6
1982	3	8
1983	2	5
1984	3	9
1985	2	5
1986	1	2
1987	3	8
1988	3	9
1989	1	2
1990	3	7
1991	2	6
1992	2	6
1993	2	5
1994	3	8
1995	2	6
1996	2	5
1997	2	5
1998	2	6
1999	1	3
2000	2	5
2001	2	6
2002	2	6
2003	2	5
Total	96	222

*Total number of persons who flew in space in a given year. Some individuals made multiple flights.

AP photo/Mikhail Metzel



USAF Lt. Col. Edward Fincke (left), a Russian cosmonaut, and a Dutch astronaut arrive for a training session in preparation for a mission on the International Space Station.



China's first manned spacecraft, Shenzhou 5, lifts off at the Jiuquan Satellite Launch Center on Oct. 15, 2003. China is only the third country to launch a human being into orbit.

Spacefarers
(As of Dec. 31, 2003)

Nation	Persons
Afghanistan	1
Austria	1
Belgium	2
Bulgaria	2
Canada	8
China	1
Cuba	1
Czechoslovakia	1
France	9
Germany	9
Hungary	1
India	1
Israel	1
Italy	4
Japan	5
Mexico	1
Mongolia	1
Netherlands	1
Poland	1
Romania	1
Russia	97
Saudi Arabia	1
Slovakia	1
South Africa	1
Spain	1
Switzerland	1
Syria	1
Ukraine	1
United Kingdom	1
United States	274
Vietnam	1
Total	432

Payloads in Orbit
(As of Dec. 31, 2003)

Launcher/operator	Objects
Russia	1,368
United States	1,054
Japan	88
Intl. Telecommunications Satellite Orgn.	60
France	56
China	46
ESA	43
United Kingdom	32
India	27
Germany	22
Canada	21
Luxembourg	13
Italy	11
Australia	10
Brazil	10
Saudi Arabia	10
Sweden	10
Indonesia	9
NATO	8
South Korea	8
Argentina	7
Mexico	6
Spain	6
Czechoslovakia	5
Israel	5
Netherlands	5
Turkey	5
International Space Station	4
Thailand	4
Denmark	3
Malaysia	3
Norway	3
Egypt	2
France/Germany	2
Philippines	2
United Arab Emirates	2
Algeria	1
Chile	1
Greece	1
Nigeria	1
Pakistan	1
Portugal	1
Singapore	1
South Africa	1
Taiwan	1
Total	2,979

Military Space Lore



Military Space Firsts

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

Feb. 24, 1949. Bumper-WAC Corporal two-stage rocket, first with fully tanked second stage, reaches record altitude of 244 miles and velocity of 5,150 mph.

July 24, 1950. Bumper No. 8 becomes first missile launched from Cape Canaveral, Fla.

Sept. 20, 1956. US Jupiter C rocket, part of the Army's 1954 Project Orbiter, achieves record first flight, reaching altitude of 682 miles and landing 3,400 miles from Cape Canaveral.

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

Dec. 17, 1957. USAF Atlas ICBM makes first successful test flight.

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. In test, 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 the Discoverer 2 satellite, the 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.

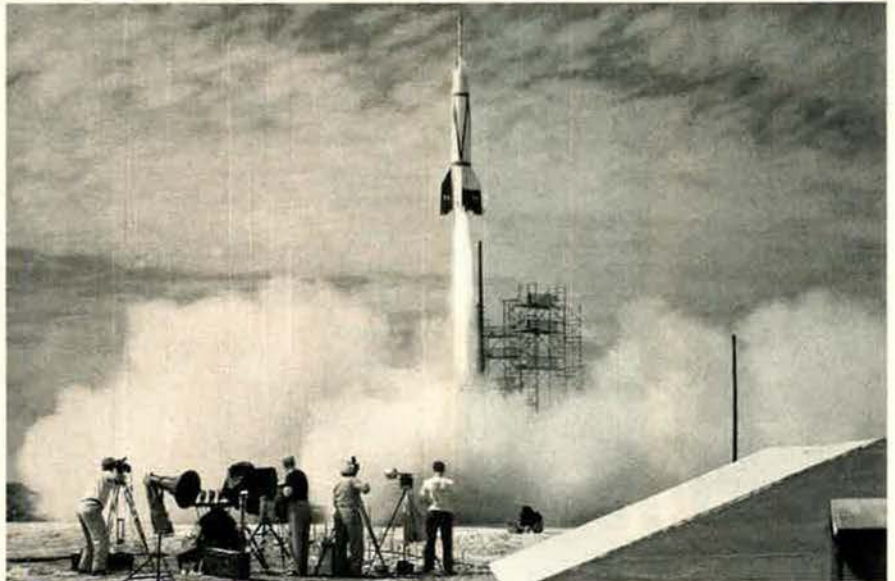
Aug. 7, 1959. US carries out first satellite intercontinental relay of a voice message.

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

April 1, 1960. TIROS 1 is first US weather satellite to go aloft.

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

May 24, 1960. MIDAS II is first early warning satellite in orbit.



Bumper No. 8 lifts off from Cape Canaveral on July 24, 1950, as members of the media record the event a few hundred feet from the launchpad. Pictured in the lower right corner is the "control center," which was nothing more than a wooden shack.

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.

Aug. 19, 1960. Capsule containing first satellite photographs of Soviet Union ejected from Discoverer 14 becomes first orbital payload recovered in midair by C-119 Flying Boxcar.

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.

July 12, 1961. First Atlas D/Agena B booster lifts MIDAS III satellite, the heaviest US spacecraft to date, into a record 1,850-mile-high orbit.

July 21, 1961. Capt. Virgil I. "Gus" Grissom becomes the first Air Force astronaut in space, reaching an altitude of

118.3 miles on the second Mercury mission.

Feb. 20, 1962. Project Mercury astronaut Lt. Col. John H. Glenn Jr., aboard Friendship 7 capsule, completes first US manned orbital flight.

April 23, 1962. The 6555th Aerospace Test Wing launches an Atlas D/Agena B vehicle that carries NASA's Ranger 4, the first US instrument package to reach the moon.

May 23, 1962. JS deploys first DMSP spacecraft.

July 17, 1962. Air Force Capt. Robert M. White earns astronaut wings when he reaches altitude of nearly 60 miles in rocket-powered X-15, first aircraft to be flown to lower edge of space, considered to be 50 miles.

May 15, 1963. USAF Maj. L. Gordon Cooper Jr. makes nearly 22 orbits in spacecraft Faith 7, becoming the first American astronaut to spend a complete day in orbit, first to perform an entirely manual re-entry, and last to go into space alone.

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

Aug. 14, 1964. First Atlas/Agena D standard launch vehicle successfully fired from Vandenberg.

March 18, 1965. First space walk conducted by Alexei Leonov from Soviet Voskhod 2.

June 4, 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. In a first for the US space program, 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.

Dec. 16, 1965. Astronauts Schirra and Stafford conduct the first controlled re-entry of a manned spacecraft to a predetermined landing point on Earth.

Jan. 25, 1967. Soviet Kosmos 139 antisatellite weapon carries out first fractional orbital bombardment system test.

Jan. 27, 1967. First deaths in US spacecraft occur in flash fire in Apollo 1 command module, killing astronauts Lt. Cmdr. Roger B. Chaffee and USAF Lt. Cols. Virgil I. Grissom and Edward H. White II.

July 3-4, 1967. Air Force, Army, and Navy conduct first satellite-based tactical communications.

Oct. 20, 1968. Soviet Kosmos 248 and Kosmos 249 spacecraft carry out first co-orbital antisatellite test.

Dec. 21-27, 1968. Apollo 8 astronauts—USAF Col. Frank Borman, Navy Cmdr. James A. Lovell Jr., and USAF Maj. William A. Anders—become the first humans to orbit the moon.

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. He and lunar module pilot, USAF Col. Edwin E. "Buzz" Aldrin Jr., spend just under three hours walking on the moon, while the command module pilot, USAF Lt. Col. Michael Collins, orbits overhead.

November 1970. USAF launches first classified DSP satellite, whose infrared sensors provide space-based early warning of missile launches.

April 19, 1971. First space station, Salyut 1, goes aloft.

Nov. 2, 1971. Titan IIIC launches first DSCS Phase II satellites into GEO.

Feb. 9, 1978. Atlas booster launched at Cape Canaveral carries Navy's first Fleet communications satellite, dubbed FLTSATCOM, into orbit.

Feb. 22, 1978. Atlas booster carries first GPS Block I satellite into orbit.

Dec. 13, 1978. Successful launch of two DSCS II satellites puts full four-satellite constellation at users' disposal for first time.

April 12-14, 1981. First orbital flight of space shuttle and first landing from orbit of reusable spacecraft.

Dec. 20, 1982. First DMSP Block 5D-2 satellite launched.

May 1, 1983. USAF enlisted satellite control specialists officially begin operations at Air Force Space Command, marking the first time in its history that noncommissioned Air Force personnel have been permitted to "fly" spacecraft on a regular basis.

Aug. 30, 1983. USAF Col. Guion S. Bluford Jr. becomes the first African American in space, as a mission specialist aboard *Challenger*.

Jan. 24-27, 1985. On the 15th shuttle mission, the crew of *Discovery* carries out the first dedicated DOD flight, deploying a classified payload, believed to be a signals intelligence (Sigint) satellite.

Sept. 13, 1985. First US antisatellite intercept test destroys Solwind scientific satellite by air-launched weapon.

Oct. 3, 1985. Shuttle *Atlantis* performs first launch of pair of DSCS III satellites from space shuttle using inertial upper stage (IUS).

Jan. 28, 1986. Space shuttle *Challenger* explodes after liftoff, killing seven astronauts.

Feb. 14, 1989. Launch of first Block II GPS satellite begins operational constellation.

June 14, 1989. First Titan IV heavy-lift space booster is successfully launched from Launch Complex 40 at Cape Canaveral. The booster, nearly 20 stories tall, carries a classified military payload.

April 24, 1990. Marine Col. Charles F. Bolden becomes the first African American to pilot a US spacecraft, shuttle *Discovery*. He would later be the first African American commander of a shuttle mission, aboard *Discovery* on Feb. 3, 1994.

Aug. 5, 1990. Over Edwards AFB, Calif., a B-52 carrier aircraft drops an air-launched Pegasus space booster on its first flight, which is a success.

Jan. 17, 1991. What USAF calls "the first space war," Operation Desert Storm, opens with air attacks.

Feb. 11, 1992. First military launch of an Atlas II/Centaur takes place at Cape Canaveral.

Jan. 13, 1993. USAF Maj. Susan J. Helms, flying aboard *Endeavour*, becomes first US military woman in space.

July 19, 1993. Launch of DSCS Phase III satellite into GEO provides first full five-satellite DSCS III constellation.

Feb. 7, 1994. First Titan IV Centaur booster launches first Milstar Block I satellite into orbit.

March 13, 1994. First launch of Taurus booster places two military satellites in orbit.

Feb. 6, 1995. USAF Lt. Col. Eileen M. Collins is the first woman to pilot an American spacecraft, doing so when shuttle *Discovery* and space station *Mir* perform the first US-Russian space



Astronaut and USAF Maj. Edward White II became the first American to walk in space during the Gemini 4 mission on June 4, 1965. White was attached to the spacecraft by a 25-foot umbilical line and a 23-foot tether line, both wrapped in gold tape to form one cord.

rendezvous in 20 years. She later would be the first woman to command a shuttle mission, aboard *Columbia* on July 23, 1999.

Feb. 23, 1997. The first Titan IVB launch vehicle lifts off from Launch Complex 40 at Cape Canaveral using an IUS. It launches a DSP satellite.

May 29, 1998. First transfer of an operational military space system to civilian agency occurs when Air Force

hands over primary control of the DMSP on-orbit assets to NOAA.

Nov. 1, 2000. For the first time, a single Delta II rocket, lifting off from Vandenberg, launches two different primary payloads.

Jan. 22-26, 2001. AFSPC's Space Warfare Center conducts Schriever 2001, the first wargame to explore requirements for space control, counters to enemy space capabilities, and the ability of an

enemy to deny the US and its allies the use of space assets.

March 10, 2003. Delta IV boosts into orbit a DSCS III satellite, marking the first launch of a military payload aboard an EELV.

April 22, 2003. AFSPC's 14th Air Force activates first-of-its-kind space intelligence squadron, the 614th SIS, whose mission is to identify and devise means to respond to threats to US space systems.

Space Terms

Aerospace. A physical region made up of Earth's atmosphere and the space beyond.

Aerospace plane. A reusable spacecraft able to operate effectively in both the atmosphere and space. Also known as a "transatmospheric vehicle" or, more currently, "spaceplane."

Apogee. The point of greatest distance from Earth (or the moon, a planet, etc.) achieved by a body in elliptical orbit. Usually expressed as distance from Earth's surface.

Atmosphere. Earth's enveloping sphere of air.

Boost phase. Powered flight of a ballistic missile—i.e., before the rocket burns out.

Burn. The process in which rocket engines consume fuel or other propellant.

Circumterrestrial space. "Inner space" or the atmospheric region that extends from 60 miles to about 50,000 miles from Earth's surface.

Constellation. A formation of satellites orbiting for a specific combined purpose.

Deep space. All space beyond the Earth-moon system, or from about 480,000 miles altitude outward.

Eccentric orbit. An extremely elongated elliptical orbit.

Ecliptic plane. The plane defined by the circle on the celestial sphere traced by the path of the sun.

Elliptical orbit. Any noncircular, closed spaceflight path.

Exosphere. The upper limits of Earth's atmosphere, ranging from about 300 miles altitude to about 2,000 miles altitude.

Expendable Launch Vehicle (ELV). A launch vehicle that cannot be reused after one flight.

Ferret. A satellite whose primary function is to gather electronic intelligence, such as microwave, radar, radio, and voice emissions.

Geostationary Earth orbit. A geosynchronous orbit with 0° inclination in which the spacecraft circles Earth 22,300 miles above the equator and appears from Earth to be standing still.

Geosynchronous Earth orbit (GEO). An orbit at 22,300 miles that is synchronized with Earth's rotation. If a satellite in GEO is not at 0° inclination, its ground path describes a figure eight as it travels around Earth.

Geosynchronous transfer orbit (GTO). An orbit that originates with the parking orbit and then reaches apogee at the GEO.

Ground track. An imaginary line on Earth's surface that traces the course of another imaginary line between Earth's center and an orbiting satellite.

High Earth orbit (HEO). Flight path above geosynchronous altitude (22,300 to 60,000 miles from Earth's surface).

High-resolution imagery. Detailed representations of actual objects that satellites produce electronically or optically on displays, film, or other visual devices.

Inertial upper stage (IUS). A two-stage solid-rocket motor used to propel heavy satellites into mission orbit.

Ionosphere. A region of electrically charged thin air layers that begins about 30 miles above Earth's atmosphere.

Low Earth orbit (LEO). Flight path between Earth's atmosphere and the bottom of the Van Allen belts, i.e., from about 60 to 300 miles altitude.

Magnetosphere. A region dominated by Earth's magnetic field, which traps charged particles, including those in the Van Allen belts. It begins in the upper atmosphere, where it overlaps the ionosphere, and extends several thousand miles farther into space.

Medium Earth orbit (MEO). Flight path between LEO, which ends at about 300 miles altitude, and GEO, which is at an average altitude of 22,300 miles.

Mesosphere. A region of the atmosphere about 30 to 50 miles above Earth's surface.

Orbital decay. A condition in which spacecraft lose orbital altitude and orbital energy because of aerodynamic drag and other physical forces.

Orbital inclination. Angle of flight path in space relative to the equator of a planetary body. Equatorial paths are 0° for flights headed east, 180° for those headed west.

Outer space. Space that extends from about 50,000 miles above Earth's surface to a distance of about 480,000 miles.

Parking orbit. Flight path in which spacecraft go into LEO, circle the globe in a waiting posture, and then transfer payload to a final, higher orbit.

Payload. Any spacecraft's crew or cargo; the mission element supported by the spacecraft.

Perigee. The point of minimum altitude above Earth (or the Moon, a planet, etc.) maintained by a body in elliptical orbit.

Period. The amount of time a spacecraft requires to go through one complete orbit.

Polar orbit. Earth orbit with a 90° inclination. Spacecraft on this path could pass over every spot on Earth as Earth rotates under the satellite's orbit (see orbital inclination).

Remote imaging. Images of Earth generated from a spacecraft that provide data for mapping, construction, agriculture, oil and gas exploration, news media services, and the like.

Reusable launch vehicle (RLV). A launch vehicle that can be reused after flight.

Rocket. An aerospace vehicle that carries its own fuel and oxidizer and can operate outside Earth's atmosphere.

Semisynchronous orbit. An orbit set at an altitude of 12,834 miles. Satellites in this orbit revolve around Earth in exactly 12 hours.

Single-stage-to-orbit (SSTO) system. A reusable single-stage rocket that can take off and land repeatedly and is able to boost payloads into orbit.

Stratosphere. That section of atmosphere about 10 to 30 miles above Earth's surface.

Sun synchronous orbit. An orbit inclined about 98° to the equator and at LEO altitude. At this inclination and altitude, a satellite's orbital plane always

maintains the same relative orientation to the sun.

Thermosphere. The thin atmosphere about 50 to 300 miles above Earth's surface. It experiences dramatically increased levels of heat compared to the lower layers.

Transfer. Any maneuver that changes a spacecraft orbit.

Transponder. A radar or radio set that,

upon receiving a designated signal, emits a radio signal of its own.

Troposphere. The region of the atmosphere from Earth's surface to about 10 miles above the equator and five miles above the poles. This is where most clouds, wind, rain, and other weather occurs.

Van Allen belts. Zones of intense radiation trapped in Earth's magnetosphere that could damage unshielded spacecraft.

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Air Force Materiel Command will mirror the operational Air Force, not the business world.

Operational Acquisition

By John A. Tirpak, Executive Editor

AIR FORCE Materiel Command is in the midst of a major restructuring, one that could bring to AFMC its most significant change of course since it was created from the merger of Air Force Logistics Command and Air Force Systems Command 12 years ago.

AFMC leaders have high hopes that the makeover will cure some ills that have plagued the acquisition community for years. They believe that, by clarifying lines of authority, the command will be able to speed the introduction of new technologies, improve efficiency, and become more responsive to operational "customers."

A by-product could be improved morale. According to Gen. Gregory S. Martin, AFMC commander, his people often are unfairly blamed for weapon systems being over budget and behind schedule.

Martin believes the restructure ultimately will enable the command to share capabilities across weapon systems, reducing the number of individual program offices. Martin also expects it to pave the way for a new management approach, one that he thinks will provide greater confidence that programs will succeed.

Air Force Secretary James G. Roche is expected to make the AFMC restructure official within the next few months. The command intends to revisit the restructure at six-month intervals through 2005 to ensure that

the changes have produced the desired effect.

Operationalizing AFMC

The basic plan entails regrouping units within AFMC's centers into wings, groups, and squadrons. The intent is to make AFMC more closely mirror the operational Air Force rather than the "business world," said Martin.

"We can conduct ourselves in a 'businesslike' manner, but don't be confused; we are a military organization, not a business," wrote Martin in the command magazine, *Leading Edge*.

