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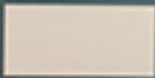


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2002 Space Almanac

New Horizons for the Total Force

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About the cover: A four-ship of F-15C Eagles flies over Florida. See "The Air Dominance School," p. 80. Staff photo by Guy Aceto.

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By Robert S. Dudley, Editor in Chief

Hyperextension

ON a recent visit to Scott AFB, Ill., Defense Secretary Donald H. Rumsfeld shot down the idea that he might expand the US military. He was "very reluctant" to add more troops, the Pentagon chief declared.

It would be "enormously expensive," he said. "Would we be better off increasing manpower or increasing capability and lethality?"

As for gaps in the force, they probably could be fixed by shifting troops internally. One result of this, he indicated, would be to make the US "stop using military people for nonmilitary functions."

Rumsfeld's view permeates the Bush Administration. All signs in late summer were that there would be no growth for the struggling, 1.4-million-member US military. There might even be further cuts, according to press reports. All requests faced scrutiny. "If you hear some squealing, you'll know it's my fault," joshed Rumsfeld.

The services had hoped for better. In various forums this year, top leaders talked in terms of adding 20,000 or so active troops, with more to come later. Prominent unofficial figures were 7,000 for the Air Force, 8,000 for the Army, 4,000 for the Navy, and 2,500 for the Marine Corps. They sought modest growth in the reserve components.

The services viewed the steps as the minimum needed to relieve shortages in security forces, firefighters, intelligence workers, medical specialists, and the like.

Rumsfeld changed the subject. He cut off talk of increases and instructed the services to work harder to make do with the troops they had. The goal: a "net of zero," said DOD manpower chief David Chu.

It would be a surprise if the matter is resolved so easily.

The Cold War force peaked at 2,174,000 troops. In 1993, the military was drawing down to a "Base Force" of 1,653,000, but the Clinton Administration abruptly levied new budget cuts and staged its notorious Bottom-Up Review to retroactively justify the reductions. Soon, force-cutters crashed through the Base

Force "floor" and slashed 290,000 more troops.

Radical force cuts and surging overseas operations proved toxic. US troops soon faced a grueling routine of long duty shifts and serial deployments. By the late 1990s, the situation stirred fears of a 1970s-style "hollow force." Presidential candidate George W. Bush, in his Sept. 23, 1999,

The US military simply has been cut too much.

speech at the Citadel, worried publicly about an "overstretched military."

If the military had concerns about end strength (and force structure) back then, they were nothing compared to today's.

The Sept. 11 attacks touched off a global war on terror, massive new homeland security duties, and the need to prepare for war with Iraq, all on top of existing obligations.

The smallish US active forces had to call up large numbers of reservists. Roughly 85,000 reservists are still on active duty. Some have been there since initial call-ups.

"I don't think we can sustain ... this kind of demand on the Guard and Reserve forces," said Sen. John McCain (R-Ariz.) of the Senate Armed Services Committee. He believes reserve recruiting, retention, and employer support will "suffer enormously."

The problem was especially acute for USAF, with its heavy taskings in both Noble Eagle and Enduring Freedom. The 359,000-member Air Force met its requirements with a huge call-up of Air Guardsmen and Reservists and stop-loss actions to prevent active duty and reserve troops from leaving service at the end of their normal commitments. Almost a year later, USAF maintained a steady-state mobilization of 37,000 ANG and AFRC members.

The problem is widespread. In

March, Adm. Dennis C. Blair of US Pacific Command and Gen. Joseph W. Ralston of US European Command warned that their forces were not adequate for all missions.

This is not mere overextension of the force, warns Sen. Max Cleland, the Georgia Democrat who heads the Senate Armed Services Committee's personnel panel. It is, he says, "hyperextension."

"We simply cannot continue to increase our military commitments without increasing the end strength of our armed forces," Cleland said. "They are already stretched too thin. ... We cannot fight a war on the cheap, and we cannot fight a war without people."

The House this year endorsed a first-step increase of 12,650 active duty personnel in its defense bill. The Senate did not, and the fate of the move awaits negotiation this fall.

The problem now is that the need for more people has been cast into competition with other defense needs, the most prominent of which is force transformation. Transformation is expensive, and as Rumsfeld said to the troops at Scott, "Resources are always finite."

DOD is banking heavily on no-cost or low-cost alternatives such as realigning forces, cutting overseas commitments, contracting out military functions to civilians, and the like.

Perhaps some or all of these steps will work. However, it seems to us that this is exactly the sort of approach that created the problem in the first place. It should be obvious now that the US military simply has been cut too much. It is time to reverse mistakes of the past and rebuild the force to a larger and more-sustainable size.

Rumsfeld himself, in a secret March 13 memo published in *Newsweek*, said this: "The entire force is facing the adverse results of the high-paced optempo and perstempo. We are past the point where the department can, without an unbelievably compelling reason, make any additional commitments."

Can that mean anything other than the military is too small? ■

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EAF in War and Peace

I agree that the number of aircraft should be associated with each AEF. [See "The EAF in Peace and War," July, p. 24.] An Air Staff officer said, "Our goal is to eventually have 10 fully capable AEFs with organic F-22s. The current buy of 339 aircraft will not be enough to give us 24 aircraft in each of the 10 AEFs. We will need to move the number to 399 to have enough F-22s to provide equal capability across the AEF structure."

However, the logic is flawed. Earlier in the same article Brig. Gen. Allen G. Peck said that in bygone days, Unit Type Codes were designed to pick up 24 aircraft and send them to, say, Spangdahlem, Germany. Peck said, "What we are finding is, we don't fight like that. We fight in sixes and twelves in many cases. We've had to deconstruct the Cold War UTC module into more bite size things that reflect the way we are going to build the blocks today."

If we don't fight like that, why are we striving for an artificial number of 399 F-22s? If we used 24-399 as a basis for analysis, Peck's quote would suggest that we would need to purchase approximately 200 F-22s. If we look at the 339 number of aircraft, using the same ratio 24-399, then this would render approximately 20 F-22s per AEF, certainly providing a comfortable margin for the way we fight.

Having said this, I also agree with the editorial ["The B-2 Syndrome Rides Again," July, p. 4], which makes the argument that we should avoid a B-2 syndrome, since the Pentagon appears to be leaking the number of 180 F-22s. Based on the previous quasi-analysis, this number appears to be at least 20 short of the number needed to fight the way we fight.

The reason I point this out: If we desire to fulfill our mission, and are sure that 399 or 572 air dominance fighters are needed to accomplish this goal, then we should not be afraid to support these numbers with rational explanations.

It is just possible that the reason we deconstructed the Cold War UTC

module and currently fight in "sixes and twelves" was due to shrinking resources and expanding mission requirements that put the late-'80s and early-'90s Air Force on the field with no bench and no relief.

John R. Powell
Sterling, Va.

Bekaa Valley War

[Rebecca] Grant's article "The Bekaa Valley War" [June, p. 58] indirectly and subtly reasserted two old truths: "Necessity is the mother of invention," and "Where there is a will there is a way." As the author so ably explained, the Israeli Air Force's losses during the 1973 Yom Kippur War caused tacticians to dually posit that "airpower's role in future wars had been placed in doubt" and that "fighters might no longer be able to gain air superiority against an integrated air defense."

Israel, being a geographically tiny nation, is in effect an isolated sanctuary of democracy surrounded by a sea of mostly unfriendly nations. Thus, repeated and prolonged failures have never been an option for the Israeli Defense Forces in general and the Israeli Air Force in particular.