Converting to wings, groups, and squadrons will make AFMC units more accessible to their "customers"—the operational commands. Lt. Gen. William R. Looney III, commander of Aeronautical Systems Center at Wright-Patterson AFB, Ohio, said the structure change will ensure that "everybody else in the United States Air Force understands who you are and what you do."

Many in the service look upon Materiel Command as an enigma with an organizational arrangement that is unintelligible outside AFMC. Command leaders believe the new structure not only will help eliminate that confusion, but also will enable AFMC to group like elements and take advantage of crosscutting capabilities.

For instance, one of the new ASC wings will be the Fighter/Attack Systems Wing. It will comprise all

To better relate to the rest of the Air Force, AFMC is reorganizing into wings, groups, and squadrons in its development and testing activities and depots. Only a small number of people will change locations, and most activities will stay put, but the benefit will be more commonsense groupings of similar activities. At right, examples of the diversity of AFMC activities: a new F/A-22 is readied for duty, a C-17 receives depot maintenance, and new munitions are tested on an F-15E.





Established from photo by Keith Horvath



USAF photo by Steve Stapp



Staff photo by Guy Aento

the current fighter programs under ASC control. The F-15 and F-16 System Program Offices will become the F-15 Systems Group and F-16 Systems Group, respectively, under the wing.

The wing will also have a combat systems squadron that will orchestrate the addition of new capabilities that can be applied to various fighter platforms.

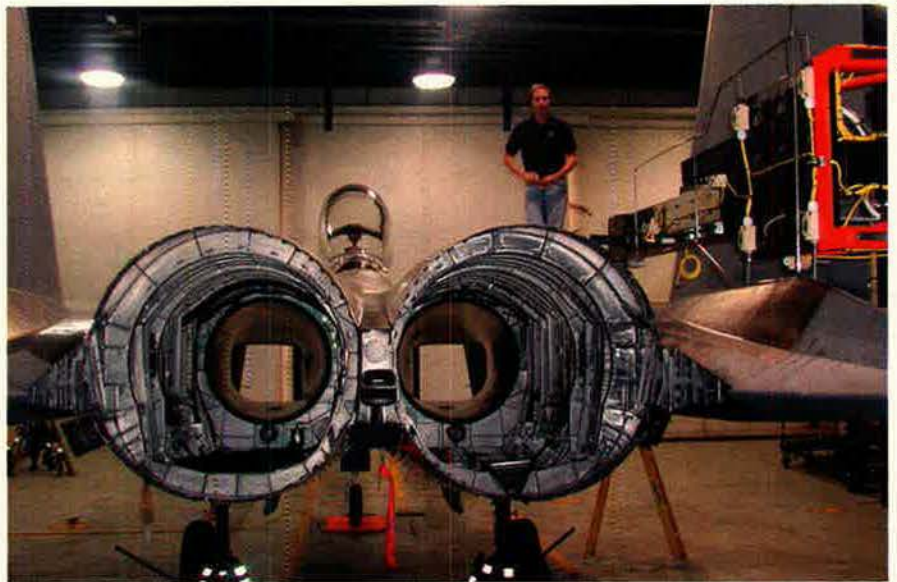
When these platforms are bundled together, Martin said, "there will be some synergies between the platforms that can occur that will keep you from having as many people in each of these programs." For example, instead of having four engineers on each fighter program working on a helmet mounted cueing system unique to that aircraft, there could be fewer engineers developing a helmet system that will apply across the board. The same would go for radios, onboard sensors, ejection seats, and other components. There would be a manpower savings up front and savings in commonality in production downstream.

This has not been done before, said Martin. The whole process has been "platform-centric," he said, when it should be centered on a capability area.

Looney noted that at ASC, he had no single person to ensure that all the platforms are making design decisions and setting up their schedules for the "capabilities that we consider crosscutting," such as the Small Diameter Bomb and Link 16. Such things would "fall through the cracks," he said, causing huge scheduling, operational, and cost headaches down the road.

Attempts to lay on such crosscutting programs over the last couple of years have not always been successful, according to Maj. Gen. Robert W. Chedister, commander of the Air Armament Center at Eglin AFB, Fla. Previously, he said, "it was always kind of a forced fit." Now, he emphasized, the wholesale restructuring of AFMC will "formally create those crosscutting opportunities and those capability-focused organizations."

AFMC plans first to restructure its product centers, followed by similar reorganizations at the air logistics centers and test centers. Officials were quick to point out that the effort is not a budget-cutting drill, nor is it driven by the base realign-



The F-15 depot will stay at Warner Robins ALC, Ga., but most new fighter depot work will migrate gradually to Ogden ALC, Utah, to keep like activities together. AFMC wants the rest of the Air Force to know intuitively where to go for support.

ment and closure process. And it will not require legislative changes.

The restructure does not mean that certain types of activities will pick up and move to other installations. Warner Robins Air Logistics Center in Georgia, for instance, focuses mainly on mobility aircraft, but it also manages the sustainment of the F-15. The F-15 work won't move, said Maj. Gen. (ret.) Michael A. Collings, commander of WRALC.

However, he noted that as the Air Force moves from the F-15 to the new F/A-22, Ogden Air Logistics Center in Utah will eventually become the center for fighter aircraft.

"The vast majority of the people in the centers will not see any changes," said Collings. "It's more that some supervisors will move, ... but the vast majority of people will not see a difference."

The maintenance for some aircraft components already is grouped at single locations. The Oklahoma City ALC, Tinker AFB, Okla., for instance, handles all Air Force aircraft engines, while Ogden does all landing gear work. The restructure, said officials, has little to do with where work is or will be done. It is about becoming more productive and efficient.

Martin maintained that the AFMC restructure was never viewed as a means to save money by reducing personnel. "We weren't expecting any big personnel changes from the restructure," he explained. "If anything, we're hoping to add people."

Martin believes the restructure will enable AFMC to standardize units and resources where there have been few standards and little consistency in determining how many people and how much money it takes to field a weapon system or put an airplane through depot maintenance.

Finding a Manpower Model

Manpower standards do exist in the rest of the Air Force. Martin explained that a 24-aircraft fighter squadron receives "a certain amount of resources automatically." It gets 1.25 pilots per aircraft, a set number of crew chiefs, engine specialists, munitions handlers, and other required personnel. "So when you say you need a 24 [primary aircraft authorized] squadron, a box of resources shows up on your doorstep and off you go," he said. Fighter squadrons are not shortchanged because it's well understood how many people are needed to run one.

In acquisition, however, there has been no set organizational structure upon which to estimate how many people will be needed to develop a new system. The command, instead, has been "capped" in its manpower level, said Martin.

Each time the command must create a new system program office, there has been no ready means for gaining personnel to take on the new workload. As old programs close down, those personnel become available, but, Martin said, that's not happening often

enough. More new offices have been created than old ones closed.

That means Martin must “take from other organizations.” He said he makes the best allocation of personnel he can and, often, must hire contractors to fill the gaps. Because “contractors cost about twice as much as government employees,” said Martin, the price goes up. If he pulls Air Force personnel from other programs, those programs are robbed of necessary expertise, increasing the risk that some programs will fall behind.

Martin plans to use the restructuring effort to establish “resource-earning units.” These units will form the basis for decisions about the manpower needed for a project of a certain size or complexity. The number of personnel would vary depending on the various stages in a program’s life cycle, from developing requests for proposals to the endgame of sustaining the system with spare parts, depot maintenance, and modifications.

Just as with the fighter squadron, a certain pool of resources would flow to AFMC each time it undertakes a new program, eliminating the need to cannibalize other organizations or hire contractors to do the work.

Martin said that AFMC currently is working with the Air Force acquisition community to create “unit manning documents” for notional system program units. He said the same approach is being addressed at the command’s depots, where standard-



USAF photo by MSgt. Stefan Alford

TSgt. Mike Emmendorfer performs battle damage repair on an A-10. Upgrades, repairs, and purchase of new equipment for systems such as the A-10 will be consolidated to improve management and speed up technology insertion.

size work units will allow smarter allocation of resources.

Such a process was used on the KC-135 corrosion problem, which had backed up the wait for depot maintenance at the Oklahoma City Air Logistics Center to unacceptable levels. The group at ALC “dug themselves out of the hole” using “work units and a lean process,” said Martin. He added, “It’s a team that’s designed to do a certain amount of work [in] a certain amount of time.”

No More “Hail Mary”

The capstone of the restructuring

effort will take some selling, admitted Martin. Air Force programs tend to be late and over budget not just because there aren’t enough people to work the acquisition properly, but because the Air Force doesn’t plan sufficiently for the setbacks and delays that are part and parcel of developing new technology.

“Right now what we do is, we describe the schedule as what we want to have happen, and we continue to push to make it happen, even though we’ve fallen behind,” he explained. “We don’t move the IOC [initial operational capability date], we keep everything the same, and here we are hoping for a Hail Mary at the end, and it never happens. So we’re guaranteed to be late.”

Instead, he’d like to institute what he terms “attrition-based planning.” That concept requires studying how previous, similar acquisitions have fared, building some wiggle room in the schedule, and adding funds to deal with inevitable surprises.

After picking apart the execution timeline of a couple of programs, “you’ll start to find some trends,” said Martin.

For instance, during new aircraft testing, the program schedule will call for a certain number of sorties, of which some number will be lost for whatever reason. The lost sorties still cost money. “If I build a schedule that takes into account the attrition that I’m going to experience, ... it will correct back,” said



USAF photo by TSgt. Kevin J. Gruenwald

Fighter management is merging into a single wing, to take advantage of crosscutting technologies such as new munitions, radios, and helmet mounted cueing systems. Until now, such projects were dispersed and not well-coordinated.

Martin. "Or, now that I've studied the attrition, I can do things to minimize it."

Attrition-based planning requires up-front honesty, he said, emphasizing that if it is done properly, the customer will get a more realistic timeline for aircraft turnover and for how much it will cost. "You've given yourself an opportunity to understand where your variances came from, and you can start to work those problems incrementally to reduce the attrition overall," Martin added.

He said that the Air Force acquisition executive, Marvin R. Sambur, agrees with this approach, although Sambur calls it "expectation management."

The basic premise is "do a better job of telling our customers what they should expect," said Martin. However, he said, the Air Force is still "two to three years away from this hitting pay dirt, in my view."

Overlapping Functions

One major change the Air Force made last year has gone a long way toward purging the "venom" that has existed in the relationship between the Air Force Secretariat acquisition community and the AFMC acquisition community, said Martin. He hopes the command's new operating structure and procedures will complete the transition.

The missions of the two acquisition groups, he said, have a "significant amount of overlap." Unfortunately, they sometimes worked at cross-purposes under confusing acquisition rules and laws.

Sambur, as the assistant secretary of the Air Force for acquisition (AQ), is, "by law, responsible" for some of the functions that AFMC has had in its mission statement, said Martin. At least part of the confusion came from a plethora of acquisition rules that don't have the weight of law but were applied as if they did.

"There were laws, ... directives, ... executive orders, all of which at one time or another said something about the acquisition chain, authority, and force," observed Martin. "Many people get them mixed up," he said, adding that some people applied a directive "as if it were the law."

Martin said that AFMC experienced "tension" from two sides. On one hand, the major commands blamed AFMC for running weapon programs



USAF photo by Sue Sapp

Consolidating improvements and depot maintenance will also give managers more insight into what upgrades provide the most payback within a mission area. A C-5 undergoes maintenance at Warner Robins, the hub of mobility depot work.

over budget and late. While on the other, the Secretariat's acquisition staff and AFMC were often at odds, to the extent that the command "wasn't allowed to sit in on some of the meetings."

According to Looney, "It was not collegial, it was not a team, it was not working together, and it was not always headed in the right direction."

Much of the problem, said Martin, stems from the Goldwater-Nichols legislation of 1986. Among other actions, that legislation took acquisition responsibility away from the service military head and placed it under the service civilian secretary.

Although Martin said the transfer of authority for program execution was the "right thing to do," it had an unintended outcome. "I don't think the law intended to split us apart, but that's what happened, over time," he said.

Last fall, the Air Force restructured the program executive officer (PEO) function—a move that Martin said has eased the friction between AQ and AFMC "because there's one person in charge."

Previously, all of the PEOs, who are responsible for acquisition of major weapon systems in a particular mission area, had been stationed in Washington, D.C., while the program management was the function of AFMC's product centers. Now, program responsibility resides in the field.

Each of AFMC's major product center commanders is also designated as the PEO for their respective mission areas. (See *Aerospace World*, "USAF Recasts PEO Arrangement," November 2003, p. 16.) The PEOs still work for Sambur, but the new arrangement puts the PEOs more closely in touch with the programs they manage.

Sambur's organization is in charge of "executing acquisition programs," said Martin, while AFMC's job is to provide the right infrastructure—tools, airspace, test and evaluation telemetry—all the elements that support program development through program fielding.

Each PEO/product center commander has the "responsibility to turn the resources loose to support the programs and the execution responsibility for the success of the program," said Martin. He emphasized that there is now "no one else to blame."

However, Martin does not think the conflict between AFMC and AQ will evaporate overnight. He expects a gradual melding over "a couple of years" before everyone realizes "we're on the same team."

Overall, Martin believes that AFMC's people now will have the "tools they haven't had before" to develop "war winning capabilities, on time, on cost." He said, "Once we achieve that regularly, then we'll get the next part, which may be faster, better, cheaper." ■

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**AIR FORCE
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The Chief says the demand for airmen is high, and it won't decline "for some time."

Longer Deployments

By Adam J. Hebert, Senior Editor

THE expeditionary Air Force is rushing to adapt itself to a new type of expedition. It is a change that will affect airmen throughout the service.

For more than a decade, USAF's expeditionary units focused on enforcing "no-fly zones" over Iraq. Emphasis was on deployment of aviation forces. Aircrews flew hundreds of thousands of combat air patrols, looking for threats which materialized sporadically.

The war changed this. The US dissolved the no-fly zones, along with any need to enforce them. Airmen started flying combat missions, which are continuing but at a slower pace. Support operations got greater emphasis.

Unsurprisingly, this has generated pressure to reorient USAF's expeditionary system, which comprises 10 rotating combat groupings and their support elements.

Gen. Hal M. Hornburg, the commander of Air Combat Command, recently observed that Air Force lead-

ers are "compelled" to think about the system in new ways. As a result of this, he said, "we have a different emphasis."

According to a June 4 announcement by the Air Force Chief of Staff, Gen. John P. Jumper, a new expeditionary deployment schedule will go into effect Sept. 1.

When it does, the possible deployment period for each airman will increase to 120 days, up from the 90 days that previously had been the limit.

Because each air and space expeditionary force period will be longer, the entire cycle will lengthen, too. The cycle once lasted 15 months. Now, it is going to last 20 months.

Thus, while an airman will be vulnerable to overseas deployment for a somewhat longer period, he or she will now have to experience that vulnerability once every 20 months, rather than once every 15 months, as before.

Officials hope the new schedule will increase stability and predict-

ability in the lives of airmen. They also believe that it will not undercut force readiness.

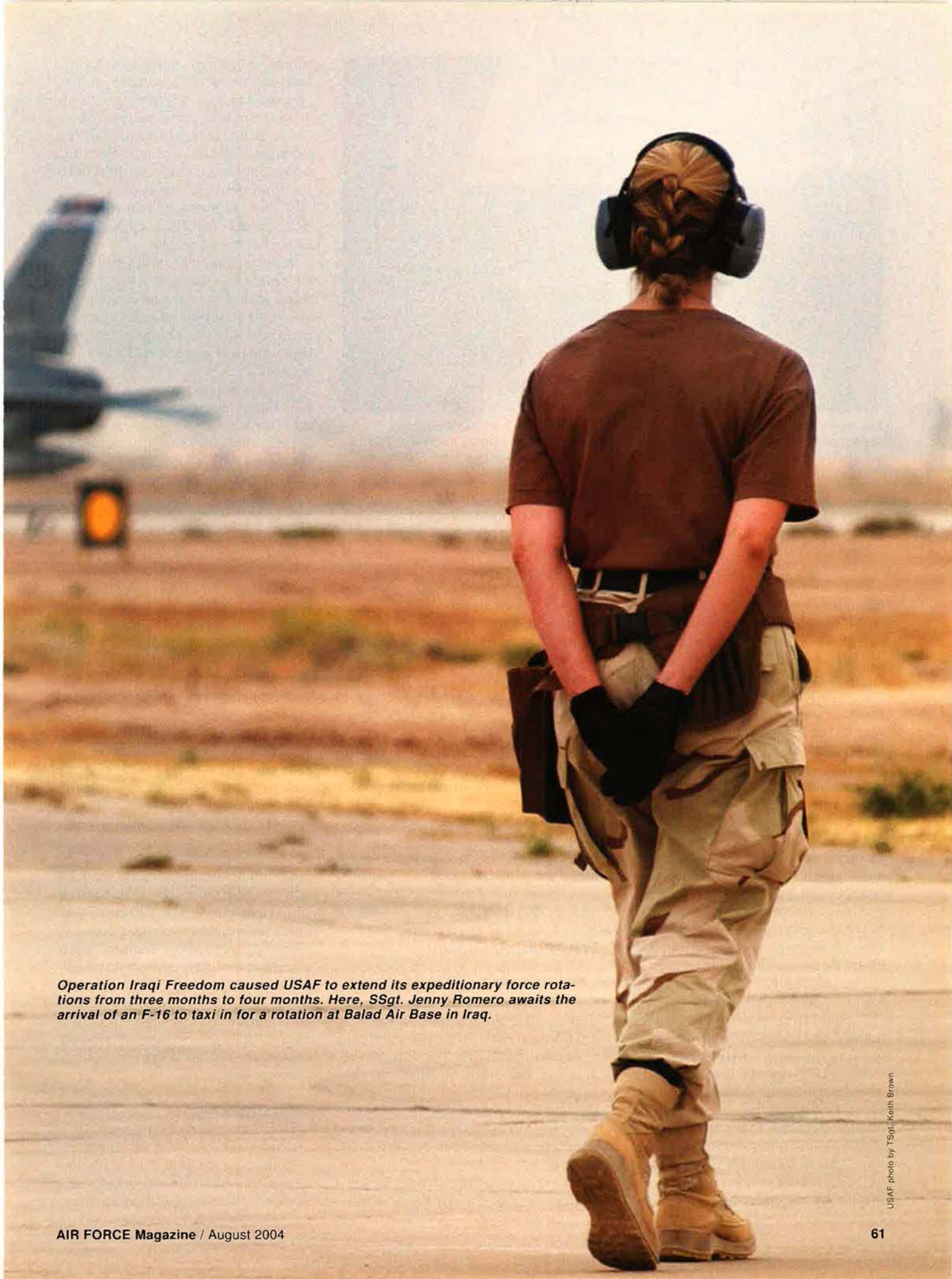
It will, however, lead to longer duty periods for some airmen and perhaps for many.

Needed: 20,000 Airmen

"The demands on our deployable forces have not diminished and are not expected to decline for some time," said Jumper. "We have a new rotational requirement for nearly 20,000 airmen—about three times the demand prior to Sept. 11, 2001.

"Further, the Air Force component commander in the Central Command area of operations has asked us to deploy people for longer tour lengths to allow greater continuity for expeditionary commanders in the field."

At the heart of USAF's expeditionary system are the 10 discrete packages of airpower and support capabilities called air and space expeditionary forces, or AEFs. At the start of each deployment phase, a



Operation Iraqi Freedom caused USAF to extend its expeditionary force rotations from three months to four months. Here, SSgt. Jenny Romero awaits the arrival of an F-16 to taxi in for a rotation at Balad Air Base in Iraq.

USAF photo by TSgt. Keith Brown



The new requirements mean more time in combat zones but less frequent deployments—with 20 months between expeditionary assignments. Here, TSgt. Cindy Beck briefs airmen from McGuire AFB, N.J., departing for AEF tours.

pair of AEFs become vulnerable for overseas assignment. There are five pairs of AEFs, and the rotation of these five constitutes a cycle.

The basic concept dates to the early 1990s. Impetus came from the demands of Operation Northern Watch and Operation Southern Watch, the patrols of the no-fly zones over Iraq after the 1991 Persian Gulf War.

By the mid-1990s, the “watches” were wearing out aircrews and ground crews. Compounding the problem was the fact that many of the same units were sent again and again to patrol the desert, disrupting training schedules and family lives.

Something better was needed, and AEFs were the solution.

In the mid-1990s, Jumper, who formerly commanded the air component of CENTCOM, advocated a new, “expeditionary” approach to air operations. He argued that the Cold War-style garrison structure couldn’t keep up with the needs generated by multiple crises and deployments.

Gen. Michael E. Ryan, then USAF Chief of Staff, formally restructured USAF into 10 air expeditionary forces, mainly to deal with the burden of running the Iraqi no-fly zones.

The AEFs spread around the deployment burden to more units and created predictability where none had existed before. There was nothing magic about 90-day deployment windows and a 15-month cycle—those durations were chosen partly to get airmen back to their home bases be-

fore their skills got too rusty and to ensure that the same person wouldn’t have to go to the “sandbox” every holiday season.

The watches, however, had become a steady state, seemingly without end. To enforce the no-fly zones, airmen flew 10 times as many sorties as they had in all-out war during Desert Storm.

Hornburg, the ACC commander, recalled that the desert no-fly zone operations “essentially were burning our training.”

Today, however, because of the way USAF crews are flying, “I’ve changed the way I look at it,” said Hornburg.

When the Air Force was flying combat air patrols in the desert, he said, the pilots “weren’t in there doing close air support, [and] we weren’t exercising our wartime skills.” He added, “Well, we are today.”

Emphasizing Support

In the old days, aviation packages used to dominate AEFs sent to the Gulf. Now, the natures of the continuing operations in Iraq and in Afghanistan are changing that situation.

According to the Air Force, the aviation requirement formerly accounted for 42 percent of the airmen deployed to the region. In the AEF grouping that deploys this summer, aviation will account for only 18 percent.

The reason for the change in percentages is that the Air Force is put-

ting more and more emphasis on combat support forces—security police, communications technicians, truck drivers, fuels experts, and the like.

For them, lack of training isn’t a problem. While deployed in Iraq, troops in these combat support units are busy performing their primary jobs and, as a result, don’t have to worry about losing their edge through lack of training events.

Jumper summed up the situation: “A tasking to support Army operations with 2,000 of our expeditionary combat support forces required us to reassess our planning assumptions and to adjust our AEFs to a new mission set.”

The latest major change affecting Air Force deployments was a requirement to provide more convoy drivers and security forces to the forces of CENTCOM. Those are jobs that historically have been performed by the Army. “We were glad to help out there where we could,” said Hornburg.

Still, close work with the Army can sometimes require additional acclimation, and longer deployment periods could prove helpful. With 120-day deployments, airmen will likely increase their levels of proficiency. New people will be coming into the theater less frequently, and so the experience level should be higher.

Top service officials on several occasions debated whether the benefits of longer tours (such as more stability in the theater) would outweigh the negatives (such as longer separation from an airman’s home station).

The leadership believes that the most important benefits of the AEF will be unaffected by this change. Either period—90 or 120 days—allows for meeting combat requirements in an orderly manner, while offering predictability for the troops.

The change is considered permanent. “This evolution of the AEF is not a temporary adjustment,” Jumper wrote. “It is recognition of new demands around the world for air and space power.”

Less Churning

Hornburg expanded on that explanation.

In the past, he said, “we wanted to change our aviation packages every 90 days ... because our aviation pack-

ages were losing their edge, but they're not now. If you look at the fact that we are going to have a pretty significant laydown in Southwest Asia for the foreseeable future, it does not make good sense operationally to change the AEFs every 90 days when we can do it every 120 days."

Hornburg also noted another benefit stemming from longer deployments: a reduced transportation burden. Traditionally, the Air Force changed out its AEFs four times per year. "Doing it three times a year, you save that percentage of transportation costs and everything else," Hornburg noted.

The Air Force concedes it will not be able to keep some airmen on this 120-day schedule, and it worries that some will continue to be deployed for six months at a time.

These extended tours are seen most frequently in the security forces, but they also affect airmen in some very small career fields. Example: Frequency management experts, of which USAF has exactly two available for deployment.

Maj. Gen. (sel.) Anthony F. Przybyslawski, then commander of the AEF Center at Langley, said in an interview that the Air Force keeps a close watch on such airmen. Their schedules have fluctuated.

During Operation Enduring Freedom in Afghanistan, 7.3 percent of deployed airmen were extended beyond 90-day deployment windows.



USAF photo by SSGT. Travis Aston

Designed with the no-fly zones in mind, the original AEF mission changed when OIF brought the "watches" to an end. Pictured are F-15s with the 1st Fighter Wing at Langley AFB, Va., returning from a Northern Watch deployment.

The figure dropped as low as one percent during the post-Operation Iraqi Freedom reconstitution period, but it has risen again to 10 percent.

The pair of AEF 9 and AEF 10 are up for deployment this summer. The projection for that pair is that extensions will once again be back at 7.3 percent, but the Air Force will continue trying to adjust to the new requirements while living within the bounds of regular AEF rotations.

"This is the transition," Przybyslawski said.

Extensions are worrisome, for a number of reasons.

To begin with, some airmen might get burned out. For example, security forces are essentially operating under an "AEF A" and "AEF B" construct—half a year deployed and half a year at home station. While retention has not suffered to date, leaders are keeping a close watch on morale.

Another concern is that the schedules are designed to offer recovery, normal operations, and training time during the 12 months airmen are supposed to be at their home bases. The long-term effect on those who are not getting that recovery time is still unknown, but there are worries.

The system meets higher-than-normal demands by reaching forward to dip into the upcoming pair of AEFs. The structure allows identification of needed personnel.

Brig. Gen. William L. Holland, former director of AEF matters on the Air Staff, says the priorities are providing capability first and personnel stability second. "The AEF construct allows us to do that," he said, and it has repeatedly proved to be flexible.

It Works

Officials consider the rotational system an unqualified success. The number of airmen deployed through AEFs has varied dramatically since the 9/11 terrorist attacks, frequently going well above what the two on-call AEFs were able to accommodate. Even so, say officials, the sys-



USAF photo by TSgt. Steve Faulisi

Some personnel in high-demand fields will continue to face extended deployments. Security forces, such as these with the 332nd Air Expeditionary Security Forces Squadron at Balad, can be deployed half a year at a time.



The 90-day AEF was designed to prevent pilots, such as Maj. Mike Love of the 1st Fighter Wing at Langley, from losing their edge while flying uneventful sorties over Iraq. That concern has eased.

tem has done what it was set up to do in wartime: provide needed capabilities in an orderly and predictable manner.

Before the Sept. 11 attacks, the Air Force had about 8,400 personnel deployed through the AEFs, primarily in support of Northern Watch and Southern Watch.

During Enduring Freedom in Afghanistan, however, the number rose to 22,400. It climbed all the way to 107,300 for Operation Iraqi Freedom last year. At that time, personnel from eight of the 10 AEFs were directly supporting the war effort.

Officials maintain that the need to deploy so many airmen did not mean the system was broken. Far from it. The AEF setup actually helped by allowing planners to “look forward” into the next pair of AEFs for personnel and capabilities when the demands became too great for the on-call pair.

The system also allowed personnel to be released in an orderly manner once demands began to subside.

During the peak of OIF, all assets supporting CENTCOM’s requirements were assigned through the AEF system—the first time the Air Force was able to meet all its global taskings that way. The Air Force flew roughly 750 sorties per day. It set up and supported some 37 contingency bases in Southwest Asia.

As major combat wound down, the Air Force cobbled together two “contingency” AEFs (Blue and Silver), consisting primarily of airmen

who had not deployed in support of CENTCOM’s operations. This allowed a period of reconstitution for airmen who had deployed.

AEFs Blue and Silver were each put on call for 120 days, giving the Air Force a prototype for the new schedule—and eight months to prepare for regular rotations to resume. For most airmen, the standard cycle picked up again with the pair of AEF 7 and AEF 8, which deployed in March.

Przybylski noted that Blue and Silver were able to meet almost all requirements without extending the assigned airmen. Unfortunately, the extensions that did happen were of the worst kind. Personnel who were already deployed were told they would have to stay in the theater beyond their expected return dates.

Mortal Sin

Przybylski described this as a “mortal sin.”

Officials came back to the idea of living up to a “contract” with the airmen—keeping them informed of how the AEFs will work for them and what is expected of them.

Hornburg takes the opinions of airmen very seriously, in that ACC supplies 36 percent of all forces in the AEFs. That is nearly double the number supplied by any other Air Force major command. Shifting to 120-day assignments obviously affects ACC, but perhaps in a good way.

“We’ve done some informal polling,” Hornburg said, “and, while I

do not speak for every airman, ... [they] are telling us that they would actually prefer one 120-day cycle every 20 months.”

Today, the post-OIF steady state requires deployment of roughly 22,000 airmen. With the exception of certain high-demand fields, two AEFs’ worth of capabilities should be able to meet the new steady state requirements. Most shortfalls concern support of contingency bases.

The Air Force has picked up some duties from a stressed Army. Przybylski said 1,620 Air Force personnel in AEFs 7 and 8 are filling Army shortfalls in security forces and logistics ground teams. This is essentially a quid pro quo; the Army in OEF mobilized to make up for shortfalls in the Air Force’s domestic force protection system.

“The first two letters of ‘US Air Force’ happen to be ‘US,’ so that’s the way she goes and we’re happy to do that,” said Hornburg, “but I’d be happier if we didn’t have such a support load over there, and we were able to get some of our folks rested.”

The Air Force strategy calls for shutting down some Southwest Asia bases as the situation improves. “The reason we’re stressed the way we are right now is that we had intended to shut down more bases over there than we have been able to ... because of the status of the operation,” Hornburg explained.

The Air Force is broadly attempting to steer additional personnel into the overtaxed career fields. Of these, the most overtaxed probably has been security forces.

At present, the Air Force has about 272,000 airmen in “the library”—that is, on the rolls as deployable in AEFs. Jumper says he wants to increase that number, though doing so may prove difficult. The Air Force has marked off-limits those forces assigned to alert missile duty, missions in South Korea, or undergoing permanent change of station.

Jumper wrote that he asked all of USAF’s major commands to “aggressively review the assumptions upon which they exclude airmen from our AEFs and [to] take immediate steps to maximize” those available to the system.

“Let me be perfectly clear,” Jumper continued. “In our Air Force, every airman is expeditionary.” ■

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The unique 46th Test Group tries out a wide range of weapons systems over the white sands of southern New Mexico.

TEST BY TRIAL



Staff photo by Guy Aceto

Photography by Guy Aceto, Art Director and Paul Kennedy

An AT-38B Talon, equipped with a range telemetry pod hanging from its centerline hardpoint, flies over the desert.



The 46th Test Group at Holloman AFB, N.M., operates world-class aerospace testing facilities, many of which have existed since the 1960s at Holloman and nearby at the Army's White Sands Missile Range. The group, which is part of the 46th Test Wing, headquartered at Eglin AFB, Fla., also oversees all Air Force testing conducted within White Sands.

At right, one of the group's AT-38B aircraft, distinctively painted in a low-visibility, two-tone gray color scheme, prepares for a test sortie. (In the background is a German F-4. The German Air Force has a training unit at Holloman.)



The 46th Test Group comprises three test squadrons—the 586th Flight Test Squadron, 746th Test Squadron, and 846th Test Squadron—the Directed Energy Office, and the National Radar Cross Section Test Facility.

The 586th Flight Test Squadron operates AT-38s and a one-of-a-kind, specially modified C-12J aircraft used for evaluating avionics, electronics, and guidance/navigation equipment. The C-12J also flies low-speed photographic support and safety chase sorties. In the future, the aircraft may be fitted with external hardpoints to offer even greater test versatility.

At right, the C-12J launches for a sortie to test the Joint Precision Approach and Landing System (JPALS), a next generation landing system being developed for austere environments.





The 586th's Talons (above and right) offer Global Positioning System navigation and precision data recording and telemetry, electronic countermeasures, chaff and flare dispensing, and multiple-format photographic coverage, including helmet-mounted video cameras. The aircraft's rear seat area can be fitted with a rack-mounted equipment kit to provide additional test capabilities.

The squadron conducts most of its flight tests over White Sands, which is clear of all commercial air traffic, making possible full up electronic jamming and live-fire weapons testing.



Photos by Paul Kennedy



Sharing ramp space (far left) at Holloman are QF-4 drones used in various DOD weapons tests. The drones are operated by Det. 1, 82nd Aerial Targets Squadron, of the 53rd Weapons Evaluation Group, Tyndall AFB, Fla.

Pictured at near left is a "target" parked at White Sands.

The 746th Test Squadron is also known as the Central Inertial Guidance Test Facility. It is DOD's center of expertise for testing GPS user equipment; inertial guidance systems for aircraft, missiles, and spacecraft; doppler and stellar-aided inertial navigation systems; and navigation subsystems. Its test and evaluation systems include heavy centrifuges such as the one at right.

The 746th has several specialized laboratories and mobile and fixed antenna test assets. After completing functional and performance evaluations in the labs and field, the squadron works with the 586th Flight Test Squadron for flight testing in dynamic operating environments.



The 846th Test Squadron runs the world's premier rocket sled at the Holloman High Speed Test Track facility. At left is the 50,788-foot sled track, the longest in the world. On it, test sleds can achieve velocities from subsonic through hypersonic. Full-scale aircraft can be tested at realistic flight velocities. The facility fills the gap between lab investigations and full-scale flight tests. Dubbed DOD's center of expertise for aircraft ejection seat testing, it also tests everything from canopies to munitions to scramjets.



Above and right are "wafers"—that is, huge, reinforced slabs of concrete that serve as the targets for sled tests. The wafers are designed with varying specifications, depending upon individual test parameters.





Above is a time exposure of a sled test of a hypervelocity kinetic warhead. For this type of event, days of preparation come down to a few brief seconds of excitement, followed by a lengthy evaluation of the results.

At right, the same track tests the ejection seat in USAF's new F/A-22 Raptor. High-speed cameras and recording devices capture these events in spectacular detail.

The highly technical nature of this work makes for exact thinking. Note how precisely the unit measures speed—44 fps (feet per second)—on the gag road sign below.



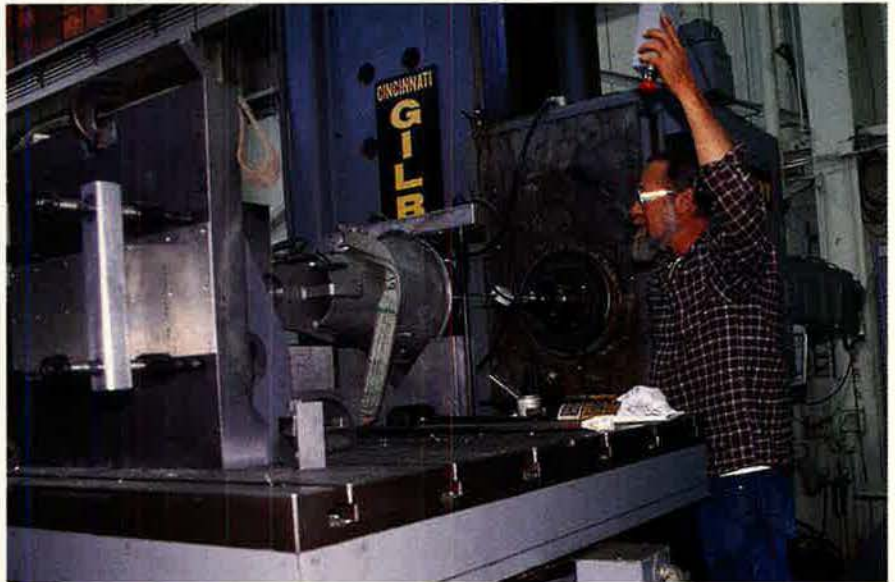
46TG photos



At left, high-speed cameras catch a 192-pound Missile Defense Agency payload traveling at 5,416 mph, a new land speed record. The April 30, 2003, test validated the track's hypersonic upgrades and broke its 1982 record of Mach 8.1 for travel on rails.

Exacting tests require equipment made to exacting standards. This often means that the engineers of the 46th Test Group have to fabricate necessary components themselves. True craftsmen, the engineers build the test sleds and even some of the payloads, often from scratch. At right is one of the group's huge milling machines, and, below that, a welder puts the finishing touches on a component for an upcoming test.

The group has a large civilian component. It currently consists of some 90 military, 240 civilian, and 160 contractor personnel—two-thirds of whom are scientists, engineers, and technicians.



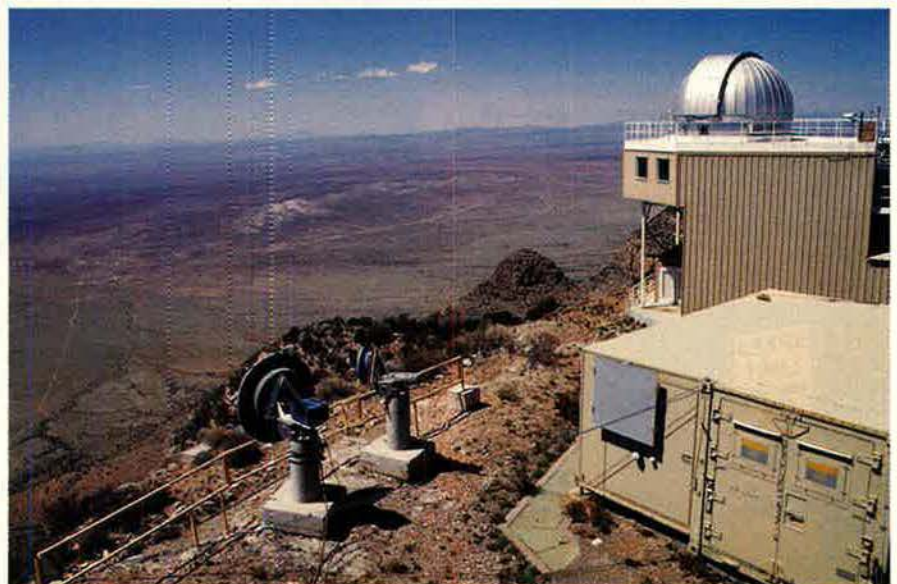
Photos by Paul Kennedy



At left, a technician photographs a completed test sled being readied for a hypersonic test.