The old gunnery school (HMS *Excellent*) at Portsmouth, England, adopted a wise dictum as its motto: "In times of peace, prepare for war." (Perhaps this is in part why Britannia effectively ruled the waves for such a long era.) The Israeli Defense Forces have had no choice but to preserve national survival via a corresponding creed. Adaptability, innovation,

and preparation have enabled the IAF to successfully complete the multifaceted missions with which the air service is tasked.

Ms. Grant also alluded to the subsequent strategic change within the region, after the IAF's notable triumph in the Bekaa Valley, to pursuing a surface-to-surface war against Israel in lieu of a surface-to-air war. Just as some individuals believed layers of [surface-to-air missiles] represented an insurmountable barrier almost 30 years ago, in the not too distant past "experts" contended that a national missile defense wasn't possible or feasible. Yet Israeli defense contractors and the IAF, with joint funding from the United States, have developed and deployed an apparently effective anti-ballistic missile defense—the Arrow Weapon System.

Pessimists similarly cautioned late last year, based upon the historical experiences of British and Soviet military forces, that the campaign against terrorist organizations in Afghanistan would be long and prohibitively costly in terms of American casualties. Some of these same experts also prophesied that the US air war would be of limited effectiveness due to the country's rugged, mountainous terrain.

Fortunately, American military planners did not capitulate to the dire warnings of the numerous domestic and foreign pundits. In fact, one could aptly apply two of the article's sentences to the early, critical successes of Operation Enduring Freedom in Afghanistan: The US military "was undertaking very high-risk missions and, ultimately, ... reaped the reward. The air support helped turn the tide in huge battles."

John T. Stemple
Dayton, Ohio

Glick-Em

Peter Grier's article ["The Short, Happy Life of the Glick-Em," July, p. 70] prompted me to recall the front end of the deployment process. From 1979 to 1983, while assigned to US Air Forces in Europe, Ramstein AB,

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Germany, I had the responsibility for preparing and negotiating construction and deployment memoranda of agreement with the four basing countries on the continent.

To prevent media attention, our small negotiating team traveled in mufti, meeting our interlocutors in secure embassy rooms, at remote local government locations, or occasionally at Ramstein. Despite the unpopularity of the basing decision, including among some of the host officials, the governments stepped up to the task, agreeing to provide the sites and infrastructure the system and personnel would require. Of course, the hosts drove hard bargains, but we pushed for maximum support. Given their complexity and the level of political interest, the agreements were concluded quite rapidly.

After the intense effort to secure the basing rights, I was assigned to the Joint Chiefs of Staff, J-5, Arms Control Directorate. There, I was involved in the endeavor that eventually led to the [Intermediate-range Nuclear Force] Treaty.

Having participated in both the beginning and the end of GLCM and Pershing II deployment, I believe wholeheartedly that NATO's action to neutralize the SS-20 threat contributed immeasurably to the ending of the Cold War. The USAF role in this effort is long unsung. Kudos to Mr. Grier for bringing this important element of our history to light.

Col. Ruth M. Anderson,
USAF (Ret.)
Graham, Wash.

Grier should be commended for his terrific article on the GLCM. As a mere teenager at the time of the GLCM deployments, I had no idea they played such a major role in Cold War politics. Thank you for a genuinely informative story.

Joel Hilden
Edgewater, Md.

[There was an earlier missile—the Matador.]

The first Matador unit in Europe was the 701st Tactical Missile Wing, activated in September 1956 at Hahn Air Base in Germany. The wing was comprised of the former 1st PBS/TMS (Pilotless Bomber Squadron/Tactical Missile Squadron) at Bitburg Air Base, the 69th PBS/TMS at Hahn, and the 11th PBS/TMS at Sembach Air Base. The PBS designation was changed to the TMS designation in 1955.

After several iterations, the wing designation was changed to the 38th TMW in June 1958. The 38th TMW

was one of the largest USAF combat missile units and the only tactical missile organization in NATO.

The Matador TM-61A was replaced with the TM-61C in 1957 and remained operational until September 1962. The Matadors were gradually replaced with the TM-76A Mace in August 1959 and remained operational until 1966. The Mace B became operational in June 1964 and remained in service until April 1969. The Mace was originally designated the TM-61B Matador; however, with different guidance systems and longer range than the Matador A and C models, it received the TM-76 designation.

The 1st PBS arrived in Germany in March 1954, the 69th PBS in September 1954, and the 11th PBS in mid-1955. All were initially equipped with the B/TM-61A Martin Matador. The Matador was a ground-to-ground cruise missile powered by a J33 jet engine and was launched from a zero-length launcher using a [rocket assisted takeoff] bottle.

I was with the 69th TMS at Hahn AB, Germany, from September 1954 through August 1957 and participated in live firings in Tripoli, Libya, in 1956 and 1957.

Joseph V. Traina
Albuquerque, N.M.

Eyewitness

Articles about the Dec. 7, 1941, attack on Oahu are always stimulating to me since they make me relive my experience as I watched the attack from the roof of our family quarters at Hickam Field [Hawaii]. Your article, "In History's Shadow" [p. 62], in the July issue was no exception.

However, in the interest of accurate history I must point out that the caption under the photograph on p. 66 of the burned out B-17 implies that the aircraft was strafed after landing, which is untrue.

First Lt. William R. Schick, the 38th Recon Squadron flight surgeon, was on the pictured B-17 and died the next day from wounds received. Col. Ernest L. Reid, USAF (Ret.), who was the copilot on that aircraft wrote in his logbook, "War! Plane shot down on arrival." Further on, "Two Jap planes attacked us as we turned in on final approach."

That is exactly as I saw it.

My special interest in this B-17 stems from the fact that it was the only aircraft I have actually seen shot down. I also believed [at the time] that my father could have been flying it. He and about a dozen pilots from his 11th Bomb Group at Hickam returned to the States to pick up some B-17s for delivery to the Philippines

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To support the needs of the Air Force and Air Force people.

To explain these needs to the American people.

Letters

via Hickam. By Dec. 7, we had been expecting his return for several days. He flew in four days [after the attack].

Col. Robert F. Hegenberger,
USAF (Ret.)
Niceville, Fla.

■ *The caption was misleading. The B-17 was first strafed while in the air, which ignited the pyrotechnics stored in the middle of the aircraft. When it landed, it broke apart in the middle where the fire had burned through. Lieutenant Schick was hit in the leg while the B-17 was still in the air, but he managed to get out, then was hit in the head by a bullet from a passing Japanese aircraft. Colonel Reid provided these and other details in an article, "Shot Down at Pearl Harbor," he wrote in our December 1991 issue.*—THE EDITORS

The Meltdown

Thank God for your magazine and authors like Peter Grier. [See "Meltdown of the Nuclear Critics," June, p. 32.] The anti-nuclear cranks derailed our energy independence program in the 1970s; now they seek to cripple our defense posture. Although it is certain that the critics will never read the article, just having it in print may enlighten others, thus performing a public service.

Joseph J. Cunningham
Jackson Heights, N.Y.

Remember the 33rd

[In reference to "Pantelleria, 1943," June, p. 64]: It seems that the 33rd Fighter Group—58th, 59th, and 60th Fighter Squadrons flying P-40s—were the forgotten combat unit that catapulted off the aircraft carrier USS *Chenango* during Operation Torch. The 33rd crossed northern Africa to Tunisia, flying combat missions until the Germans were driven out of Africa.

Col. William Momyer (later general) was the Commanding Officer of the 33rd FG, and Maj. Levi Chase (later major general), CO of the 60th FS, was the [unit's] top ace with 10 planes shot down [credited with two more for action in 1945]. The 325th FG (P-40s) was mentioned but not the 33rd FG.

We were stationed on Cape Bon at Menzel Temime, where we flew dive bombing missions on and bomber escort missions to Pantelleria. At that time, the 99th FS was stationed at Menzel Temime with the 33rd FG. Then—Col. [Benjamin O. Davis Jr.] was CO of the 99th. They flew their first combat missions with the 33rd

FG—a flight of four P-40s at a time over Pantelleria.

After Pantelleria surrendered, the 33rd FG was stationed on Pantelleria, flying top cover over the invasion of Sicily. The 33rd left Pantelleria and was stationed at Licata, Sicily, where the 99th FS was also stationed, now flying their own missions as a combat unit. The 33rd FG is known as the "Nomads" due to moving so many times in Africa, Pantelleria, Sicily, Italy, and the China–Burma theater.

Lt. Col. Kenneth Scidmore,
USAF (Ret.)
Whittier, Calif.

I was there and took part in the bombing [of Pantelleria]. The 33rd FG, composed of the 58th, 59th, and 60th FSs flying P-40s with Colonel Momyer as CO, took part in the bombing. (Momyer retired as a four-star general, the commander of Tactical Air Command at Langley Field [Va.]

The 33rd FG went into North Africa from the aircraft carrier [USS] *Chenango*. We landed at Port Lyautey in Morocco. The 58th FS moved up to Thelepte in southern Tunisia in December 1942. At the time of the bombing of the island, we were stationed at Menzel Temime at Cape Bon. There were also two groups of Spitfires flown by Americans, the 31st and 52nd.

After the island surrendered, the 33rd FG moved to an airfield on the island. We operated from there until we went to Sicily. Four days before the invasion of Sicily, we were given the task of providing top cover for the convoy as it assembled from the various ports around there.

We kept 12 planes over the convoy all day. On the first day of the invasion, I was leading a flight of four P-40s and I was over the beachhead when the sun came up. We kept planes over the beachhead all day. I saw some Spitfires a couple of times that day.

Lt. Col. William R. Davis Jr.,
USAF (Ret.)
Waycross, Ga.

New Wing Structure

My hearty congratulations to [USAF leadership] for the realignment of the Air Force wing structure. [See "Aerospace World: Air Force Implements New Standard Wing Structure," June, p. 17.]

As a former aerospace maintenance director, I believe that maintenance owns the assets while on the ground and operations owns them when in the air.

I was disappointed that supply was



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not given a more important position in the new organization. Without supply, maintenance cannot function, except by cannibalization—a wasteful way to go. Perhaps a maintenance and supply group should have been considered.

I do appreciate the new requirements for rapid employment readiness in this new post-9/11 environment and thus the emphasis in the mission support group.

Lt. Col. Robert E. Webber,
 USAF (Ret.)
 Carmichael, Calif.

Different Views

Your article ["*Stop-Loss*," July, p. 52] revived memories for me. I was on a three-year enlistment when the Korean conflict started and I was involuntarily extended for the duration. Not knowing how long the duration would be, I talked the situation over with my wife. We decided I could re-enlist for six years, get the re-enlistment bonus, and see what happens.

I was selected for [officer candidate school] and subsequently received a commission. After 21 years of gratifying service, I retired and started another career with McDonnell Douglas. Now I am fully retired and I look back on my Air Force years with pride and satisfaction.

For some of us, a program such as Stop-Loss can be beneficial. It just depends on how we handle the situation.

Maj. Edward J. Gagznos,
 USAF (Ret.)
 Dallas, Ore.

The implementation of Stop-Loss across the spectrum of Air Force specialties is a continuation of poor choices the Air Force has made in the personnel arena. Place this alongside the cyclic pilot shortage. I say poor choice because I cannot see

any justification for it when compared to other personnel policies.

What is most interesting to note is a program that wasn't mentioned in this article but could play a key role in manning. Immediately after the Sept. 11 [attack], the Air Force mentioned that retirees could return to active duty. Unlike the across-the-board Stop-Loss, this return to active duty only centered on a few operational specialties. Reason would dictate that if you must keep everyone to do the mission, you would also open the door to qualified people returning to active duty to also do that same mission. This would allow people who have completed their commitments to get on with their life if they wanted to.

In the article the statement was made that the "closer you are to being a sortie generator or a trigger-puller," the greater the chance you wouldn't be allowed to separate. By the same logic, the closer a qualified retiree is to being a sortie generator or trigger-puller, the greater the chance that he or she should be allowed to return. I haven't seen that happen yet.

If Stop-Loss is really needed, why is there a contrast between this program and those allowing retirees to return to help out?

Lt. Col. David J. Wallace,
 USAF (Ret.)
 Kokomo, Ind.

More on Predating Predator

[In reference to comments by William H. Vinehout, "*Predating Predator*," July, p. 8]: I was assigned to VX-2 at NAS Chincoteague, Va., in the late '40s, and when I got there the squadron emblem was the Bucking Dog, a cartoon of a World War II F-6F Hellcat under remote control. The squadron flew the leftover F-6s with a receiver package strapped into the

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pilot's seat. Control was directed from a pair of F-8F, an SNB, or SNJ chase planes.

Perhaps to justify in part the expense of the experiment, and subsequent development of RPVs (Remote Pilotless Vehicles), some of our missions were to provide target practice [for] the fleet. I am not sure of the date, but it was in 1949 or 1950 that one F-6F was retrofitted with a ramjet on the belly.

I remember that the ignition system was a long rod of punk, or slow burning fuse, that was to ignite the fuel in the engine. The purpose was to fly this aircraft, loaded with explosives, into a North Korean hydroelectric dam that supplied power to factories in the area. As I remember, the dam was surrounded with anti-aircraft batteries that made it impervious to manned aircraft attack. I have never heard if the mission was a success.

A sister squadron on the base was deeply involved with infrared guidance of RPVs at the same time.

Jim Burley
 Yachats, Ore.

Remembering William Jones III

The item reporting the 15th anniversary celebration of the William A. Jones III (Va.) Chapter [See "*AFA/ AEF National Report: 15 Years Old*," June, p. 82] neglects to say that then-Lieutenant Colonel Jones was awarded the Medal of Honor for his heroism in the mission which rescued a downed pilot in North Vietnam.

After several months of treatment for his severe burns, Colonel Jones regained flight status and was promoted. He died in 1969 at the controls of his private aircraft. Although the exact circumstances of his crash were never determined, it was believed by all that his previous injuries and severe burns were the underlying causes of his fatal accident.

Lynn Cummings
 Alexandria, Va.

Corrections

In the July issue, a caption about the Airborne Laser on p. 14 of "*Aerospace World*" should have said 747.

In the June issue, the article "*The Bekaa Valley War*," [p. 58] described Trevor N. Dupuy as a British military historian. He was an American, a career US Army officer, and a military historian.