The Directed Energy Office coordinates the Air Force's directed energy testing on White Sands Missile Range, making use of two high-altitude test sites—North Oscura Peak and Salinas Peak. The office works with the Air Force Research Lab's Directed Energy Directorate at Kirtland AFB, N.M., on test and evaluation of the Air Force's new YAL-1A Airborne Laser.

At right is AFRL's facility on North Oscura Peak.





The National Radar Cross Section Test Facility (NRTF) is where DOD first proved that stealth technology worked. NRTF, which has been in operation since 1963, is located at White Sands. It has two complementary outdoor static radar signature measurement ranges, each offering one-of-a-kind capabilities. NRTF is the only facility in DOD capable of making such tests on full-size aircraft. It is government-owned and contractor-operated.

Pictured above, an AT-38B passes by an NRTF structure, housing a 50-foot pylon and gantry crane.



The 46th Test Group offers a wide variety of capabilities, from indoor evaluations to actual flight checks. The group's goal is to provide accurate tests of the most advanced equipment in the world to ensure the Air Force stays ahead of global threats. ■

A review of nearly half a century of Air Force spending produces several surprises.

Follow the MONEY

THE US Air Force *is* combat aircraft, most laypersons would say. Asked to gauge service strength, they would probably do so by simply adding up the numbers of F-15s, F-16s, B-2s, and other combat airplanes with which they are familiar.

Even some informed observers might take the level of combat forces as indicative of the strength of the force—and therefore of the adequacy of the Air Force budget.

The truth, of course, is that the sharp edge of the Air Force represents only a portion of its capability. The amount of money allocated to sustain these fighting forces represents a surprisingly small—and declining—share of the total Air Force budget.

An extensive service analysis of spending trends shows the Air Force now devotes almost half of its resources to airlift, space, intelligence-surveillance-reconnaissance (ISR) systems, and other capabilities that support the entire US military establishment.

By contrast, combat forces get only 25 percent. The remainder goes to infrastructure and support functions.

“In some cases, people just don’t realize how much we do on the joint enablers,” said Lt. Gen. Duncan J. McNabb, USAF’s deputy chief of staff for plans and programs.

The Air Force strategic planning directorate wanted a better understanding of the trends in resource allocation. They researched the actual spending record of 47 years, sorting some 900 individual programs into general mission and functional areas.

Planners then cross-referenced program budget numbers from 1962 to 2009, the end of the current planning cycle, to produce data depicting fluctuations in planned spending patterns.

The goal was to try to help determine the right balance of capabilities—old and new—for investment. The directorate white paper, “Past Trends and Future Plans,” noted that

By Peter Grier

the data reflect thousands of decisions taken against a backdrop of decades of dramatic events.

"You can really see a lot of history" in this analysis, said Christopher J. Bowie, USAF's deputy director of strategic planning.

More Spent on Jointness

The data show a huge shift toward joint support enablers—airlifters, tankers, and command, control, communications, computers, ISR (C4ISR) systems—and away from joint combat forces—fighters, bombers, special operations, ICBMs, and munitions—and foundations—training, health care, security, base operating activities, and other support functions. (See "Five Decades of USAF Resource Allocation," below.)

"There are reasons why these things occur," said Bowie. "There are very powerful institutional pressures driving them." Bowie added that they are "often difficult to discern."

In helping to produce the analysis, Bowie discovered some patterns that surprised even him.

First, the figures showed that spending on "foundations" has shrunk from about 36 percent of the total Air Force budget in the 1960s to about 30 percent in the current decade. McNabb and Bowie interpret this trend as fruits of a successful USAF effort to reduce spending on the service's "tail."

Second, spending on capabilities used by all the services has risen from about 33 percent of the budget in the 1960s to 45 percent in today's plans. Growth has averaged more than a quarter of a percent each year.

"The really striking trend is that roughly half [the Air Force budget] goes into joint enabler forces," said Bowie.

If the trend continues for another 20 years, spending on joint support areas will pass the 50 percent mark.

Indeed, Air Force planners have every reason to believe the trend will continue. The demand for airlift is growing. Some sort of program will eventually recapitalize the much-in-demand tanker fleet. E-8 Joint STARS radar aircraft, spaceborne sensors, and other ISR platforms are becoming ever more important to joint combat operations.

As the joint enabler share increases, the share for other categories declines, putting those functions under pressure.

Spending on combat forces at first rose from about 31 percent in the 1960s to 35 percent in the 1980s, but it has now fallen to about 25 percent.

This decline was not smooth. In the 1960s, the US bought large numbers of aircraft for continental air defense. Replacement efforts were moderate in the 1970s and 1980s, through Vietnam and the declining years of the Soviet empire. Then, they plunged.

Fleet recapitalization became sporadic. "In the '90s, there were a couple of years where we didn't do anything," said McNabb. "We were living off the fat of the Cold War."

Of course, fewer aircraft does not equal less capability. One F/A-22 fighter would be able to handle several of today's fighters. Newer fighters are "dramatically more capable" than they used to be, according to McNabb.

Recapitalization Pressure

Still, recapitalization remains a difficult issue. Much of the aircraft fleet is old. Aging airplanes cost more and more to maintain, at a time the

service needs money for new platforms.

The service has simultaneous modernization needs in all its mission areas. Some estimates have put the annual cost for recapitalization of USAF's assets at \$30 billion to \$40 billion.

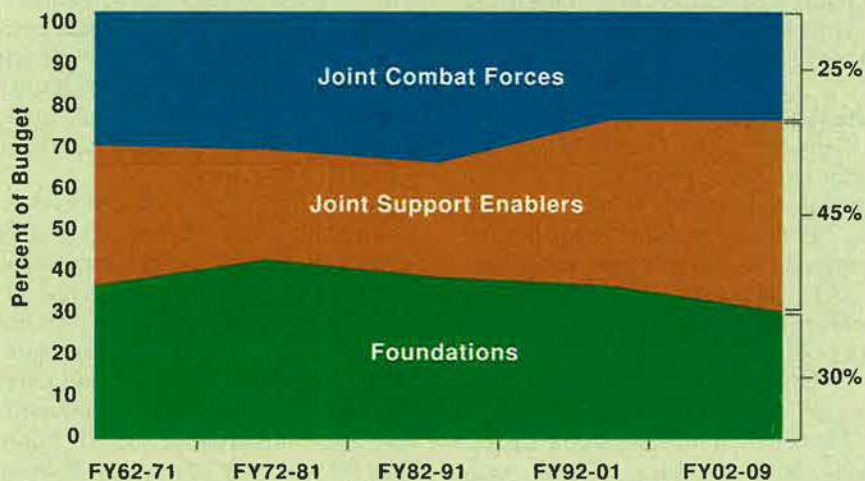
"You've got to continue to recapitalize all the time or you'll get into a crunch," said McNabb.

Given this budget context, how should the Air Force move forward? This was the central question of the "Past Trends and Future Plans" exercise.

Strategic planning for the service is not necessarily a straightforward enterprise. It is a bit like playing 3-D chess, said officials. On one level, the Air Force is planning for its transformation. On other levels, the Army, Navy, and Marines are laying their own transformative plans—all of which affect the Air Force with its growing role as a provider of joint combat and support capabilities.

"In fact, everybody's wanting more of the Air Force," said McNabb, "not

Five Decades of USAF Resource Allocation



Joint combat forces: fighters, bombers, special operations, ICBMs, and munitions.

Joint support enablers: airlifters, tankers, and command, control, communications, computers, ISR systems.

Foundations: base operating and headquarters support, environmental programs, general research and development efforts, health care, security, training, and quality of life functions.

only our combat kinetic kill capability but all of the other things that we bring to the fight, whether that's joint enablers ... or expeditionary combat support."

In high-level planning meetings, representatives of the rest of the military never say they want less of something the Air Force provides. They always say they need it all, according to service planners.

"The good part of that is that the investment in joint enablers is allowing everybody to get better from a capability standpoint," said McNabb.

Consider the race to Baghdad last year during major combat operations in Iraq. Ground forces, including special operations units, relied on air and space power as never before. And the Air Force delivered, providing accurate fire support, unprecedented situational awareness, rapid resupply and troop movement, and secure communications and navigational data.

As with chess, the difficult part is to look into the future and make judgments about how various possibilities will play out. A key factor is jointness.

"That's just going to expand," said McNabb. The fundamental question becomes "how do we work with [other services] to make sure we're supporting them, they're supporting us, and we're doing best by the taxpayers?" he noted.

The Squeeze

Growth in the budget share devoted to joint programs has been made possible partly by a corresponding reduction in the slice of the pie spent on the "foundation" activities. USAF has worked successfully for years to develop efficiencies in those types of activities.

"We have been squeezing the foundation," said McNabb.

The cost of headquarters operations, base operating support, general research and development, and other baseline operations has been squeezed in the past and is likely to be squeezed harder in the future.

"People don't realize how much we have done ... to be more efficient and show declining dollars in our foundation accounts," said McNabb.

The Air Force continues to encourage units to find savings by let-

ting them retain a percentage of the money saved.

More savings will come from the next round of base realignment and closure efforts. USAF officials say the new BRAC is crucial to its attempts to "right size" the service's infrastructure.

The Air Force also is considering new, money-saving ways of basing its forces. One plan calls for collocation, with those of other services, Air Force troops and assets that perform similar functions. Service officials want to make training more efficient, possibly by embedding less-experienced active duty fighter pilots and maintenance personnel into veteran Air National Guard units.

However, foundation accounts can be squeezed only so much.

"The data indicate that the 'low-hanging fruit' has already been plucked," stated the McNabb-Bowie paper. "Gaining additional increases in efficiency will undoubtedly become more difficult."

Making Legacy Cuts

McNabb and Bowie believe that it will be necessary to give up some legacy weapon systems—specifically those whose operation and maintenance has become expensive. Eliminating those could make upgrades to other existing platforms affordable.

Some older weapon systems continue to play key roles in today's Air Force, though. "We are certainly using legacy systems in ways rarely considered before," noted the strategic planning paper.

For example, B-1Bs and B-52s, combined with GPS targeting data and Joint Direct Attack Munitions, destroyed enemy forces in Afghanistan and Iraq, even if they were uncomfortably close to friendly units.

Still, it is new systems that offer the highest reliability and capability. The challenge for the Air Force will be in taking advantage of these resources.

Take the C-17 fleet. Originally, some 120 aircraft were slated to replace 265 C-141s. Numbers, in this case, are not comparable. The newer

airlifter has higher reliability rates, requires fewer backup aircraft, and offers substantially lower cargo transport costs, noted the planning paper.

"Today, you will not find anyone who would want to trade the smaller C-17 force for the larger C-141 force," said the white paper.

USAF assigns five crews to each C-17, compared to 3.6 for each C-141. The move has helped strengthen US mobility. Other systems might benefit from such an approach. For instance, increasing the crew-aircraft ratio could maximize use of fighter, tanker, and ISR aircraft. Increasing the number of trained air operations center personnel and enhancing reachback capabilities might be a big boost to joint US military capabilities.

Striking the right balance between old systems, technical upgrades, and new weapons is a difficult one. This is reflected in the current controversy over what to do about Air Force refueling aircraft. Expanding airlift requirements have led the Air Force to increase its planned buy of C-17s to 180 airframes and undertake C-5 upgrades. At the same time, it must make a decision about its tanker fleet—obtain new tankers, either through purchase or lease, or purchase expensive upgrades for the current ones.

"That's why you see the debate about the tanker," said McNabb.

Given the obvious restraints on the Air Force budget, a mix of approaches to modernization seems the most logical planning option. According to the white paper, holding on to the "whole range of legacy systems" means that "increasing operations/support costs will consume" scarce dollars, and the "decreasing availability" of those legacy systems will impair USAF's ability to perform its mission.

Concluded the McNabb-Bowie paper: "We need to transform: utilize capabilities-based planning to establish priorities, upgrade some legacy systems to do new things, divest other legacy elements to free up resources, modernize, and then fully resource new capabilities using organizational changes to active and reserve units to maximize their potential." ■

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

Vietnam Warrant

On Aug. 2, 1964, North Vietnamese PT boats launched a daylight attack on USS Maddox, a Navy destroyer in the Tonkin Gulf east of North Vietnam. The attackers were driven off. Two days later, on Aug. 4, Maddox's commander reported that his ship and USS Turner Joy were under nighttime attack.

Later, there were doubts that the second attack had actually occurred. President Lyndon B. Johnson, in an evening address to the nation on Aug. 4, announced he had approved air strikes on North Vietnam and that he would ask Congress to give him a mandate for further action.

On Aug. 7, Congress overwhelmingly passed a joint resolution authorizing LBJ to use "all necessary measures to repel any armed attack against the forces of the United States and to prevent further aggression."

This Gulf of Tonkin Resolution was not a formal declaration of war, but it was the closest approximation that Congress ever provided. It served as a legal basis for a large-scale escalation of US military operations in Southeast Asia.

H.J. RES 1145

Joint Resolution: To promote the maintenance of international peace and security in southeast Asia.

Aug. 7, 1964

Whereas naval units of the Communist regime in Vietnam, in violation of the principles of the Charter of the United Nations and of international law, have deliberately and repeatedly attacked United States naval vessels lawfully present in international waters, and have thereby created a serious threat to international peace; and

Whereas these attacks are part of a deliberate and systematic campaign of aggression that the Communist regime in North Vietnam has been waging against its neighbors and the nations joined with them in the collective defense of their freedom; and

Whereas the United States is assisting the peoples of southeast Asia to protect their freedom and has no territorial, military or political ambitions in that area, but desires only that these peoples should be left in peace to work out their own destinies in their own way: Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,

That the Congress approves and supports the determination of the President, as Commander in Chief, to take all necessary measures to repel any armed attack against the forces of the United States and to prevent further aggression.

"The Gulf of Tonkin Resolution"

Senate and House of Representatives

Joint Resolution 1145,

Washington, D.C.

Aug. 7, 1964

Find the text and related documents on the
Air Force Association Web site

www.afa.org

Air Force Magazine

"The Keeper File"

Sec. 2. The United States regards as vital to its national interest and to world peace the maintenance of international peace and security in southeast Asia. Consonant with the Constitution of the United States and the Charter of the United Nations and in accordance with its obligations under the Southeast Asia Collective Defense Treaty, the United States is, therefore, prepared, as the President determines, to take all necessary steps, including the use of armed force, to assist any member or protocol state of the Southeast Asia Collective Defense Treaty requesting assistance in defense of its freedom.

Sec. 3. This resolution shall expire when the President shall determine that the peace and security of the area is reasonably assured by international conditions created by action of the United Nations or otherwise, except that it may be terminated earlier by concurrent resolution of the Congress.

Speaker of the House of Representatives
President pro tempore of the Senate

Statement by the President on the Passage of the Joint Resolution on Southeast Asia

Aug. 7, 1964

The 414-to-nothing House vote and the 88-to-2 Senate vote on the passage of the Joint Resolution on Southeast Asia is a demonstration to all the world of the unity of all Americans. They prove our determination to defend our own forces, to prevent aggression, and to work firmly and steadily for peace and security in the area.

I am sure the American people join me in expressing the deepest appreciation to the leaders and Members of both parties, in both Houses of Congress, for their patriotic, resolute, and rapid action.

Lyndon B. Johnson

The great 1954
battle sucked
US airmen into
Indochina and
helped set the stage
for the Vietnam
War.

Dien Bien Phu

By Rebecca Grant

IT WAS in August 1964—40 years ago this month—that the United States stepped irrevocably into the Vietnam War. However, that step had been foreshadowed a full decade earlier.

On Aug. 4, 1964, President Lyndon B. Johnson announced that North Vietnamese boats had fired on US warships. Congress on Aug. 7 responded with the Gulf of Tonkin Resolution, which opened the way for large-scale US intervention in Southeast Asia.

Less well known, however, is that the Vietnam fuse had been lit back in 1954. The spark was the battle of Dien Bien Phu.

In early 1954, France, a key Western ally, faced a major crisis in what was then called French Indochina. Several thousand French soldiers were trapped in the fortress at Dien Bien Phu, an isolated town in northern Vietnam, near the border with Laos.

In an effort to assist the besieged garrison, French forces had borrowed and were using a US Navy aircraft carrier, 10 US Air Force B-26s, several C-47s and C-119s, and hundreds of US Air Force personnel.

Washington wanted to help. The question was how far President Dwight D. Eisenhower would go to prevent a communist triumph at Dien Bien Phu.





United States Air Force B-26s loaned to France sit on the ramp at Tourane, Vietnam—later known as Da Nang. They still wear the nose art they carried in Korean action, mere months before. American airpower assistance was the last hope for the French in Indochina.

Vietnam and other parts of Indochina had been French colonies since the 19th century. Chased out by occupying Japanese forces in World War II, France had returned after the defeat of Japan and sought to re-establish colonial control.

France's actions provoked open warfare with communist-dominated Viet Minh forces—led by Gen. Vo Nguyen Giap—which in 1946 launched a broad armed uprising against the French. In October 1949, China's communists won their own civil war and started sending aid southward.

“Total Destruction”

The Viet Minh prepared for all-

out war. Bernard B. Fall, the author of *Street Without Joy*, a classic 1961 study of the 1946-54 Vietnam War, wrote that Giap sought not mere victory but “the total destruction of French forces.”

France's goal was a mirror image—total destruction of communist forces. France sought to lure Giap's forces into a set-piece battle, which it felt sure it would win.

In early 1953, France had roughly 200,000 troops in the field. Some 200,000 Vietnamese troops fought with them as allies. French forces held delta areas and towns but they did not control the back country and highlands.

France had an overwhelming advantage in air mobility. This was especially useful for dealing with the rugged inland terrain. In late 1952, French forces established and held a northern strong point at Na San. French air forces supplied the fortified garrison using an air bridge from French-held Hanoi, only 50 minutes of flying time from Na San. In early December 1952, French forces turned back a two-division attack, after which the Viet Minh withdrew.

France relied on airdrop techniques perfected in the China-Burma-India theater in World War II. One such example was a three-battalion para-



France employed paratroopers in quick raids that destroyed Chinese supplies for the Viet Minh. Paratroopers were also used to reinforce Dien Bien Phu, but to no avail. French air mobility was not matched by air striking power.

chute drop at Lang Son in July 1953. The French paratroopers destroyed Chinese arms and supplies and left without holding on to “useless real estate,” as historian Howard R. Simpson put it in his book, *Dien Bien Phu, the Epic Battle America Forgot*.

The commander of all French forces in Indochina was Gen. Henri Navarre. His plans called for the deployment to Vietnam of roughly half a million French troops by the end of 1954. With such a large force, he thought, he would be able to subdue the Viet Minh once and for all.

In the fall of 1953, Navarre took a bold step. He sent French forces to seize and fortify the town of Dien Bien Phu, an outpost nestled in a deep valley. In Navarre’s view, establishing the fortress served two purposes.

First, it would block the route from Vietnam into Laos and thereby force Giap to stretch his supply lines if he wanted to operate in that neighboring country. Second, such a fort would allow France to keep an eye on local opium production, which helped to finance the Viet Minh.

Navarre sensed no danger in taking this step. He knew that heavy artillery could cause him problems, but the commander was convinced that China would not give Giap heavy guns. Even if Giap somehow got such weapons, thought Navarre, the Viet Minh would not be able to move

them up onto the hills above Dien Bien Phu.

The French strategy was to make the 15,000-man garrison a strong point and draw Giap’s forces into battle in the valley. Navarre ringed Dien Bien Phu with artillery outposts bearing names such as Beatrice, Isabelle, and Huguette. These positions were deeply buried and buttressed to withstand artillery fire.

French officers believed that, by creating interlocking fields of fire, they could defeat an attack in much the same way that they had successfully repelled the enemy at Na San. The Europeans were confident that, even should Giap get a few artillery pieces into play, French counterbattery fires would silence them.

French forces also had the air all to themselves. They planned to use air support to spot and hit artillery and troop concentrations.

Tables Turned

Giap, a brilliant strategist, turned the tables in three ways.

First, he immediately began to build massive concentrations of manpower and supplies in the Dien Bien Phu area.

Second, he brought in Chinese-supplied heavy artillery and Chinese advisors to further train his Viet Minh gunners. Engineers built roads and bridges for trucks. In a few months, his artillerymen had surveyed the whole of Dien Bien Phu.

Third, he put off a frontal attack and set his forces to digging trenches that would come close to the French outposts. He would keep at it until he controlled a trench perimeter around Dien Bien Phu.

As Giap’s biographer, Peter G. MacDonald, put it: “The French had thrown down the gauntlet, but, because the jungle country concealed troop movements, it took some time for them to realize that Giap had picked it up.”

Giap soon had 50,000 combat troops at Dien Bien Phu and 300,000 soldiers and peasants moving artillery, anti-aircraft guns, and other materiel along the 500-mile supply lines almost with impunity. Those forces outgunned the Dien Bien Phu garrison. The French had flown in about 60 artillery pieces of heavy caliber (57 mm and bigger). However, Giap had in place in January 1954 more than 200 heavy artillery pieces, including the fearsome “Stalin Organs,” Soviet-built Katyusha rocket launchers.

Dien Bien Phu would never be the stronghold the French wanted. Instead, it had become a trap.

The situation in Indochina was a headache for Eisenhower. The President deplored France’s colonial agenda. Moreover, he had in late 1953 come to hold a bleak view of France’s military situation. In his memoirs, he recalls that France’s move into Dien Bien Phu raised eyebrows among soldiers “who were well-acquainted with the almost invariable fate of troops invested in an isolated fortress.”

Eisenhower was not sure there was a way to win in Vietnam, and he was wary of getting the US involved.

Early US Involvement

Yet America already was involved. President Harry S. Truman reluctantly had provided military aid to French forces in Vietnam, and, now, the US was picking up as much as 75 percent of the cost of France’s adventure in Indochina.

According to an Eisenhower biographer, Stephen E. Ambrose, the President ruled out use of US ground troops. He told participants at a Jan. 8, 1954, National Security Council meeting, “This war in Indochina would absorb our troops by divisions.”

One month later, he told influen-

tial Sen. Leverett Saltonstall (R-Mass.) that he was “frightened about getting ground forces tied up in Indochina.”

That left airpower—land-based and sea-based. In fact, Eisenhower put US airpower at the heart of all secret discussions of US assistance to France. This was consistent with President Eisenhower’s so-called “New Look” defense policy, which emphasized airpower—especially strategic nuclear airpower—as the centerpiece of US military power.

Only a few months before, in a famous speech in January 1954, Secretary of State John Foster Dulles had unveiled the new concept of “massive retaliation.” With that phrase, Dulles was signaling that the United States would not try to match communist forces tank for tank, gun for gun, or rifleman for rifleman. Rather, the US, faced with aggression, would



AFP/Getty Images

Gen. Vo Nguyen Giap (in black) plans the encirclement of Dien Bien Phu. Using the cover of the jungle, Giap moved men and artillery ever closer to the French outpost, holding fire to avoid alerting the defenders.



“retaliate instantly by means and at places of our choosing.”

The clear implication was that the United States was prepared to resort to nuclear weapons.

At first, however, France only requested use of 25 B-26 bombers and 400 USAF support personnel to maintain them. The plan was to use B-26s for strafing and bombing of the encroaching Viet Minh troops. Eisenhower sent only 10 B-26s and 200 US airmen to maintain them. He also laid down the strict proviso that they would rotate out of Vietnam and be home by June 15, 1954.

Still, it was impossible to miss the significance of the American deployment. “For all Eisenhower’s emphasis on reduced numbers and a definite date for withdrawal,” wrote Ambrose, “he had sent the first American military personnel to Vietnam.”

Meanwhile, Giap bided his time. He had canceled his original assault plan, which called for launching the main attack in January 1954. He did this because he had not yet finished the disposition of his forces. However, the French appear to have drawn the wrong inference, concluding that their artillery and air strikes were weakening the communist force. What they did not know was that Giap was steadily moving his artillery closer, positioning it down the front slopes of the hills, all con-



C-119 Flying Boxcars such as this one were lent to the French for both mobility and attack. Most of the aircrews flying these aircraft were Americans—some military advisors, some civilians.

cealed by camouflage. Giap's 105 mm guns had yet to be fired.

Throughout this period, the Dien Bien Phu garrison was bleeding. French commanders had dispatched soldiers on armed patrols, hoping to clear the surrounding hills of Viet Minh, but sniper attacks and firefights with small clusters of guerrillas were having an effect. France had suffered 1,000 casualties by February 1954.

The Siege Begins

The attack that formally began the siege of Dien Bien Phu was launched March 13, 1954.

Giap's forces unleashed fire from 105 mm guns and other artillery on three key northern strong points and on the main airstrip. The artillery shells cratered the runway and destroyed aircraft on the strip. French mechanics hastened to repair what they could and got three F8F Bearcat fighter-bombers airborne to escape. Viet Minh gunners turned six others into scorched hulks.

The artillery outposts fell within hours. Then began a dismal trickle of wounded survivors into Dien Bien Phu's garrison hospital. The French plan to create intricate fields of fire was falling apart. One who knew it was the French artillery chief, Col. Charles Piroth, who had assured his leaders that his guns would silence the enemy's. On March 15, he killed himself in the fortress, using a hand grenade.

The French tried to hit back with artillery and airpower. Already in action were some 30 US C-119 Flying Boxcars modified to drop napalm on the Viet Minh artillery. According to Ambrose, Eisenhower believed that napalm would "burn out a considerable area and help to reveal enemy artillery positions."

Most of the aircrews flying these C-119s were American employees of Civil Air Transport (CAT), the contract airline founded by Maj. Gen. Claire Lee Chennault, the head of the World War II "Flying Tigers." More than a few aircrew members included

US pilots from the Military Assistance Advisory Group, stated Simpson.

The first napalm strike was carried out March 24. It targeted revetted gun positions about one-half mile outside Dien Bien Phu. According to Simpson, Viet Minh Gen. Tran Do credited the strikes as being somewhat effective. Do later said: "Under the enemy napalm bombs, even stone and earth took fire." Yet the Viet Minh "held on," according to Do, and continued with the artillery fire.

At the Dien Bien Phu airstrip, daylight operations ceased. Night operations worked for a few days, due in part to an unusual tactic described by Simpson. One C-47 would roar over the strip at full power as if dropping supplies. Meanwhile, a second C-47 cut its engine and glided in to land. The first C-47 followed in turn. Flares and light from artillery fire ended the trick as Viet Minh gunners wised up. Soon, C-47s were gliding into an anti-aircraft barrage.

At that point, Dien Bien Phu could be supplied only via airdrop. A reinforcement group of paratroopers made it within the garrison a few days after the start of the siege. Indeed, small groups of personnel were being dropped into the fortress until a few days before it fell.

However, dropping and retrieving supplies soon became a nightmare as Viet Minh artillery shrank the effective size of the drop zone. Morning fog and stretches of cloudy weather made it even harder. On



This ex-US Navy F8F Bearcat in theater was armed with napalm. Napalm raids were flown by these and the C-119s in a desperate effort to strip away Giap's jungle cover so his forces could be more accurately targeted.

March 27, French Col. Jean Louis Nicot, the man in charge of the aerial resupply effort, had to raise the drop altitude from 2,000 feet to 8,000 feet. Drop zone accuracy declined, and some supplies inevitably fell into Viet Minh hands.

By mid-April, the drop zone had been compressed into a ground area only 1,500 yards in diameter. Giap's cunning had put a gaping hole in the Hanoi-Dien Bien Phu air bridge.

Operation Vulture

With the drop zone all but gone, the French—with the encouragement of some US officials based in Saigon—pressed hard for the US to launch an overwhelming air strike to save Dien Bien Phu. In fact, only 10 days after the start of Giap's initial assault, Gen. Paul Ely, the French Chief of Staff, arrived in Washington to plead the French case to US policy-makers.

Ely met with Dulles and Adm. Arthur W. Radford, Chairman of the Joint Chiefs of Staff. They discussed and approved Operation Vulture, a plan attributed in part to US and French officers in Indochina and in part to Radford's own staff.

Operation Vulture was to be a type of massive retaliation with airpower. The target was to be the Viet Minh forces arrayed around Dien Bien Phu. This was the first time that US leaders had seriously contemplated a major military intervention with airpower alone.

Eisenhower was still open to the possibility of such an airpower operation. After the Ely visit, he confided to Dulles that he would not "wholly exclude the possibility of a single strike, if it were almost certain this could prove decisive results."

Yet Ike had concerns about the tactic. "There were grave doubts in my mind about the effectiveness of such air strikes on deployed troops where good cover was plentiful," he said in his memoirs.

Operation Vulture, however, was the source of considerable confusion.

One version of the plan, detailed in Simpson's book, envisioned sending 60 B-29s from US bases in the region to bomb Giap's positions. Supporting the bombers would be as many as 150 fighters launched from US Seventh Fleet carriers. The fighters were needed because of the proximity of Chinese airfields to the border with Vietnam. With the experience of



AP photo

Secretary of State John Foster Dulles (left) meets with President Eisenhower. Dulles advocated "massive retaliation" to combat communist aggression, but Eisenhower refused pleas to employ nuclear weapons in Vietnam.

Korea fresh in their minds, senior officials thought China would not hesitate to open a new "MiG Alley" over northern Vietnam and Laos.

That was not the most disquieting aspect of Operation Vulture, however. The plan included an option to use up to three atomic weapons on the Viet Minh positions.

Radford, the top American military officer, gave this nuclear option his backing. US B-29s, B-36s, and B-47s could have executed a nuclear strike, as could carrier aircraft from the Seventh Fleet. Eisenhower, who liked to deal directly with his Chiefs on military matters, certainly knew of the JCS option.

Declassified material confirms that Operation Vulture was seriously considered—and that it had room for both conventional and atomic weapons. In fact, France evidently thought the plan was a "go," but it wasn't.

A "Misunderstanding"

In his book *Eisenhower: Soldier and President*, Ambrose recounted the situation this way:

"On the morning of April 5, Dulles called Eisenhower to inform him that the French had told [the US ambassador to Paris] that their impression was that Operation Vulture had been agreed to and hinted that they expected two or three atomic bombs to be used against the Viet Minh. Eisenhower told Dulles to tell the French ... that they must have misunderstood Radford."

Clearly, Eisenhower saw an air attack as a distinct possibility, but was he ready to use tactical nuclear weapons? On this point, Eisenhower never showed his hand. His longtime aide, Army Gen. Andrew J. Goodpaster, recalled in a 1967 interview that the President simply "never told anybody whether he would or not."

Meanwhile, Air Force Gen. Earle E. Partridge, commander of US Far East Air Forces, visited Saigon in April, bringing along Brig. Gen. Joseph D. Caldara. Their discussions with the French officers there left them convinced that the Dien Bien Phu defenders had not thought through the consequences of the air strikes. With Giap's trenches now at the forts, there was no way to separate the fortress itself from the bombs that would fall from B-29s or from the blast radius of nuclear weapons.

Moreover, according to Simpson, Caldara flew his B-17 over Dien Bien Phu and came back with the conviction that only a daylight raid was possible.

The time for decision came in late April. On April 24, Dulles told Eisenhower that Paris was begging for Seventh Fleet air cover because it would allow the French to send in a relief column from Laos. Dulles cabled back that the US could not act without Congressional support—support which Eisenhower knew from previous feelers would not be forthcoming.

Navarre also demanded action. A



Dien Bien Phu fell on May 7, 1954, and the defeated French left Indochina shortly thereafter. Here, captured French soldiers trudge through the fields after the surrender at Dien Bien Phu.

cable from Saigon informed Dulles that Navarre wanted "immediate and massive air support."

Now, the French were desperate, and "they wanted us to go in and bomb," Eisenhower recalled in a 1967 interview.

In the end, Eisenhower was not willing to step all the way into Vietnam. He ruled out unilateral US intervention at an April 27 press conference. He later declared, "Airpower might be temporarily beneficial to French morale, but I had no intention of using United States forces in any limited action when the force employed would probably not be decisively effective."

The defenders of Dien Bien Phu were now on their own. In the last two weeks before the fortress fell, French (and some American) aircrews continued to do what they could to bomb and strafe Viet Minh positions and to deliver aerial supplies, despite increasingly intense anti-aircraft fire. The US carrier *Belleau Wood*, manned with a French crew and equipped with Corsair fighter-bombers, arrived in the Tonkin Gulf to take over from a French carrier whose airplanes had been supporting Dien Bien Phu. The French Navy, flying US-built F6F Hellcats, had provided effective and heartening air support, but their 500-pound bombs could not knock out Giap's heavy, revetted artillery.

Dien Bien Phu fell on May 7.

After that, momentous events unfolded rapidly. France realized that



Only four months after the surrender, Dulles signed the Manila Pact, the basis for the SEATO treaty. The treaty commitment helped pave the way for America's own Vietnam War.

it had lost Indochina and made clear that it would fight no more. Paris began preparations for a full withdrawal from that part of the world.

In June 1954, France, charged with civil administration in southern Vietnam, granted that region its independence.

Six weeks later, on July 20-21, 1954, the US, France, Britain, and

the Soviet Union met in Geneva. Out of this conference came measures that were supposed to end the Indochina war.

The conference agreed to a partition of Vietnam into north and south. Partition was to be temporary, with unification to come after national elections in 1956. Elections never came.

At the same time, however, the US began organizing a collective defense system aimed at blocking communist advances. In September 1954, the US and seven other nations signed the Manila Pact, basis of the Southeast Asia Treaty Organization.

It was one of the pillars of America's own Vietnam War.

By that time, however, American blood had already been spilled in Vietnam. On May 6, 1954, CAT pilots James B. McGovern and Wallace

A. Buford were flying their C-119 Boxcar on a Dien Bien Phu airdrop mission. Clear weather made it easy for the Viet Minh anti-aircraft gunners to target the aircraft. The stricken Boxcar crashed behind enemy lines.

Thus it was that McGovern and Buford—two pilots—became the first Americans known to have died in combat in Vietnam. ■

Rebecca Grant is a contributing editor of Air Force Magazine. She is president of IRIS Independent Research in Washington, D.C., and has worked for RAND, the Secretary of the Air Force, and the Chief of Staff of the Air Force. Grant is a fellow of the Eaker Institute, the public policy and research arm of the Air Force Association's Aerospace Education Foundation. Her most recent article, "Storms of War," appeared in the July issue.

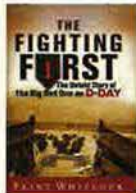
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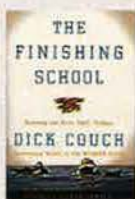
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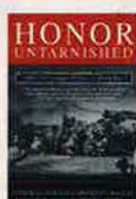
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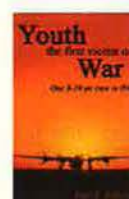
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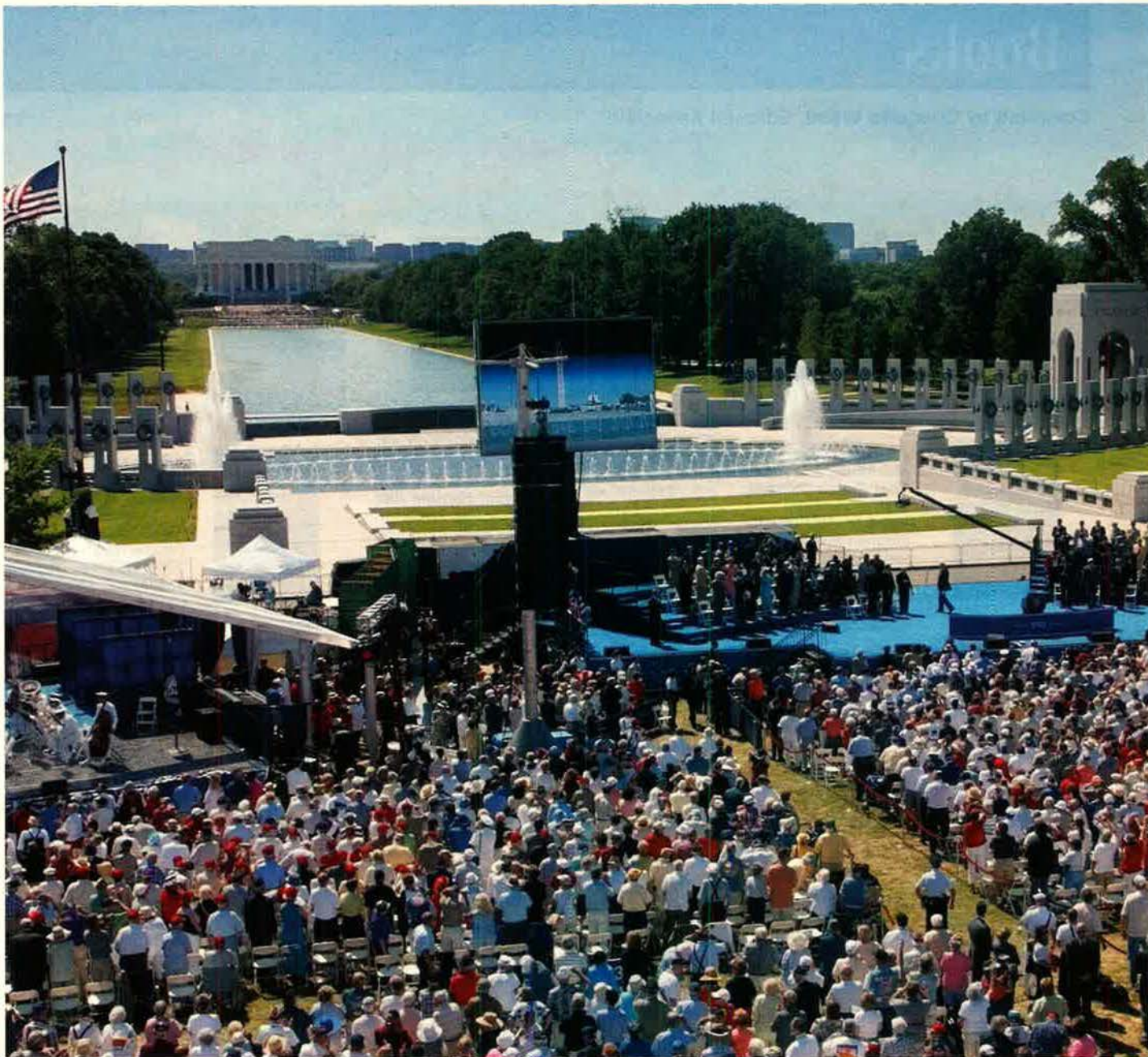
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The new National World War II Memorial on the mall is a striking tribute in bronze and granite.