Verbatim

By John T. Correll, Contributing Editor

Taking the Offensive

"If we wait for threats to fully materialize, we will have waited too long. ... [We] must be ready to strike at a moment's notice in any dark corner of the world. And our security will require all Americans to be forward looking and resolute, to be ready for pre-emptive action when necessary to defend our liberty and to defend our lives."—**President Bush, speech at West Point graduation, June 1.**

Hot Pre-emption

"We are calling on states to step up to their internal responsibilities to end any terrorist presence, while saying also that we reserve, within the framework of our right to self-defense, the right to pre-empt terrorist threats within a state's borders. Not just hot pursuit: hot pre-emption."—**Former Secretary of State George P. Shultz, at the dedication of the George P. Shultz National Foreign Affairs Training Center, Arlington, Va., May 29.**

Either Way

"I don't know if he is dead or alive, for starters—so I'm going to answer your question with a hypothetical. Osama bin Laden, he may be alive. If he is, we'll get him. If he's not alive, we got him."—**Bush, in a July 8 press conference at the White House.**

Thank God for the Navy

"When America struck its initial blows in the wake of the Sept. 11 terrorist attacks, it was Navy fighter-attack jets flying from two carriers in the region, not the Air Force, that struck the first blows. The long-distance missions into landlocked Afghanistan were necessary because Air Force fighters based in Saudi Arabia could not participate without host-nation consent."—**Marine Corps Times editorial, May 27.**

The Demise of NATO

"Why should we be greater advocates of European power than the Europeans themselves? They have practiced international affairs long

enough to know that diminished power means diminished influence—and a radically diminished NATO, their place at the decision-making table. NATO may still have a role in peacekeeping but not in war-making. As a serious military alliance it is finished."—**Charles Krauthammer, Washington Post, May 24.**

These Few Concessions

"President Bush has perhaps inadvertently made our security fight more difficult by rejecting instead of improving arrangements that Europeans care about on missile defense, biological weapons, international justice, and climate change and by an embarrassing unwillingness to use the European military capacities that are relevant."—**Former Secretary of State Madeleine Albright, Washington Post, May 22.**

Decisions Lag Capability

"My contention is the first few weeks in Afghanistan, because of a lack of understanding of what we could do, we lost opportunities that have kept us in Afghanistan overtime, longer than we would have had to be. And that's a tragedy. I think some day that will all come out."—**Lt. Gen. Charles F. Wald, USAF deputy chief of staff for air and space operations, Aerospace Daily, May 24.**

On the Other Hand

"Hold your hand as high as you can above your head to indicate how much data our present system collects. Then drop your hand to your knee—that's how much gets translated into English. Then point to your ankle: That's how much goes to our intelligence analysts at the CIA in time to be useful. As far as FBI counterintelligence in the US is concerned, that's in your little toe."—**William Safire, New York Times, June 13.**

Too Long in the Depot

"In the last several years, we have doubled the amount of time—from about 180 days to more than 300 days—it takes to take one of these

airplanes apart, fix all the corrosion and things that are wrong with them, ... and put them back together again, and it's too long."—**Gen. John P. Jumper, Air Force Chief of Staff, talking about depot maintenance of KC-135 tanker aircraft in testimony to the Senate appropriations defense subcommittee, May 15.**

Too Bad

"I am alive. My friend, Mullah Omar, is alive, and it is the duty of all Muslims to wage a war on non-Muslims."—**Posters placed in areas along the Afghanistan-Pakistan border, allegedly quoting Osama bin Laden, Washington Times, June 6.**

The Food Supply

"Terrorists aim to strike terror among civilians in their everyday lives. With our food supply, the target is the very heart of many homes: the family dinner table. ... Food security is homeland security, and if we fail to take steps to bolster these safeguards, we will leave behind a gaping hole in America's homeland defense."—**Sen. Hillary Rodham Clinton (D-N.Y.), Newsday, June 10.**

300 of the Best

"If you take any of our ships today, I would contend that our 300-ship Navy is far, far more potent than our 600-ship Navy was. Just count the number of [missile launch] tubes, count the number of strikes, count the number of targets we can service on any given day, and it's vastly more than we could do back in the '80s, when we had twice the number of ships."—**Secretary of the Navy Gordon R. England, quoted in Defense Weekly Daily Update, June 11.**

Pat Garrett, Front and Center

"They were under intense propaganda, and for them bin Laden is a kind of Billy the Kid."—**Najeeb Al-Nauimi, lawyer for 60 Muslim prisoners from Afghanistan held at Guantanamo Bay, Washington Post, June 2.**

Aerospace World

By Suzann Chapman, Managing Editor

Eberhart To Head NORTHCOM

The Senate on June 27 confirmed Air Force Gen. Ralph E. Eberhart to be the first leader of the Pentagon's new homeland defense unified combatant command, US Northern Command.

Eberhart, who is currently commander in chief of US Space Command and NORAD, will relinquish only one of those positions on Oct. 1 when NORTHCOM stands up. As head of the new command, he will retain only his NORAD position.

Under changes to the Unified Command Plan that take effect Oct. 1, NORAD, the US-Canadian binational command charged with air defense of North America, will be aligned with NORTHCOM. NORAD is headquartered at Peterson AFB, Colo.

The day before Eberhart's confirmation, DOD announced plans to merge US Space Command, currently housed at Peterson, with US Strategic Command at Offutt AFB, Neb. (See "Unified Command Plan Change To Merge SPACECOM and STRATCOM," p. 11.) Current plans call for placing the new entity, reportedly to carry the Strategic Command moniker, at Offutt and NORTHCOM at Peterson.

USAF Studies New F-22 Test Approach

Senior Air Force officials met with F-22 prime contractor Lockheed Martin at Edwards AFB, Calif., the second week in July to discuss the pace of F-22 flight testing.

USAF officials attending the review included Air Force Secretary James G. Roche, Chief of Staff Gen. John P. Jumper, USAF acquisition principals Marvin R. Sambur and Darleen A. Druyun, as well as Air Force Materiel Command head Gen. Lester L. Lyles.

Lyles said the F-22 flight-test program is not where the service thought it should be. "We wanted to understand what the impediments are and work together on a game plan to remove any constraints."

The F-22 program director, Brig. Gen. William J. Jabour, told reporters in late May that the test program

is unlikely to make its scheduled start date of April 2003 for dedicated initial operational test and evaluation. He projected a six-month slip.

The General Accounting Office has projected the possibility the program may slip at least 11 months.

As a result of the review, Lyles said USAF leadership gave Maj. Gen. Wilbert D. Pearson Jr., the Air Force Flight Test Center commander, "even more responsibility to look at priorities for test activities and support, to make key decisions and to support the F-22 test force leadership."

AEF Schedules To Stand

USAF decided it would stand by its current Aerospace Expeditionary Force deployment cycle: five pairs in a 15-month cycle with most personnel deployed for 90 days.

In a late June announcement, the Air Force said that to keep up with current operational demands, it would have to incorporate into the existing 10 AEFs the resources it had held back for surprise requirements.

Service leaders decided to fold the resources of the so-called 911 or on-call wings into the current AEF buckets of capability.

USAF Chief of Staff Gen. John P. Jumper said the Air Staff is attempt-

ing to develop both short- and long-term solutions to the problem.

"AEF is not a hobby—it's the system," he said. (See additional coverage of this issue in "Building Aerospace Expeditionary Forces for the Long Haul," p. 14.)

AFRC May Fall Short of Volunteers

The pace of USAF's expeditionary deployments—more 90-day tours—may force the Reserves into additional mobilizations, said an Air Force Reserve Command official.

It is AFRC policy to seek volunteers to fill its AEF commitments, which prior to last year's Sept. 11 attacks were normally only two-week tours, said Tony Tassone, AFRC's AEF Cell director.

"However, if the number of 90-day tours, with no intermediate rotation, remains at the present level, we will not have enough volunteers to meet the taskings."

He said if AFRC maintains its current level of commitments for AEF Cycle 3 (March 1, 2002–May 31, 2003), "it will provide more than 30,000 volunteers in addition to its approximately 13,000 mobilized Reservists."