To Honor a Generation

Eleven years in the making, the long-awaited National World War II Memorial, located on the National Mall in Washington, D.C., was dedicated May 29. It commemorates the sacrifices of the generation of Americans that vanquished Nazis, fascists, and militarists in Europe and the Far East. Here, spectators rise at the end of the dedication ceremony, part of a four-day holiday celebration.



AP photo by Evan Vuoti

This is a view of the National World War II Memorial (foreground) and Lincoln Memorial as seen from the vantage of the Washington Monument. The \$175 million World War II memorial is situated on a 7.4-acre site and was financed almost entirely by private donors. Its granite plaza, pillars, and walkways are adorned by bronze columns, eagles, laurels, and wreaths, along with 4,000 sculpted gold stars on its Freedom Wall. The dedication events drew more than 150,000 visitors. Some, such as the World War II veteran below, wore their original Army Air Corps uniforms.

ation



Photo by Mark Wilson/Getty Images



A "Wartime Stories" pavilion featured Donald S. Lopez (left)—deputy director of the National Air and Space Museum—and John R. Alison—former AFA Board Chairman and National President. Both were World War II fighter aces. Below are other members of "the Greatest Generation."



Photo by Don Ripper/Latoff



Above, AFA member Wilbur Richardson, a ball turret gunner in the 94th Bomb Group, talks to a member of the media. At right, Army veterans Frank Bima of New Jersey (left in photo) and Casimier Sochocki of Indiana trade stories at the memorial.



Photo by Brendan Smailowski/Getty Images

In photo at bottom, Korean War veteran Paul Deal of Philadelphia (left) and Peggy Siers of Hayfork, Calif., support World War II veteran George Deal of Junction City, Calif., during the dedication ceremony.

Already, tourists are flocking to the memorial, which can be visited 24 hours a day, seven days a week, year round. It honors the 16 million Americans who served in the armed forces of the US during World War II, the more than 400,000 who died, and the millions who supported the war effort at home. It is emblematic of the 20th century's defining event and celebrates the American spirit. ■



AP photo by Evan Vucci



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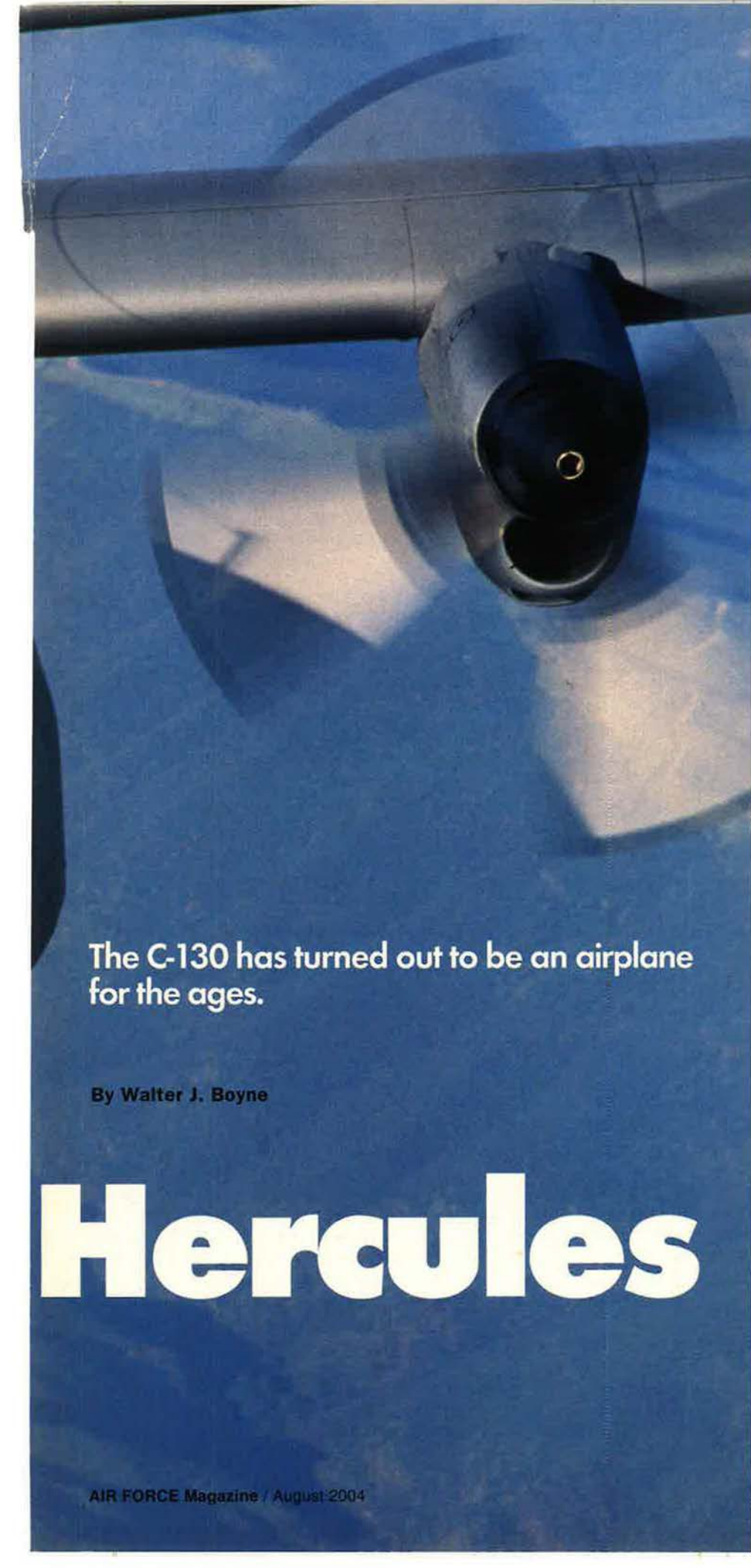
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Photo by Ted Callison

The Immortal



The C-130 has turned out to be an airplane for the ages.

By Walter J. Boyne

Hercules

IT WAS exactly 2:45 p.m. on Aug. 23, 1954, in Burbank when the prototype of a brand-new Air Force transport slowly took off into the smoggy skies over southern California. As they watched it climb out of sight, Lockheed officials dared to hope that the Air Force might buy as many as 100 of these new aircraft.

Talk about answered prayers.

Even the airplane's most ardent supporters could not have foreseen that the humble C-130 would enjoy the longest continuous production run of any military aircraft in history. USAF snapped up those first 100 airplanes and just kept on going—for decades, with no sign of stopping anytime soon.

Still under its original type certificate, the Hercules remains in production 50 years after that maiden flight. Lockheed has delivered 2,262 C-130s to some 60 countries. Even today, the aerospace giant enjoys a healthy backlog; it is working off firm orders for 71 of the latest variant—the C-130J.

No one would have believed that an aircraft designed as a workhorse “trash hauler” would undertake such a variety of missions. It has dropped bombs, supplies, and paratroops, jammed electronic transmissions, fought fires, tracked icebergs, flown in hurricanes, hauled a live whale and camels, carried Muslims to Mecca, taken Ethiopian Jews to Israel, and even landed on an aircraft carrier.

Four C-130s were used to form the Four Horseman aerial demonstration team. The “Herk” has flown to most countries and every continent. It has landed in the Arctic and Antarctic. For the last 50 years, it has usually been among the first airplanes to arrive at a trouble spot.

It has served as a gunship, tanker, bomber, and drone mother ship. It has supported psychological warfare, special operations, electronic intelligence, command and control, and humanitarian rescue and relief.

The Air Force experience with cargo aircraft early in the Korean War convinced senior leaders that USAF needed a more capable trans-



Lockheed built the prototype C-130s in Burbank, Calif., but moved production to Marietta, Ga. (above), where it is today. In 1951, B-47 production (in background) was ending.

port. The Fairchild C-119 proved to be marginally more effective (and less reliable) than the Douglas C-47s and Curtiss C-46s from World War II.

Birth of a Program

So it was that, on Feb. 2, 1951, the Air Force put forth a general operational requirement that called for a huge advance in cargo aircraft capability. Lockheed, Boeing, Douglas, and Fairchild were invited to compete for the contract.

All of the specifications for range, load, and operating conditions were formidable (see box at right). The most daunting of these, however, was the requirement that the airplane have the ability to fly with a full load with one engine out. In the past, twin-engine aircraft, especially those operating out of short fields in forward areas, usually did not survive the loss of an engine on a heavy-weight takeoff.

Willis M. Hawkins, then head of preliminary design for Lockheed, put together a team of veteran Lockheed engineers that included Eugene Frost, Art Flock, and Dick Pulver, all of whom had worked together on other projects. Notably absent from the team was Lockheed's most well-known engineer, Clarence "Kelly" Johnson, who was deeply involved in the F-104 project.

In June 1951, the Hawkins team completed its proposal for what Lockheed called the Model 82 aircraft and took it to Hall L. Hibbard, Lockheed's chief of engineering.

In the Beginning ...

Here is an excerpt from the original General Operational Requirement for Cargo Aircraft, issued in 1951.

The aircraft must be able to:

- 1** Carry 92 infantrymen or 64 paratroopers on a mission with a combat radius of 1,100 nautical miles, or, alternatively, a 30,000-pound cargo more than 960 miles.
- 2** Operate from short unprepared airstrips of clay, sand, or humus soil.
- 3** Slow down to 125 knots for paratroops and even slower for assault landings.
- 4** Have both a rear ramp operable in flight for heavy equipment and side doors for paratroop drops.
- 5** Handle bulky and heavy equipment, including bulldozers, artillery pieces, and trucks.
- 6** Fly with one engine out.

The entire proposal was about three-quarters of an inch thick.

Hibbard asked, "Has Kelly seen this?" When Hawkins said no, the group asked Johnson to come review it.

Johnson went through the drawings, glanced at the model Hawkins had provided, and then declared to Hibbard, "If you send that in, you'll destroy Lockheed."

Johnson's reaction to the C-130 was based in part on aesthetics. Lockheed was known for building beautiful aircraft, from the early Vega through the P-38 and Constellation. The Hercules, as the new aircraft would be called, was not exactly beautiful.

Fortunately Hawkins persisted and Hibbard backed him. They knew that, despite its plain looks, the C-130 was a radically advanced transport, using four T56 turboprop engines and featuring a completely pressurized cargo compartment.

Form had followed function, and the heart of the aircraft was the huge 4,500 cubic foot cargo area that duplicated the volume of the standard American railroad boxcar. The use of a high wing and rugged dual-tandem wheel landing gear system, mounted in stub-like fairings outside the fuselage, improved its short, rough-field capabilities.

On to Georgia

Lockheed won the competition, and construction of two prototypes began in Burbank.

The first flight was staged by the second (Serial No. 53-3397) of the two prototypes. It was piloted by Stanley Beltz and Roy Wimmer, with Jack Real as flight-test engineer and Dick Stanton as flight engineer. Johnson flew in a chase airplane. After a satisfying 61-minute flight, the YC-130 landed at Edwards AFB, Calif., where it awaited further tests.

The new aircraft exceeded all goals, cruising faster, climbing higher, and landing on less runway than required in any of the Air Force specifications. The C-130 had a maximum payload of 40,000 pounds, thanks in part to the weight control measures that kept the airframe



This C-130A is not stuck: It's taxiing in sandy soil at Eglin AFB, Fla., in 1959, demonstrating its capability to operate on unimproved strips. The early C-130s featured three-bladed props and a "Roman nose," later extended for a radar.

down to 108,000 pounds, 5,000 less than anticipated.

When the Air Force issued a contract for the first seven production aircraft, Lockheed decided to move the program to Marietta, Ga., where Lockheed had built Boeing B-47s under license. B-47 production was coming to a close, and the C-130 program was perfectly timed to pick up the slack.

Shortly after the successful first flight, the Air Force increased its production order from seven to 75 airplanes.

Production went smoothly at the Georgia plant, despite a mishap to the first production aircraft (53-3129), which suffered a major in-flight fire in its No. 2 engine nacelle on its third flight. The aircraft landed without further incident. The left wing was replaced. (This specific aircraft was subsequently modified to become an AC-130A gunship and saw service in the Vietnam War. It is now at the USAF Armament Museum, Eglin AFB, Fla.)

The most significant engineering change stemmed from the unsatisfactory operation of the turboelectric propeller. At one point, 50 completed C-130s could not be delivered because no decision had been made about which propeller to use. Finally, a new hydraulically operated propeller was selected, and it mated perfectly with the engine.

The Hercules entered the Tactical Air Command (TAC) fleet Dec. 9,

1956, with the delivery of 55-0023 to the 463rd Troop Carrier Wing at Ardmore AFB, Okla. Crews were delighted, for the aircraft was far nimbler than the C-119s. It also had surplus takeoff power.

Deliveries to TAC continued on a regular basis, and two C-130 units, the 463rd and the 314th TCW, Stewart AFB, Tenn., formed an important part of the Composite Air Strike Force.

Wherever the C-130 went, it brought new standards of performance along with vastly improved comfort and reliability. C-130s were called on to fly

troops, weapons, and ammunition to trouble spots around the world. One early case occurred in July 1958, when turmoil in Iraq caused Lebanese President Camille Chamoun to seek a US troop presence in his country. An 11-day airlift brought eight million pounds of equipment into Lebanon.

With hundreds of similar incidents to come, the ability of the C-130 to move troops and equipment directly to a crisis zone became an essential part of US military and diplomatic power.

Hercules Down

The first combat loss of the C-130 occurred Sept. 2, 1958, when Soviet pilots flying MiG-17s shot down a United States Air Force C-130A-II signals intelligence platform over Soviet Armenia. All 17 crew members were killed.

Many more losses were to occur in Vietnam, where the C-130 formed the backbone of the airlift system. About 50 C-130s were lost in combat between 1965 and 1972. Few if any of the losses stemmed from accidents.

In Vietnam, no other theater airlifter could match the capacity or the versatility of the Hercules. The C-130s not only underpinned the tight logistics network throughout Southeast Asia, but also saw the war up close, bringing troops and equipment directly to front-line action within range of enemy guns. The C-130 radar permitted it to operate in a



Staff photo by Capt. Mike Perini

Ski-equipped C-130s provided a lifeline to the facilities along the DEW Line in Greenland (above) and resupplied scientific teams at the poles. The Herk quickly gained a reputation as the "go anywhere" airplane.



The rugged Hercules was first adapted to duty as a gunship in Vietnam. Bristling with sensors and cannons, AC-130 Spectres have rained down fire on enemies in every US action since 1967.

much wider range of weather, and this capability led logically to it being employed later as a gunship.

In its best-known Vietnam exploit, the C-130 fleet frustrated North Vietnamese Gen. Vo Nguyen Giap's efforts to trap American forces at Khe Sanh. Giap wanted to score a significant propaganda victory by capturing a large number of prisoners, and, to that end, he sent two regular North Vietnamese Army divisions to surround the 6,000 Marines defending the Khe Sanh garrison.

During the 70-day siege in early 1968, 92 percent of all supplies were brought in by C-130s. Other elements of American airpower, including close air support, helped the Marines resist, but it was the C-130s that kept them supplied and operating.

The C-130s would land at Khe Sanh after a steep approach and off-load cargo as swiftly as possible. When it was too dangerous to land, the C-130s would achieve the objective by using the low-altitude parachute extraction system technique (LAPES). When neither landing nor LAPES was possible, the C-130s would air-drop their cargoes.

In every instance, the transports were vulnerable to enemy fire.

The first AC-130 Spectre gunship commenced operations from Nha Trang in September 1967. It was so successful that the Air Force built 28 more. The effect of the Spectre's firepower was startling. In one minute, its 20 mm gun could

saturate an area the size of a football field. The last 11 AC-130s were equipped with the 105 mm howitzer.

The AC-130 performed spectacularly in the April to June 1972 battle for An Loc.

The C-130 also served as a bomber. In Operation Commando Vault, C-130s flew hundreds of bombing sorties to clear a jungle area for use by helicopters. During the Tet Offensive in early 1968, C-130s bombed enemy troops with improvised bombs. The Herk can now handle the Massive Ordnance Air Blast (MOAB) bomb, more colloqui-

ally known as the "Mother of All Bombs."

Continuous improvement of the aircraft over the years, particularly the increase in performance resulting from the use of new and more powerful engines, made it attractive for a wide range of roles.

Seventy, So Far

There have been at least 70 C-130 variants. Some were built in small numbers for tasks that differed only slightly from the routine, while others were built for highly specialized tasks, far removed from the concept of carrying troops and cargo from Point A to Point B. Some aircraft, after having fulfilled the new duties of a specific mission, were converted back to standard C-130 transport configuration.

Gathering signals intelligence was one of the first additional missions, and 10 C-130A-II-LM aircraft were modified for use by the 7407th Combat Support Wing. This tradition has been expanded in today's EC-130 counterparts.

The now-retired EC-130 ABCCC (Airborne Battlefield Command and Control Center) was an effective supplement to the larger E-3 Airborne Battlefield Warning and Control System aircraft.

The EC-130 Commando Solo is used in psychological warfare, carrying such powerful radio and television broadcasting equipment that it literally becomes the one voice



In Vietnam in 1968, the Herk resupplied the besieged Marine garrison at Khe Sanh. Exposed to enemy fire, C-130s often performed pallet insertion of desperately needed materiel, as seen here.

that can be seen and heard in its broadcast area.

The Hercules offered the Marine Corps a chance to obtain a suitable aerial tanker for its aircraft. The first of these, originally designated GV-1s but subsequently redesignated KC-130F, entered service in 1960. One of the most remarkable capabilities of the Hercules was the in-flight refueling of helicopters. This not only helped choppers conduct conventional missions but also opened a broad new area of helicopter tactics.

The C-130 was especially valuable for the search and rescue role, with HC-130H aircraft acting both as command and control aircraft and tanker. The Air Force uses the HC-130P version currently for combat search and rescue.

Some Hercules were modified to become MC-130E Combat Talon I



Lockheed Martin photo by John Rossino

The next generation C-130J has a six-bladed prop, more powerful engines, and a digital cockpit. With better performance and unmatched flexibility, the Herk will be around for decades to come.

Long Takeoff at Tan Son Nhut

On April 29, 1975, the fall of Saigon was imminent, and nearby Tan Son Nhut Air Base was under heavy fire. South Vietnamese Air Force officer Tinh Nguyen saw a single C-130A taxiing out. The cargo ramp was still open, with desperate people clambering on board. Nguyen joined them.

At the end of the runway, the cargo door finally closed, and the pilot powered up. The overweight Hercules slowly ran down the 9,000-foot runway, finally staggering off the ground at the end of the 1,000-foot overrun. The C-130 stayed in ground effect until it gained enough speed to begin a shallow climb.

The airplane was at least 20,200 pounds overweight, as it carried 452 people, including 33 crowded into the flight deck.