The cycle includes 800 taskings

"CINC" Is Out, "Combatant Commander" Is In

Secretary of Defense Donald H. Rumsfeld has clarified the Pentagon's use of the term Commander in Chief, or CINC.

The title historically has been applied to the heads of the unified commands. Today, there are nine: US Central Command, US European Command, US Joint Forces Command, US Pacific Command, US Southern Command, US Space Command, US Special Operations Command, US Strategic Command, and US Transportation Command.

It also, of course, is the title conferred by the Constitution upon the President, who is Commander in Chief of the armed forces.

Rumsfeld decreed that the recent update to the Unified Command Plan would change the title of both functional and geographic heads from CINC to combatant commander. The official title will be commander, said DOD public affairs.

The change in title takes effect Oct. 1, along with other changes to the UCP.

Unified Command Plan Change To Merge SPACECOM and STRATCOM

The Pentagon will merge US Space Command with US Strategic Command on Oct. 1. The headquarters for the new unified combatant command, reportedly to be named Strategic Command, will reside in Nebraska.

Defense Secretary Donald H. Rumsfeld announced the much anticipated merger June 26.

STRATCOM, which is headquartered at Offutt AFB, Neb., controls US nuclear forces—ICBMs, nuclear submarines, and nuclear-equipped bombers. SPACECOM, with headquarters at Peterson Air Force Base in Colorado Springs, Colo., controls military space operations, information operations, computer network operations, and space campaign planning.

Both commands are charged with countering the proliferation of weapons of mass destruction.

Rumsfeld said the missions of the two commands "have evolved to the point where merging the two into a single entity will eliminate redundancies in the command structure and streamline the decision-making process."

The new command, he said, will oversee "early warning of and defense against missile attack as well as long-range conventional attacks." It will also be responsible for information operations.

Pentagon officials had confirmed the merger was under study in April when they announced other major changes to the Unified Command Plan. Those changes included creation of a new unified command, US Northern Command, to oversee homeland security.

This is not the first time DOD has sought to merge STRATCOM and SPACECOM. In 1993 the Pentagon made a concerted effort to eliminate US Space Command and transfer its mission to Strategic Command. The move failed, though, largely because of Canadian opposition.

Canada objected to having NORAD, the US-Canada binational air defense command, aligned with the command charged with US nuclear offensive operations. At the time, NORAD was aligned with SPACECOM, whose Commander in Chief also served as head of NORAD.

That objection was removed in April when Rumsfeld announced the Pentagon would align NORAD with US Northern Command. NORAD will still rely on missile warning data it receives from SPACECOM, but it will not share commanders.

The current head of SPACECOM, Air Force Gen. Ralph E. Eberhart, has already received Senate confirmation as the first commander for NORTHCOM. (See "Eberhart To Head NORTHCOM," p. 10.)

Rumsfeld also set the stage for the merger by discuss-

ing his plans with Members of Congress from Nebraska and Colorado before the official announcement.

Nebraska lawmakers see the move as one that will solidify a long-standing military presence in that state, insulating Offutt in any future round of base closures. Indications are that the new Nebraska command would also oversee the Administration's proposed national missile defense system.

Although Colorado loses SPACECOM's headquarters function and its four-star general, the state will retain its central role in military space activities as host to Air Force Space Command, which has its headquarters at Peterson. The state already gained a new four-star general in April when the Pentagon separated command of AFSPC from SPACECOM and Congress authorized the Air Force an additional four-star billet. Peterson has also been designated to host NORTHCOM.

Neither state stands to gain or lose a great number of personnel as a result of the merger. SPACECOM has about 900 military and civilian personnel, while STRATCOM has 1,500. Officials said only a small number of personnel would transfer from Peterson to Offutt.

Proponents of the merger say it will increase the military's ability to respond swiftly to unexpected attacks and offer a wider range of strategic options—nuclear and non-nuclear. They say the new command will have a truly global perspective.

The move allowed Rumsfeld to create the new homeland defense command, yet he can still limit the overall number of combatant commanders to nine. Additionally, it allowed him to combine two commands which, separately, appeared to have limited roles.

Some critics claim, though, that the merger will actually delay the emergence of a space warfighting doctrine. They say Rumsfeld has abandoned his desire to see advanced space technologies integrated throughout the military at the tactical level.

Others say the two cultures represented are not likely to mesh well and question how the new command will support NORAD on domestic defense issues.

Fine-tuning of the unified commands may not end here. Defense officials also have expressed an interest in merging US Southern Command with NORTHCOM.

However, any decision in that arena will have to wait at least for a year or so, according to USAF Gen. Richard B. Myers, Chairman of the Joint Chiefs of Staff.

"We have made some very, very big changes in the Unified Command Plan," said Myers. "We're thinking we probably ought to let this settle out for a little bit before we tackle some more big issues."

for two-week tours but some 1,500 that require 90-day commitments.

Tallone said if the number of 90-day tours remains at the present level, "AFRC will be forced to resort to mobilization to meet its requirements."

"This is not something AFRC will recommend, but that decision will be made by the gaining major commands if they need Reserve participation," he said.

Planning has already started for the next AEF cycle, which will begin in June 2003. For that, Tallone said

AFRC plans to offer capabilities using volunteers in 15-day rotations.

USAF Issues New Stop-Loss Relief

The Air Force released all but three officer and eight enlisted career fields from its Stop-Loss restrictions in late June. The measure applies to active duty and reservists.

USAF implemented blanket Stop-Loss measures, prohibiting all active duty and reserve members from either separating or retiring, following

the September 2001 terrorist attacks. It released a few members from those restrictions in January and a few more in April.

The third release encompasses most career fields and is in line with USAF's exit plan, which called for a gradual drawdown in the number of specialties affected, said Lt. Col. Jan Middleton at the Pentagon.

The officers still prohibited from separating or retiring are those serving as special operations pilots and navigators or in security forces.

Gen. Benjamin O. Davis Jr., 1912–2002



In 1954, Davis received his first star, making him the first black general in the Air Force. Gen. Earle E. Partridge, Far East Air Forces commander, pins on the stars.

Gen. Benjamin Oliver Davis Jr., leader of the Tuskegee Airmen during World War II and the first African American general in the Air Force, died July 4 at Walter Reed Army Medical Center. He was 89 and had Alzheimer's disease.

At the time he entered West Point, Davis was the son of one of only two black combat officers in the Army. The younger Davis persevered through four years at the US Military Academy, where no cadet spoke to him other than on official business, and graduated 35th in his class in 1936. He wanted to fly, but segregation was a barrier. There were no black flying units in the air service.

He commanded a black service company at Ft. Benning, Ga., and then taught military science at Tuskegee Institute in Tuskegee, Ala. During this time, as a re-election initiative, President Franklin D. Roosevelt ordered the Army to create a black flying unit.

Davis, as the only living black West Point graduate, was selected to lead the unit. In May 1941 he entered advanced flying training at nearby Tuskegee Army Air Base, receiving his pilot wings in March 1942.

He led the 99th Pursuit Squadron from Tuskegee to North Africa in April 1943 and later to Sicily. After three months in combat, Davis was called to Washington to defend the 99th against charges that black pilots did not have the proper reflexes to be fighter pilots. Davis's testimony saved the 99th and the other black flying units being formed.

He took charge of the 332nd Fighter Group, leading it to Italy in January 1944. Throughout the war, the Tuskegee Airmen established a dazzling record of victories against superior German aircraft. When they flew escort duty, not one bomber they escorted on some 200 missions was lost to an enemy fighter.

In 1946, as commander at Lockbourne AAB, Ohio, Davis's professionalism won over the white civil servants working for him there. His successes at Lockbourne and with the 332nd helped set the stage for racial integration within the newly formed US Air Force.