After a flight lasting nearly four hours, the C-130 landed at U Tapao RTAB, Thailand. When Nguyen got out, he looked at the C-130 and vowed that he would someday work for the company that built such a remarkable airplane.

Today, he does just that. Nguyen works at Lockheed Martin in Marietta, Ga., where he is a specialist in defensive systems. The aircraft that carried him and 451 others to safety may now be found as the gate guardian at Little Rock AFB, Ark.

aircraft used for special operations. They have in-flight refueling receptacles and infrared detection equipment, and some used to carry Fulton rescue gear. The follow-on MC-130H Combat Talon II is a new-build aircraft with additional equipment. The MC-130P Combat Shadow is dedicated to long-distance, clandestine, low-level missions into denied areas to provide air refueling to special operations forces helicopters.

Unique Roles

In addition to broad missions as outlined above, many Hercules were used for unique roles that sometimes required only a few aircraft. These versions included weather reconnaissance aircraft (WC-130), a ski-equipped version (LC-130) for use in both the Arctic and Antarctic, "TACAMO" (Take Charge and Move Out EC-130G) that linked the National Command Authority to subma-

rines on patrol, and a satellite recovery version (NC-130H). Perhaps the most dramatic of all was the YMC-130H. Under a project called Credible Sport, this specially equipped C-130 was to participate in the ill-fated 1980 attempt to rescue hostages held by Iran. The YMC-130H was to make extremely short field landings and takeoffs using booster rockets and retro-rockets. One example of the three YMC-130Hs may be seen at the Museum of Aviation, Robins AFB, Ga.

The first among the many foreign users of the C-130 was the Royal Australian Air Force, which obtained 10 C-130As beginning in 1957. The United Kingdom purchased the most aircraft, 66, while Saudia Arabia is second, with 50.

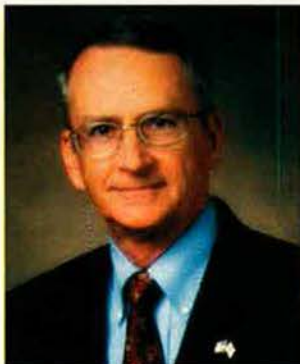
The Israeli Defense Force received 12 C-130s during the October 1973 war, and they were pressed into service, taking ammunition directly to front-line units. The Israeli C-130s performed as flying trucks, following tanks into battle, "S" turning to maintain position, and landing on a spot to deliver ammunition and fuel directly to the armored forces.

The Hercules has been around so long that one tends to take it for granted. Observers see the C-130 operating effectively 50 years after its first flight and think it's perfectly routine. The same observations will probably be made decades hence, when, almost certainly, later models of the C-130 will be going strong. ■

Walter J. Boyne, former director of the National Air and Space Museum in Washington, D.C., is a retired Air Force colonel and author. He has written more than 400 articles about aviation topics and 29 books, the most recent of which is The Two O'Clock War: The 1973 Yom Kippur Conflict and the Airlift That Saved Israel. His most recent article for Air Force Magazine, "Von Karman's Way," appeared in the January issue.



AFA Nominees for 2004-05



Condon



Callahan



Largent



Kemp



Nelson

THE Air Force Association Nominating Committee, which consists of the five most recent past National Presidents (not serving as Chairman of the Board) and one representative from each of the 14 US regions, met in Dallas on April 30 and selected a slate of candidates for the four national officer positions and six elective positions on the Board of Directors. This slate will be presented to the delegates at the Air & Space Conference in Washington, D.C., in September.

Stephen P. "Pat" Condon of Ogden, Utah, was nominated for his first one-year term as Chairman of the Board. He formerly served as National President, an AFA National Director, Northern

Utah Chapter President, Chairman of AFA Focus on Defense Symposium, Chairman of the Constitution Committee, and member of both the AFA Executive and Resolutions Committees. Among his many awards, Condon has received the AFA Medal of Merit, the Utah State AFA Presidential Citation, and Program of the Year Award.

Condon joined the Air Force in August 1964 at Wright-Patterson Air Force Base in Ohio. A veteran of 33 years, Condon spent the majority of his career in Air Force science and technology, research and development, acquisition, test, and logistics support. He commanded the Air Force Armament Laboratory, Arnold Engineering Development Center, and

Ogden Air Logistics Center and served at the NASA Manned Spacecraft Center. Additionally, he was the Deputy Assistant Secretary, Management Policy and Program Integration, in the Office of the Assistant Secretary of the Air Force for Acquisition. Condon retired as a major general in 1997. A well-decorated officer, Condon has received many awards, including the Defense Distinguished Service Medal, the Legion of Merit, and the Defense Meritorious Service Medal.

Currently, Condon is an aerospace consultant and senior associate at Dayton Aerospace, Inc., Dayton, Ohio. He is a graduate of the University of Oklahoma with a bachelor of science degree in mechanical engi-

neering; the Air Force Institute of Technology with a master of science degree in aerospace-mechanical engineering; and the University of Texas at Austin with a doctorate degree in aerospace engineering.

He is active in several community and charitable organizations. Condon is married to the former Judy Smothermon, and they have two children, Susan and Michael.

The Nominating Committee is submitting two names—James E. Callahan and Robert E. “Bob” Largent—for consideration for a one-year term as National President:

James E. Callahan of Winter Garden, Fla., is a Life Member of AFA. He has served the association in appointed and elected positions at all levels. He held positions as Chapter President and New York State President, National Vice President, and National Director. He served as both member and chair of the Long-Range Planning Committee and as a member of the Executive, Resolutions, Audit, and various ad hoc Committees. He relocated to Florida in 2001 and now serves as the State Vice President for Membership and Central Florida Chapter Vice President for Leadership Development. In addition to awards from both New York and Florida, he has received the AFA Medal of Merit, Exceptional Service Award, Presidential Citation, and Chairman’s Citation.

Callahan enlisted in the Air Force and later earned his commission and pilot’s rating through the Aviation Cadet Program. He served as Detachment Commander and Airlift Advisor to the Royal Saudi Arabia Air Force. At Headquarters USAFE, he was an Exercise Planning Division Officer, Operations Briefing Team Chief, and Airlift and Support Standardization and Evaluation Division Chief. He served as a C-130 Squadron Operations Officer and Squadron Commander at Dyess AFB, Tex. At Pope AFB, N.C., he was the wing Deputy Chief of Staff for Operations. He was a Military Airlift Group Commander, while simultaneously serving as DCS Airlift at Alaskan Air Command. He has more than 8,000 flying hours, including more than 300 combat and combat support sorties for operations in the Congo and Vietnam. He is the recipient of the Legion of Merit, Air

Medals, and numerous other awards. He retired as a colonel.

Callahan graduated from the University of Nebraska at Omaha and earned a master of business administration degree in management from the University of Utah. He founded and served as President of the Western New York Defense Industry Consortium. He is currently employed by DRS Electronic Warfare and Network Systems, Buffalo, N.Y.

He is married to the former Bonnie Berlin, from Harrisburg, Pa. His wife and their daughter, Jamie Callahan, who is a graduate of the USAF Academy and now an assistant professor at Texas A&M University, are both AFA Life Members. The family sponsors the Aerospace Education Foundation Capt. Jodi L. Callahan Scholarship in memory of their youngest daughter, who was a Life Member of AFA and who had served as an AFA Under-40 National Director and AEF Trustee.

Robert E. “Bob” Largent of Perry, Ga., is a Life Member and has been active in AFA since 1974. He has served as the Chapter Vice President and Leadership Development Vice President for the Carl Vinson Memorial Chapter and Georgia State President and Vice President of Awards and Leadership Development. He currently serves as Region President for the Southeast Region. He has been a member of the AFA Membership Committee and currently serves as a member of the Long-Range Planning Committee and the AFA Organizational Review Group. In addition to chapter and state awards, he has received the Medal of Merit, Exceptional Service Award, and Presidential Citation.

Largent was commissioned through ROTC in 1968 and served for more than 24 years in various strategic missile operations assignments, including Minuteman Combat Crew, Squadron Operations Officer, Chief of Wing Training, Chief of Wing Plans, Squadron Commander, and Assistant Deputy Commander for Wing and Group Operations. He has also served in a variety of staff assignments, including Special Assistant to the Air Force Chief of Staff in the Office of the Joint Staff Director, Joint Chiefs of Staff; Military Assistant to the Commander in Chief, Pacific; and Chief, Strategy Division, Headquarters US Pacific Command.

Largent retired in 1992 as a colonel. He received numerous awards, including the Legion of Merit, Defense Meritorious Service Medal, and the Air Force Meritorious Service Medal.

He currently is the owner and principal of an organizational and leadership development consulting firm with a practice that includes an array of national and international clients. Largent is involved in a variety of local civic and community activities, as well as those of AFA, including Rotary, Chamber of Commerce, serving as the Chair of the Business Development Committee, and Houston County Planning and Zoning Commission.

Largent graduated from the University of Arkansas with a degree in business administration and has a master’s degree in public administration from the University of Oklahoma. He is also a resident graduate of the Air War College.

He and his wife, Becky, have three children and five grandchildren.

Thomas J. Kemp of Fort Worth, Tex., was nominated for his second one-year term as AFA National Secretary. He joined AFA in December 1964 and became a Life Member in 1982. He currently serves as an AFA National Director and has been a member of AFA’s Audit, Executive, Finance, Membership, and Resolutions Committees. Kemp has also served as Texoma Region President, Texas State President and Vice President, and Fort Worth Chapter President. He has received personal recognition as AFA’s National Member of the Year in 2002 and as Texas State Member of the Year. He received AFA’s Presidential Citation in 2000, Exceptional Service Awards in 1990, 1991, and 1994, and a Medal of Merit in 1987. He has also received the Oklahoma State Medal of Merit.

Kemp was commissioned in the Air Force in December 1964 and was trained as both a navigator and a pilot. His 20-year career included service in the C-130, C-141, OV-10, and B-52. He held increasingly responsible staff positions in plans, operations, and training. Following retirement, he has worked in instructional systems and course-work design and most recently worked on development of bar code sorters for the US Postal Service as Manager, Integrated Logistics Support, for Siemens



Patterson



Sawyer



Buckwalter



Sutter



Allen



Lauducci



Marshall

ElectroCom. He graduated from Loras College, in Iowa, with a bachelor of arts degree in business (accounting), and from St. Mary's University in San Antonio with a master's degree in systems management.

He and his wife Ruth have four children.

Charles A. "Chuck" Nelson of Sioux Falls, S.D., was nominated for a fifth one-year term as National Treasurer. A Life Member of AFA, Nelson has served as North Central Region President, South Dakota State President, and Dacotah Chapter President. Nationally, he has been active since 1989 while serving on the Junior Officer Advisory Council, Air National Guard Council, Membership Committee, Finance Committee, and as an Under-40 National Director. Most recently he has served as Chairman of the Audit Committee. Nelson was awarded AFA's Medal of Merit in both 1991 and 1998.

In 1980, Nelson enlisted in the South Dakota Air National Guard. He was commissioned a second lieutenant in July 1984 and promoted to the rank of major in 1993. He retired from the South Dakota ANG in April 1995. Nelson's military awards include Outstanding Lieutenant for the South Dakota ANG (1987), Junior Officer of the Year (1987), Air Force Commendation Medal (1992), and the Air Force Meritorious Service Medal (1995).

Nelson is a certified public accountant and is employed as a managing partner for Nelson & Nelson CPAs LLP, in Sioux Falls. He serves

as Treasurer of the South Dakota Air Show, Inc., and President of the Sioux Falls Cygnets Synchronized Swim Team. He is past President of the Gloria Dei Lutheran Church, and has previously served as their Treasurer and Chairman of the Board of Administration, and is a past President of the Sioux Falls Downtown Lions Club.

He is married to the former Kristine Christensen, and they have three daughters, Rebecca, Jillian, and Sarah.

The AFA Constitution directs that one-third of the 18 elected Directors be elected at the Air & Space Conference each year. For the 2004 election, the Florida, Midwest, New England, and South Central Regions have Director positions open, and there are two Director positions open to be elected at large.

The nominees for Director to be chosen by their regions are:

Florida: **Robert Patterson**, Florida. Former National Director; member of the AFA Executive, Resolutions, Nominating, and Long-Range Planning Committees; Florida State President, Executive Vice President, Area Vice President; and Eglin Chapter President.

Midwest: **Keith Sawyer**, Illinois. Former Illinois State President and Scott Memorial Chapter President. Current President of the Midwest Region.

New England: **David T. "Buck" Buckwalter**, Rhode Island. Former New England Region President, Rhode Island State President, Blue and Gold Chapter President, and member of the

AFA Long-Range Planning Committee. Current member of the AFA Constitution Committee.

South Central: **Joseph E. Sutter**, Tennessee. Former Tennessee State President, State Vice President for Aerospace Education, Gen. Bruce K. Holloway Chapter President, and Missouri State Vice President for Government Relations. Current Chairman, AFA Long-Range Planning Committee and member of the AEF Board of Trustees.

The Nominating Committee is submitting three names for consideration for two positions as National Director at Large:

Craig E. Allen, Utah. Former Rocky Mountain Region President; Utah State President, Vice President, and Treasurer; Northern Utah Chapter President; and member of the AFA Credentials and Membership Committees. Current AFA National Director (filling an unexpired term), member of the Long-Range Planning Committee, and Chairman of the ad hoc Committee on Organization.

James R. Lauducci, Virginia. Former member of the AFA Membership and Nominating Committees, and Virginia State Vice President for Membership. Current Donald W. Steele Sr. Memorial Chapter President.

Bruce E. Marshall, Florida. Former Florida Region President; Florida State President, Executive Vice President, and Vice President for Leadership Development; and Eglin Chapter President. Current member of AFA's Membership Committee. ■

By Frances McKenney, Assistant Managing Editor

Honors for a Hero

A memorial to Medal of Honor recipient John L. Levitow was dedicated on Memorial Day in the town where he grew up, Glastonbury, Conn.

Levitow's son, John L. Levitow Jr., and grandson, John L. Levitow III, were among the family members who helped unveil the stone memorial at the Glastonbury town green on May 31. (See photo, p. 101.) Levitow Jr. is a member of the **Brig. Gen. Harrison R. Thyng Chapter (N.H.)**.

Levitow Sr., who died in November 2000, received the medal for his actions during the Vietnam War. As an airman first class, he was a loadmaster on an AC-47 carrying out a night mission in February 1969 over South Vietnam. An enemy mortar round hit the "Spooky" gunship. Despite having more than 40 shrapnel wounds, Levitow moved an injured crew member away from the open cargo door.

Then he saw a smoking flare rolling loose in the compartment. Realizing that it could ignite the munitions on board, Levitow threw himself on the activated flare, dragged it to the rear of the airplane, and hurled it out the cargo door.

Levitow had completed some 180 combat missions. After recovering from his wounds, he flew on 20 more. In his civilian career, Levitow worked on behalf of veterans and was an assistant to the commissioner in Connecticut's Department of Veterans Affairs when he died of cancer at age 55.

Air Force Association representatives at the dedication ceremony were Joseph R. Falcone and Ronald Palmer from the **Flying Yankees Chapter (Conn.)** and Joseph A. Zaranka from the **Gen. George C. Kenney Chapter (Conn.)**. Falcone and Zaranka are national directors emeritus. In a Memorial Day parade before the dedication ceremony, Levitow Jr. served as marshal, with Palmer as honorary marshal. Falcone and Zaranka rode at the head of the parade, described by the local newspaper as one of the largest in the town's recent history.

AFA Board Chairman John Politi addresses Utah AFA's 25th annual Focus on Defense symposium in June at Hill AFB, Utah. Other speakers included Marvin Sambur, assistant secretary of the Air Force for acquisition. Presentations at the conference covered transformation in logistics and acquisition.



USAF photo by Greg Wixom

Rush of Activities

For the **Rushmore Chapter (S.D.)**, May was a busy month.

South Dakota State President Ronald W. Mielke kicked it off with a visit to the chapter to brainstorm on methods to improve programs and create momentum. He encouraged chapter officers and members to build up their Community Partners program and offered Capt. Eric F. Makovsky, chapter communications VP, assistance in publishing a newsletter. He reminded the group—including SSgt. Casey E. Bullis, chapter treasurer, and SSgt. Jason L. Sigman, awards VP—that it should involve more members in committees, rather than burdening one person with an entire task.

Mielke provided outstanding guidance, said Maj. Anthony W. Buenger Jr., the chapter president.

A few days later, Buenger attended the graduation ceremony for the Community College of the Air Force at Ellsworth AFB, S.D., where he presented Aerospace Education Foundation Pitsenbarger Awards.

Named for Medal of Honor recipient A1C William H. Pitsenbarger, a pararescue jumper who died in the Vietnam War, the AEF grants are \$400. They are given to selected active duty, Guard, or Reserve enlisted CCAF graduates who plan to pursue a bachelor's degree.

Buenger presented awards to chapter member Sigman, who is from the 28th Communications Squadron, and SrA. Alberto B. Ayulo, from the 28th Maintenance Operations Squadron.

To round out the month, Buenger attended an awards ceremony at Douglas High School in Box Elder,

S.D., to present an AFA Medal to AFJROTC cadet Jessica Nixon. Buenger told the cadets that they're contributing to the future of air and space power by being in JROTC.

Teaching Leadership

It was super, an enthusiastic James T. Hannam said.

President of AFA's Central East Region, he had just returned from visiting an AFJROTC leadership school that the **Chuck Yeager Chapter** and AEF help sponsor in the "Mountain State"—West Virginia.

The week-long Mountaineer Cadet Officer Leadership School took place in June at Concord University in Athens, W.Va. The young cadets received training in everything from orienteering, escape and evasion, and drill and ceremony to discipline, counseling, and academic subjects.

David F. Slaughter, chapter aerospace education VP and JROTC instructor at Nitro (W.Va.) High School, helped organize the leadership school in 2001 and has been its commandant since then. That first summer, about 40 cadets from five high schools took part. This year, 223 cadets came from 23 high schools. Slaughter said that before the camp was established, cadets had to travel out of state to attend a summer leadership school. This year, cadets came to West Virginia from a dozen states—as far away as Kansas—and five came from Singapore. They were Nitro High School's JROTC exchange cadets, whose travel was funded by the Yeager Chapter and a matching grant from AEF.

During his visit to the leadership school, Hannam watched the cadets conduct a pass-and-review parade and helped conduct the culminating awards ceremony, with trophies and plaques provided by the Yeager Chapter. The chapter also arranged for the ceremony's guest speaker, Randy Coleman, the state's assistant secretary of military affairs and public safety. Hannam said the students' performance that day was proof to him that support from AEF and the Yeager Chapter was "well worth any effort."

Scowcroft Awards

The **Northern Utah Chapter's** annual Scowcroft Awards Banquet, held in April in Ogden, Utah, put the spotlight on the ICBM and space operations and logistics career fields.

Thirty-one awards went to outstanding USAF personnel and teams selected from the Ogden Air Logistics

AFA In Action

The Air Force Association works closely with lawmakers on Capitol Hill, bringing to their attention issues of importance to the Air Force and its people.

AFA Hosts Education Event on Capitol Hill

A recent Congressional Education Program, sponsored by AFA and USAF's House Liaison Office, for US Representatives and their professional staffs, featured the theme "Air Force Modernization and Recapitalization: Bringing Technology to the Warfighter and Leveraging the Experience of our Airmen."