Historian Alan Gropman said that Davis performed so well and led so effectively that the arguments used to prop up segregation were fatally undermined. (See "Benjamin Davis, American," August 1997, p. 70.) In 1949, the Air Force became the first US armed service to integrate racially.

Davis became the first black officer to attend a war college. He went on to a key Pentagon assignment and then commanded the 51st Fighter-Interceptor Wing in the Korean War. From there, he went to Far East Air Forces as director of operations and training, in which post he was promoted to brigadier general. His next posting called for him to create from scratch a defensive air force for Taiwan.

He continued to serve in key operational positions in Europe, the Pentagon, and Asia, rising to lieutenant general. He retired from the Air Force in 1970 as deputy commander in chief of US Strike Command.

Davis continued in public service. He became director of public safety for Cleveland, Ohio, and later served as head of the newly formed federal sky marshal program and as an assistant secretary at the US Department of Transportation.

In December 1998, Davis was awarded a fourth star in an exceedingly rare post-retirement promotion. He was only the third Air Force pioneer to receive such an honor. The other two were Ira C. Eaker and Jimmy Doolittle.

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The enlisted fields still restricted are: flight engineer, airfield management, operations resource management, air traffic control, intelligence operations, pararescue, fuels, and security forces.

Jumper: Higher Optempo To Stay

In the post-Sept. 11 world, the Air Force no longer experiences surge operations. Instead it faces a "new, higher standard of operations tempo," said USAF Chief of Staff Gen. John P. Jumper.

"While our operational rhythm will fluctuate with world events, it is unlikely we will return to a pre-September level," he said in a July 10 written statement.

Jumper emphasized USAF's reliance on the Aerospace Expeditionary Force to meet the new optempo. He said the Air Force must properly size the deployment units that make up the AEFs. Expanding the number of members who participate in worldwide commitments, Jumper said, will help decrease the demand on those "currently carrying more than their share of our deployment burden."

Expansion of the deployment pool, said Jumper, "will mesh with our 'burn-down' plan to further reduce the impact of Stop-Loss and to facilitate the demobilization of our Guard and Reserve professionals."

Northrop, TRW Agree on Buyout

Company officials announced July 1 a merger agreement in which Northrop Grumman will buy TRW for \$7.8 billion in stock.

The move, if approved by DOD and the Justice Department, could make Northrop Grumman the nation's second largest defense contractor.

After months of wrangling during which TRW turned down two previous Northrop Grumman offers, Northrop overcame last minute bids from BAE Systems, Raytheon, and General Dynamics—all pursuing TRW's government satellite business.

Lockheed Martin, the top defense contractor, is protesting the Northrop/TRW deal, saying there is not enough government satellite business to host another major player.

In 1998, Lockheed Martin had attempted to acquire the struggling Northrop Grumman. That merger was nixed by the Pentagon.

Since then Northrop rebounded, purchasing 10 companies, doubling its revenue. Over the past decade, the company has moved from primarily a producer of manned warplanes, such as the B-2 bomber, to shipbuild-

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ing, electronics, information technology, and unmanned aircraft.

Northrop projects the new company would have annual revenues of more than \$26 billion and 123,000 employees.

Goodrich To Buy TRW Unit

Goodrich announced June 18 it planned to acquire TRW's Aeronautical Systems businesses for \$1.5 billion in cash.

The purchase would expand Goodrich's military and commercial aerospace systems business to include flight controls, cargo systems, engine control systems, power and utility systems, and missile actuation.

The buyout is subject to approval

by US and European regulatory agencies. It is not affected by Northrop Grumman's proposed acquisition of TRW.

US Gains One-Year Shield From ICC

The United Nations Security Council voted 15-0 July 12 to make US forces engaged in UN peacekeeping missions exempt for one year from prosecution by the International Criminal Court.

The Bush Administration had threatened to veto such operations unless the UN granted US forces permanent immunity from the court. The Administration backed off that demand earlier in the week.

The court officially came into existence on July 1. A 1998 treaty establishing the court was signed by 179 countries, but only 76 have ratified it.

President Clinton signed, but Congress had not ratified the treaty. President Bush "unsigned" it. Other countries that have not ratified the treaty include China and Russia.

Pentagon officials said they are committed to keeping US forces engaged in UN peacekeeping operations, such as the one in Bosnia. They said the UN should grant peacekeepers immunity.

A-10 Pilot Killed in Crash

Capt. Robert I. Lopez, 32, was killed June 27 when the A-10 Thun-

Building Aerospace Expeditionary Forces for the Long Haul

USAF's 10 rotating Aerospace Expeditionary Forces were designed with steady-state peacetime operations in mind. They emphatically were *not* built to sustain the operational pace demanded since the Sept. 11 terrorist attacks.

This has happened before. In April 1999—when AEFs were being organized but before they had come officially into use—Air Force Secretary F. Whitten Peters said that roughly four AEFs' worth of assets had been deployed for Operation Allied Force over Kosovo. That, many noted, was a problem for a deployment concept based on using only two AEFs at a time.

The problem re-emerged this year under the stress of Operations Enduring Freedom and Noble Eagle, said Air Force officials. With no end to the war in sight, and with no letup in the Air Force's pre-existing commitments, the AEF concept could have been headed toward a breakdown.

However, the Air Force now has decided to strengthen the system by pumping in more resources. The service wants to make sure the system holds up in the harsh new post-Sept. 11 world.

"Obviously, with the dynamic situation you have in Afghanistan right now, requirements will continue to fluctuate," said Maj. Gen. Timothy A. Peppe, special assistant to the vice chief of staff for AEFs. "The bottom line is, we are happy with the way we've been able to do business with AEFs and I don't see us changing."

He went on, "We've discussed it at length the last couple of months," and after meeting with top leadership, "the bottom-line message is that everybody in the Air Force ... has got to understand that we are expeditionary. That is our business, and we have got to be ready to go—somewhere—at the drop of a hat."

Severely Strained

The unexpected demands have severely strained six Air Force career fields, in particular.

Security forces, the Office of Special Investigations, intelligence officers, civil engineers, enlisted aircrew members, and communications officials are considered the "most critical" shortages, according to service officials.

USAF is working to fill the shortages by constantly evaluating assignments and sending more new airmen into the stressed fields. The Air Force must match manpower and equipment with requirements so that certain airmen in high-demand areas are not deployed for half the year and so that certain capabilities are always available to the warfighting commanders.

The Air Force is working toward equal capability in each AEF, something the service does not yet enjoy because of shortages of some capabilities.

"There are things we have done in the F-16 community, for instance, both in the active and the [Guard and Reserve], to try to increase its capabilities, so that they can give us and the CINCs more flexibility as we're waging war," said Peppe. "The bottom line is: We're trying to make the 10 AEFs as equal as possible, across the board—from a capability point of view—not sheer numbers of people or machines."

Officials said airmen are supposed to deploy for only 90 days in any single 15-month period, but in some cases, certain Air Force members have been away from home bases up to 179 days.

The Stated Goal

"Our preference for these High-Demand, Low-Density assets is to try to not deploy them for more than 120 days," said Peppe. "That will be the stated goal. If the CINCs demand and the [Secretary of Defense] concurs, clearly some of those" might be used more.

For HD/LDs, said Peppe, "we need to make sure the training pipeline is as full as it can be, so that we man those particular assets to the authorizations that we've already given them."

"Making sure that the pipeline is open, sending them the right number of people, making sure that the training is available" is critical, he added. For some HD/LD assets, "we've gotten to the point a couple of times where we've adversely affected the training back home because we've had to use so many of those assets in their [primary warfighting] roles that we've not been able to keep the training going."

"As the Guard and Reserve demobilize, ... some of those numbers will go up even more," Peppe said. "Places

derbolt II he was flying crashed near the French Polygone Range on the French-German border.

Lopez was with the 81st Fighter Squadron, stationed at Spangdahlem AB, Germany. He was flying a tactical leadership program training mission at the time of the accident, said officials.

A board of USAF officials will investigate.

Pentagon Installs Dedication Capsule

Nine months after the terrorist-hijacked airliner slammed into the Pentagon, killing 184 people, officials set a dedication capsule in place in the restored west wall.

The capsule, which officials said is not meant to be opened, contains

items such as handmade cards and letters from schoolchildren, medallions from Pentagon leaders, patches from local firefighters and police, and a plaque listing the names of the 184.

It is a means to remember and memorialize the victims and recognize the rebuilding effort, said an official.

The niche that holds the capsule was capped with a block of limestone, one of the stones originally installed 60 years ago. Scorched by fire in the attack, the block had been retrieved from the ruins. It is inscribed with the date of the attack.

Pilot Error Caused F-16 Crash

Accident investigation board results released June 17 found that pilot er-

ror caused an F-16 to crash near Spangdahlem AB, Germany, March 20.

The board said that the pilot, Capt. Luke A. Johnson, failed to initiate missed-approach procedures as directed by the air traffic controller.

Johnson was killed when his F-16 crashed in a wooded area about two miles from the runway. He was on final approach following a night tactical-intercept training mission.

He was with the 52nd Fighter Wing at Spangdahlem.

DOD Seeks Attack Memorial Concepts

Defense Department officials announced a design competition for a memorial to honor those killed in the Sept. 11 Pentagon terrorist attack.

we are going to need some help" include intelligence and air traffic control, he said, while security forces "clearly are an issue."

A source of new personnel for regular deployment will be the Air Force's two Air Expeditionary Wings, based at Mountain Home AFB, Idaho and Seymour Johnson AFB, N.C. Until now, these two wings have backed up the regular AEFs, serving as on-call, rapid-reaction forces.

Spreading All the Assets

Now, said Peppe, the assets of these wings "will be spread out into the 10 AEFs," meaning each AEF will have more aircraft, airmen, and support. The AEW aircraft and personnel will be fully allocated to the 10 AEFs as of June 2003.

Combat support units from the AEWs have already been tasked to support the war on terror, Peppe said, but the units need to be more fully integrated into the AEF structure because they have been underutilized to date.

Peppe said about 175,000 airmen are postured for AEF deployments through unit type codes, which identify airmen by mission. The goal, he said, is to have "well over" 200,000 people postured for AEF deployments.

"I don't think that's going to be a problem," he said, noting that the entire Air Force headquarters staff in Washington, D.C., should become available for AEF deployment if necessary.

Most headquarters officers have skills needed at forward locations, said Col. John Vrba, chief of competitive sourcing and privatization, manpower, and organization. "Why can't the Pentagon share the pain?" asked Vrba. "We are going to make the people in the building" available for deployments so that the AEFs are not short-staffed, he said.

Many headquarters career fields have more uniformed officials than needed. For example, the service may have too many officers in the communications, personnel, and finance fields—jobs that civilians or contractors can also perform.

Shortly after Sept. 11, the Air Force took stock of its needs and identified about 30,000 new manpower requirements. "Almost half" involved security forces, according to Vrba.

Overall, 17 career fields are short-staffed. In some cases, said one USAF official, "it will take years to get them in balance again." The situation has actually improved since shortly after the terror attacks; force protection requirements have settled down somewhat.

The security forces shortage is declining and will probably settle in at "a few thousand," Vrba said. After the attacks, many Air Force installations went to force protection condition Charlie, which is a much more rigorous security level than the peacetime force protection condition Alpha.

"Long-Haul" Shortages

The Air Force career fields facing "long-haul" shortages are security forces, OSI, civil engineering readiness, fuels, firefighters, command post, power production civil engineering, liquid fuels civil engineering, transportation, combat control, intelligence, explosive ordnance detachments, communications, aerospace control and warning, pilots, air crews, and medical. The six most critical "functional areas" sometimes reach across these specific career fields.

Despite the challenges, "the decision was made last month to stick with 10 AEFs," Peppe said. "We looked at up to 15 different options, and we find no compelling need to change" to another construct, such as eight or 12 AEFs.

As of July 8, 9,900 airmen were still deployed to the Afghanistan region in support of Enduring Freedom, according to service officials. At home, there are combat air patrols, bases on "strip alert," and increased force protection levels.

The AEF construct has "offered predictability for our people, and hopefully we can make it even more predictable," Peppe said.

The cycles also allow the service to keep up with maintenance and repair schedules. According to installations and logistics officials, Air Force major commands and system program directors report that aircraft maintenance continues to be performed when and as required, whether it is at home station or deployed.

—Adam J. Hebert

Pilots Blamed in Canadian Deaths

The coalition investigation board reviewing the April 17 friendly fire incident near Kandahar, Afghanistan, that left four Canadian soldiers dead and eight others injured found that two USAF F-16 pilots were at fault.

The pilots failed "to exercise appropriate flight discipline, which resulted in a violation of the rules of engagement and an inappropriate use of lethal force," Marine Corps Lt. Gen. Michael DeLong, Central Command deputy commander, told reporters June 28.

He said the board also determined that failings within the pilots' immediate command structures were contributing factors.

The coalition board was co-chaired by Canadian Brig. Gen. Marc Dumais and USAF Brig. Gen. Stephen T. Sargeant, a veteran F-16 pilot.

A separate Canadian board also blamed the two pilots. However, in findings it released June 28, the Canadian board said the two pilots were not aware of a planned coalition live-fire exercise.

When asked about that conclusion, DeLong said he could not talk about the issue "because that's still part of an ongoing investigation." He added, "I can say that all pilots are briefed prior to every mission. ... They're briefed on the areas they fly in. And I'll just leave it like that."

However, the *Washington Times* reported July 18 that, just after the bomb struck, an Airborne Warning and Control Systems aircraft air controller told the pilot, "You're cleared. Self-defense."

The *Times* quoted what it said was a transcript of the actual communication.

"Can you confirm they were shooting us?" one of the pilot's asked the AWACS. The controller responded, "You're cleared. Self-defense."

This fact was not disclosed by US Central Command in June when it briefed reporters on the results of the investigation.

Charles Gittens, a defense attorney for one pilot, said that the transcript shows a command failure—that "neither the aircrew nor the AWACS were briefed about [the Canadians]" exercising in the area.

According to both boards, the Canadian soldiers were participating in nighttime live-fire training at the Tarnak Farms Range, which had formerly been used by al Qaeda forces for training. The two F-16s were returning from a mission when the flight lead noticed what he described as fireworks. He believed it to be surface-to-air fire (SAFIRE) and asked permission from an AWACS aircraft to pinpoint the exact coordinates.

The wingman asked for approval to fire his 20 mm cannon. The AWACS told him to stand by. Later, the AWACS asked for additional information on the SAFIRE, again telling him to hold fire. The wingman relayed the additional information and, at the same time, told the AWACS he was rolling-in in self-defense. The wingman released a 500-pound laser guided bomb. The bomb hit a Canadian firing position.

The Canadian board also revealed that the Canadian soldiers were firing a range of weapons, from personal side arms up to and including shouldered-fired anti-tank munitions. "Though visible from the air, the armament being employed was of no threat to the aircraft at their transit altitude," it said.