Among lawmakers attending the program were several members of the House Armed Services Committee: ranking member **Rep. Ike Skelton** (D-Mo.), **Rep. Mike McIntyre** (D-N.C.), **Rep. Gene Taylor** (D-Miss.), and **Rep. Mike Turner** (R-Ohio). Attending were **Rep. Cliff Stearns** (R-Fla.), co-chair of the Air Force Caucus and member of the House Veterans' Affairs Committee, and fellow VA committee member **Rep. Henry Brown** (R-S.C.), who is chairman of the subcommittee on benefits. Program attendees also included the ranking member of the House Budget Committee, **Rep. John Spratt** (D-S.C.), as well as several members of the Agriculture Committee, **Rep. Bob Goodlatte** (R-Va.), chairman, **Rep. Charlie Stenholm** (D-Tex.), ranking member, and **Rep. Bob Etheridge** (D-N.C.), who is also a member of the House Select Committee on Homeland Security.

Representing AFA was Executive Director Donald L. Peterson. The list of senior level Air Force officials in attendance included: **Ronald L. Orr**, principal deputy assistant secretary of the Air Force for installations, environment, and logistics; **Lt. Gen. Duncan J. McNabb**, deputy chief of staff for plans and programs; **Lt. Gen. Roger A. Brady**, DCS for personnel; **Maj. Gen. Richard A. Mentemeyer**, assistant DCS for air and space operations; **Maj. Gen. Jeffrey M. Musfeldt**, deputy inspector general; and **Brig. Gen. Cecil R. Richardson**, deputy chief of the Chaplain Service.

The program, which was similar to one held last month for the Senate, is presented at various times throughout the year on a variety of topics to bring lawmakers and their staff up to date on a number of Air Force initiatives and programs.

AFA Briefs Stabenow's Staffer

The association's Government Relations staff met with **Erik Floden**, military legislative assistant to **Sen. Debbie A. Stabenow** (D-Mich.). Stabenow is the newest member of the Congressional Air Force Caucus, now numbering 74.

In addition to reviewing caucus activities, GRL staffers gave Floden some AFA materials, including *Air Force Magazine's* May 2004 USAF Almanac issue, the AFA Statement of Policy and Top Issues for 2004, and a copy of AFA's study, "Gulf War II: Air and Space Power Led the Way."

AFA Co-sponsors VA Musical Salute

For a fifth year, AFA helped sponsor the Department of Veterans Affairs National Medical Musical Group's 2004 Congressional Flag Day Concert. The concert, which was held June 17 in the Cannon Caucus Room on Capitol Hill, will be broadcast later this summer on the Armed Forces Radio and Television Network and on educational television affiliates nationwide.

The concert featured inspirational patriotic music and readings and included some health messages, such as a presentation on the rising rate of obesity in America. The musical group includes more than 100 physicians, surgeons, and medical professionals from VA medical facilities nationwide. The group also has performed at the White House, before Congress, and at the United Nations.

Several members of Congress participated in the event, rendering patriotic readings. They included **Rep. Martin Frost** (D-Tex.), **Rep. Bob Goodlatte** (R-Va.), **Rep. Tom Lantos** (D-Calif.), **Rep. Steve Pearce** (R-N.M.), and **Rep. Stephanie Tubbs Jones** (D-Ohio).



A memorial to the late Medal of Honor recipient John Levitow was dedicated on Memorial Day in Glastonbury, Conn. Family members at the ceremony included John Levitow Jr., holding John Levitow III, and his wife, Lucy. See "Honors for a Hero," p. 99.

Center at Hill AFB, Utah; Space and Missile Systems Center, Los Angeles AFB, Calif.; Electronic Systems Center, Hanscom AFB, Mass.; and units of Air Force Space Command, headquartered at Colorado Springs, Colo. According to Chapter President

George C. Hitt, most of the awards went home with enlisted personnel, among them SMSgt. Mark S. Garrity from the 341st Space Wing at Malmstrom AFB, Mont.; MSgt. Rigina L. Knipp, 91st Space Wing, Minot AFB, N.D.; and MSgt. Matthew I. Barkley,

20th Air Force, F.E. Warren AFB, Wyo. Local awardees included Col. Robert Fisher, director of the ICBM System Program Office at Ogden ALC, and Col. Larry Shaefer, director of the Space and C3I Directorate, also at Ogden ALC.

Peter B. Teets, undersecretary of the Air Force, was keynote speaker for the banquet. He talked about the importance of space and the Air Force's future in that arena.

The awards are named after retired USAF Lt. Gen. Brent Scowcroft, an Ogden native who was the national security affairs assistant to Presidents Gerald Ford and George H.W. Bush.

Held at the downtown Ogden Eccles Conference Center, the 15th annual awards banquet brought out nearly 600 guests. Gov. Olene S. Walker headed the VIP list, with AFA National President Stephen P. "Pat" Condon, and Maj. Gen. Kevin J. Sullivan, Ogden ALC commander.

Funds raised through the banquet are contributed to Family Support Center programs at Hill.

USAF Memorial in Colorado

Gen. Lance W. Lord, commander of Air Force Space Command, helped the **Lance P. Sijan Chapter (Colo.)** dedicate a memorial to the Air Force on May 11 at a community park in Colorado Springs.

The Colorado Air Force Memorial honors everyone who has worn a USAF uniform, said Lord in his remarks at the dedication ceremony hosted by the chapter. "May we always remember their youthful zest for life, their adventurous spirit, and their unwavering patriotism."

The 7-foot-tall, 14-foot-wide memorial consists of several large triangles. The central one is inscribed with the Air Force symbol. The monument joins a ring of 10 others surrounding a large central memorial to the armed forces. The chapter-funded memorial is the first in this ring to be specifically dedicated to the Air Force.

Chapter President Gayle C. White said the new memorial serves a "reminder of the outstanding job our Air Force members are performing in the Pikes Peak region and around the world."

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Award in New York

In New York, the **Albany-Hudson Valley Chapter's** fourth annual Brother Leo Merriman Achievement Award went to cadet John Smith of AFROTC Det. 550 at Rensselaer Polytechnic Institute in Troy, N.Y.

Merriman, a Conventual Franciscan friar who has been the AFA New York state chaplain for half a century, presented the award to Smith at the Presidential Awards Ceremony. Chapter President William J. Dickerson Jr. was also on hand. RPI conducts this ceremony each spring to honor cadets in its Army, Navy, and Air Force ROTC units.

Smith is a sophomore majoring in biomedical engineering and was selected for the Merriman award by the AFROTC faculty. Col. Thomas D. Bell, a chapter member, is the detachment commander.

At the same ceremony, Bell presented an AFA Medal to AFROTC cadet Alexander Turner, an aeronautical engineering major who begins pilot training after he is commissioned next year.

Two weeks after the awards ceremony, Merriman—a World War II veteran—attended an RPI commissioning ceremony, where eight AFROTC cadets became second lieutenants. Among them was chapter member Jennifer Cilia.

For Junior Enlisted ANG

The **Dale O. Smith Chapter (Nev.)** presented two awards recently—one of them earmarked for junior enlisted personnel of the Nevada Air National Guard or their dependents.

SrA. Lance King of the 152nd Airlift Wing, Reno/Tahoe Arpt., Nev., received the \$1,600 scholarship in June from Chapter President DeVonde Clemence at a Saturday morning roll call formation for the 152nd Maintenance Squadron.

"We had to wake up very early in the morning to make this roll call," said Kathleen Clemence, an AFA national director. "This is hard for us retirees," she joked. She noted that the entire wing leadership turned out for presentation of the scholarship, which King will use for his studies as an electrical engineering major at the University of Nevada, Reno.

In May, Chapter President Clemence represented AEF for the presentation of the Miriam Diskin Levy Scholarship to Edward Netcher, a Civil Air Patrol cadet from Ely, Nev.

AEF established the \$2,000 scholarship in 2002. The Smith Chapter administers it. Chapter member Lt.

Col. Irwin Levy, USAF (Ret.), initially funded the scholarship, naming it for his late wife. She was a London native who helped make life vests, life rafts, and tethered blimps in World War II. Irwin Levy died in September 2003. Besides a Nevada CAP cadet, the scholarship can also be awarded to a junior enlisted member of the Nevada ANG or a dependent of a current or retired ANG member of any rank; or an AFJROTC cadet at North Valleys High School in Reno. The Smith Chapter recently donated \$2,000 to the scholarship's fund.

Over the last 21 years, the chapter has donated nearly \$20,000 in scholarships to Nevada ANG junior enlisted or their dependents, Kathleen Clemence said.

R.L. Devoucoux, 1921-2004

Retired Lt. Col. Rene L. "Dev" Devoucoux, an AFA national director emeritus, died July 11 in Portsmouth, N.H. He was 82 years old.

Born in Flushing, N.Y., he was studying at the American Institute of Banking when World War II began. He enlisted in the Army Air Corps in 1942 and flew B-17s with the 490th

Bomb Group in daytime raids over Germany.

He retired from an Air Force career in 1965 at Pease AFB, N.H., and went on to become a stock broker. He retired from Dean Witter in 1985, remaining active in several civic organizations, as well as AFA.

More AFA/AEF News

■ The **Gen. Nathan F. Twining Chapter (Fla.)** held its annual awards night in May, with SrA. Mark Siviglia named as Airman of the Year. Robert F. Cutler, chapter president, reported that Siviglia is to be commissioned this fall as a C-130 pilot in the Air National Guard. Only a week before the dinner, the chapter's AFROTC Cadet of the Year, David Grantham from the University of South Florida in Tampa, had pinned on an active duty second lieutenant's bars. There is no Air Force JROTC unit in the area, Cutler explained, so other award recipients included Army and Navy JROTC cadets, all of whom enlisted—one in the Air Force, another in the Marine Corps, and the third in the Coast Guard. Guest speaker was chapter member Earl G. Peck, a retired USAF major general.

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AFA Conventions

Aug. 6-7	Illinois State Convention , Galesburg, Ill.
Aug. 12	Alaska State Convention , Anchorage, Alaska
Aug. 13-14	Missouri State Convention , Kansas City, Mo.
Aug. 20	Colorado State Convention , Aurora, Colo.
Aug. 20-21	Iowa State Convention , Fort Dodge, Iowa
Aug. 21	Georgia State Convention , Warner Robins, Ga.
Aug. 21	Utah State Convention , Ogden, Utah
Aug. 28	Massachusetts State Convention , Charlestown, Mass.
Sept. 11	Rhode Island State Convention , North Kingstown, R.I.
Sept. 13-15	Air and Space Conference , Washington, D.C.
Sept. 26	New Hampshire State Convention , Manchester, N.H.

■ In Virginia, ANG Lt. Col. Carl F. Bess Jr., president of the **Richmond Chapter**, attended the AFJROTC change of command ceremony in May at Atlee High School in Mechanicsville. He presented an AFA Medal and Citation to Alex Stewart as Outstanding Cadet of the Year. Bess

chatted with Stewart, who had been commander of the cadet group at Atlee, and learned that he will be joining the corps of cadets at Virginia Polytechnic Institute and State University in Blacksburg this fall.

■ He may have retired from the Air Force in 1991 and "retired" as AFA

executive director in 2002, but John A. Shaud still works on behalf of AFA. He was guest speaker for the **Golden Triangle Chapter (Miss.)** and their fifth annual AFA Quail Dinner in Columbus, Miss. The gathering brought together civic and military leaders in the Columbus Air Force Base area. Among the guests were Col. Stephen Wilson, the 14th Flying Training Wing commander at Columbus; Col. John C. Burgess Jr., the 14th FTW vice commander; and Lt. Col. James Reed, deputy commander of the 14th Operations Group.

■ **Central Florida Chapter** members Richard A. Ortega and AFRC Maj. Gen. Douglas S. Metcalf participated in an awards ceremony for ROTC and JROTC cadets, hosted by the Military Affairs Committee of Winter Park, Fla., in April. Ortega, the state's aerospace education VP, was invited to give the invocation and conduct the Pledge of Allegiance. Metcalf, who is mobilization assistant to the commander of Aeronautical Systems Center, Wright-Patterson AFB, Ohio, delivered the opening remarks. ■

Unit Reunions

reunions@afa.org

9th BG (WWII), Sept. 8-12 in New Orleans. **Contact:** Pat Carnevale, PO Box 1230, Sonoita, AZ 85637-1230 (phone: 800-659-8808 or fax: 520-455-5866) (carne@dakotacom.net).

19th Bombardment Assn, including the 14th, 28th, 30th, 32nd, 38th, 93rd, and 435th Sqs. Oct. 4-9 in Philadelphia. **Contact:** Jerry Michael (317-253-9265) (g.michael@sbcglobal.net).

20th BS, Oct. 15-17 at the Officers Club, Barksdale AFB, LA. **Contact:** Bill Cocke, 1505 Gentilly, Shreveport, LA 71105 (318-797-9703).

22nd BW, Sept. 1-2 in Las Vegas. **Contact:** John Frisby (702-250-9411) (jfrisby@novahead.com).

36th AMS/525th FIS, Bitburg AB, Germany, and related units. Sept. 11-14 at the Radisson Beach Resort Hotel in Fort Walton Beach, FL. **Contacts:** Kurt Bellack, 22513 East 33rd St., Ct. S., Blue Springs, MO 64015 (816-220-9665) or Menko Christoph, 134 Park Valley Ct., St. Peters, MO 63376-7137 (636-447-8539) (mdchrist@mail.win.org).

37th FS/FIS/FTS, Oct. 8-11 in Fort Worth, TX. **Contact:** Leslie Knapp, 9819 Gemini Dr., San Antonio, TX 78217 (lesknapp@juno.com).

48th TFW, RAF Lakenheath, UK. Sept. 27-29 at the Golden Nugget in Las Vegas. **Contact:** Herk Herculson, 1810 Nuevo Rd., Henderson, NV 89014 (702-458-4173) (herk@cox.net).

363rd FG and 161st Tactical Recon Sq. Oct. 14-16 in Omaha, NE. **Contact:** Art Mimler (209-966-2713).

390th SMW, Davis-Monthan AFB, AZ. Sept. 30-Oct. 3 at the Sheraton Tucson Hotel & Suites in Tucson, AZ. **Contact:** Elaine Lasher, PO Box 17916, Tucson, AZ 85731 (520-886-7157) (elainelasher@aol.com).

410th BG (WWII), Sept. 9-12 at the Sheraton

Meadowlands Hotel and Conference Center in East Rutherford, NJ. **Contact:** Jim Egan, 5621 Mirador Cir., Shreveport, LA 71119 (318-635-9648) (jcegan@softdisk.com).

434th and 436th Sqs, 479th FG (WWII). Sept. 15-18 at the Renaissance Hotel in Denver. **Contacts:** Jack West (515-276-3519) or Al DiPaola (ald22@aol.com).

509th BW, Sept. 29-Oct. 2 in Colorado Springs, CO. **Contacts:** Don Scheid (702-360-4611) or Jack Nuding (325-690-0946).

966th AEW&C Sq. Oct. 15-17 in Kissimmee, FL. **Contacts:** Phil Szymkovicz (503-645-3917) (philszy@europa.com) or Jim Skelton (903-723-5008) (trustme5@juno.com).

3389th Pilot Training Sq. Oct. 14-17 at the Imperial Palace Hotel in Biloxi, MS. **Contact:** Chuck Davies, 1802 N.E. Loop 410, Ste. 6, San Antonio, TX 78217 (210-828-4481) (cpdavies2@juno.com).

A-10 pilots, Sept. 18 at the Rider Jet Center, Hagerstown Arpt., MD. **Contact:** Marsha Fuller (mfuller@wc-link.org).

Air Force Postal and Courier Assn. Sept. 14-17 at the New Frontier Hotel in Las Vegas. **Contacts:** Dan Neff, 413 Hartzell Ave., Redlands, CA 92374 (909-792-5424) (afpcadneff@cyberhotline.com) or Jim Foshee, 3509 Deer Trl., Temple, TX 76504 (254-774-7303) (afpcajim@earthlink.net).

Ammo Chiefs Assn. Sept. 22-26 at the Holiday Inn Convention Center in Hampton, VA. **Contact:** John Matthews, 9907 Pitman Ave., Upper Marlboro, MD 20772-4867 (home: 301-856-3962 or work: 703-602-9861) (jmatthe596@aol.com or john.matthews@pentagon.af.mil).

Army Air Corps Enlisted Pilots. Sept. 16-18 at the Lodge of the Ozarks in Branson, MO. **Contact:** John Crouch, 8028 S. Gary Pl., Tulsa, OK 74136 (918-691-2453).

Morbach Ammunition Sqs. Sept. 11 at the Executive West Hotel in Louisville, KY. **Contact:** Daniel Parks, 614 Evergreen Dr., Clarksville, IN 47129 (812-280-9574) (mooseparks@aol.com).

PBY Catalina International Assn. Oct. 6-10 at the Smuggler's Inn in Tucson, AZ. **Contacts:** Don Mortimer, 2245 Marlene Ln., Mattituck, NY 11952 (631-298-2685) (pbydon@optonline.net) or Jim Thompson (504-392-1227) (glotomcat@msn.com).

Pilot Class 43-E. Oct. 13-16 in San Diego. **Contact:** K.C. Growe, 6134 Woodman Ave., #107, Van Nuys, CA 91401 (818-989-1667).

Stray Goose International, all involved with Combat Talons in the Pacific AOR. Oct. 8-10 at picnic grounds, Hurlburt Field, FL. **Contact:** Lee Hess, PO Box 9355, Hurlburt Field, FL 32544 (850-651-0353) (papasam@mc130.com).

Vietnam Security Police Assn. Oct. 7-10 in Tucson, AZ. **Contact:** Don Graham, 2911 Westminster, Rd., Bethlehem, PA 18017 (610-691-6960) (tuyhoa68@att.net).

WWII Bombardiers. Sept. 29-Oct. 2 at the Holiday Inn in Midland, TX. **Contact:** Bob Thompson, 280 Sharon Dr., Pittsburgh, PA 15221 (412-351-0483). ■

Mail unit reunion notices four months ahead of the event to "Unit Reunions," *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information. We reserve the right to condense notices.

Pieces of History

Photography by Paul Kennedy

Hound Dog



During the Cold War, the GAM-77 "Hound Dog" missile, above, was carried on B-52s, two on each bomber. Equipped with turbojet engines and a nuclear warhead, the missile was to be air-launched and sent ahead of the bombers to destroy enemy air defenses. Hound Dogs were to strike clusters of targets as far as 600 miles away and hundreds of miles apart.

The first Hound Dog flew in April 1959. The Air Force subsequently adapted the Hound Dog, redesignated as the AGM-28, to run its engines during the B-52's takeoff, adding thrust and reducing takeoff roll despite a heavier bomb load. The missile could be refueled from the B-52's own tanks. About 700 of these systems were built through 1963, and some

remained in service as late as 1977, but none was ever used operationally. This one is on display at the Air Force Space and Missile Museum at Cape Canaveral AFS, Fla. And, yes, it got its name from the famous 1950s song, originally recorded in 1953 by Big Mama Thornton and made even more popular by Elvis Presley in 1956.

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