Press reports identified the F-16 pilots as members of the Air National Guard. Both pilots were made available to each board.

DeLong said the investigation reports were turned over to the Air Force "for disciplinary action as may be appropriate." The coalition board made disciplinary recommendations, but those were not revealed.

The competition closes Sept. 11 at 5 p.m. EDT.

The location for the planned memorial is a two-acre area near where the hijacked airliner hit the Pentagon. The Army Corps of Engineers worked with family members of victims to choose the site.

Competition rules are posted on the Web at <http://pentagonmemorial.nab.usace.army.mil>. Entrants may

also write to receive the rules: US Army Corps of Engineers Baltimore District, Public Affairs Office, PO Box 1715, Baltimore, MD 21203.

The competition calls for an artistic idea, not final blueprints. A panel of six sculptors, architects, and landscape architects will judge the entries.

Officials expect to dedicate the memorial by Sept. 11, 2003.

No Need To Cross-Train

The Air Force will no longer require its enlisted members who want to serve as first sergeants to cross-train from their current career fields. The change takes effect Oct. 1.

USAF initiated the change following a 15-month review, which found that the current system failed to meet service needs. Under the old rules, becoming a first sergeant of a unit meant an individual had to leave his primary career field permanently.

"We have 1,200 active duty first sergeant positions, and we are currently short 120 people," said SMSgt. Michael Gilbert, first sergeant career field manager.

Under the new rules, the job of first sergeant will be a special duty assignment. After a tour of three years, the individual would return to his functional specialty.

Gilbert said that a major goal of the change is to attract more senior enlisted members, some of whom may not have wanted to leave their career field permanently. "The program will help us deliberately develop some of the top enlisted leaders we will need in the future," he said.

SECAF Creates New Medal

Secretary of the Air Force James G. Roche authorized creation of the Air Force Campaign Medal to recognize significant direct contributions to wartime operations from outside the geographic area of operations.

It is meant to compensate for the DOD campaign medal, which is based on geography to define an area of combat operations.

"In light of the expeditionary aerospace force environment and the transformation in the way the Air Force carries out its missions today, such criteria doesn't allow us to appropriately recognize our people who contribute directly and significantly to the success of wartime campaigns from outside the area of combat operations," said Roche.

Roche also announced creation of two new Air Force awards.

The Gallant Unit Citation will recognize units for their significant combat heroism but at a level below that currently required for the Presidential Unit Citation.

The Meritorious Unit Award will honor units for outstanding achievement in direct support of combat operations.

USAF Museum Expands

Construction for a major expansion

The Defense Department Budget Bills at Mid-Year

Both Houses of Congress this summer passed authorization bills that essentially mirror the Bush Administration's \$396.8 billion Fiscal 2003 national defense budget request. (National defense includes funding for DOD and defense-related activities in the Department of Energy and several other agencies.)

Bush proposed the largest one-year boost in defense spending in two decades. It marked a real, after-inflation increase of more than \$41 billion.

The House version of the defense authorization legislation outlines a spending plan that is about \$10 billion less than the Bush request because it intends to handle funding for future war-on-terror activities in a separate bill.

The Senate version would authorize \$393.4 billion.

At issue during much of the debate in the Senate was \$7.8 billion for the Administration's missile defense system. Democrats wanted to cut \$814 million from missile defense and shift it to shipbuilding and heightened security at nuclear facilities.

Republicans pressed the President's case and won a compromise that would allow Bush to shift the amount cut from savings in other programs. Senators recommended that any savings go toward the war on terror, but they left the door open for Bush to return \$814 million to missile defense.

The House bill had included about \$15 million more than the President's request for the missile defense system. With the Senate's nod to the Administration, the final version produced by House and Senate conferees this month is almost certain to contain at least the figure requested originally by the President.

Another contentious issue—one that greatly concerns Air Force employees at air logistics centers—is the amount of work DOD can shift from its own depot workforce to contractors. In a 50–49 vote, Senate Republicans and two Democrats tabled an amendment from Sen. Edward M. Kennedy (D–Mass.) that would have made it more difficult for DOD to contract out work currently done by federal civilian employees.

The Administration also won the battle over the \$11 billion Crusader cannon. Despite a strong effort by senior Republicans from Oklahoma, where the Crusader would have been assembled, the Senate gave Defense Secretary Donald H. Rumsfeld approval to kill the program. The House authorizers left the door open but requested an analysis of alternatives. (The House defense appropriations bill, passed in late June, cut funding altogether.)

Personnel Issues

Both the House and Senate provided for a 4.1 percent military pay raise across the board, with up to 6.5 percent for certain grades.

Both Houses also increased the request for improvements to living and working facilities. The House authorized an additional \$425 million, the Senate about \$640 million.

The House bill would raise active duty end strength about 12,652 troops overall—10,352 more than the Administration request.

Under the Administration budget, the Air Force would have gained 200 positions. The House proposed boosting USAF by 1,995.

Although the Senate Armed Services Committee recommended staying with the Administration's personnel numbers, the full Senate passed an amendment by Sens. Max Cleland (D–Ga.) and John McCain (R–Ariz.) that would permit the military services to raise their manpower ceilings by 12,000. Unlike the House version, the amendment did not propose a way to actually fund the increase.

The issue of concurrent receipt, which has pitted veterans groups against the Bush Administration, got a limited boost. The Senate backed immediate 100 percent restoration of retired pay to military retirees who draw VA disability compensation, but it left the measure unfunded. On the other hand, the House proposed phasing in restoration over five years and then only for those with disability ratings of 60 percent or higher. It did fund its plan.

Neither plan may pass. The White House opposes both versions. To complicate matters further, while defense officials oppose concurrent receipt, they did not recommend that Bush veto the bill over the issue, but other Administration officials did.

Weapons Programs

Both the House and Senate matched the President's request of about \$5.2 billion for the F-22 air dominance fighter and \$3.5 billion for the F-35 strike fighter.

The hot issue of whether the Air Force should lease or buy new aerial refueling aircraft did not escape attention.

Senators included a provision that would prohibit Secretary of the Air Force James G. Roche from entering into a lease agreement for tankers until he produces a report Congress required in last year's defense legislation. Roche must also obtain authorization and appropriation of funds. The proposal is for lease of 100 Boeing 767s to be modified as tankers.

Roche has said all along that he would prefer to buy new tankers outright—the less expensive option according to various analysts—if he had the money. (See "Aerospace World: The Washington Tanker Wars," July, p. 15.)

Both Houses matched the President's request for \$3.7 billion to procure C-17 airlifters.

The House and Senate added funds the Administration did not request for installation of terrain awareness and warning systems on USAF C-130s. They also boosted the amount requested for upgrades to F-16s and added funds not requested to upgrade Air National Guard F-16s. Additionally, the House increased funds to upgrade ANG F-15s.

The House bill would increase by \$49 million the President's request for B-2 bomber upgrades. The Senate version added \$45.2 million for upgrades to both the B-2 and B-52.

In the space arena, the Senate reduced the Space Based Infrared System High by \$100 million because of significant cost and schedule problems and program restructuring. SBIRS High was one of six programs Pentagon acquisition chief Edward C. Aldridge certified in May is necessary to national security and can be kept within cost controls. It is intended as a replacement for the Defense Support Program ballistic missile early warning satellites.

The Senate added \$17 million to the Evolved Expendable Launch Vehicle program to reduce the launch integration risk for the first Wideband Gap-Filler satellite.

Overall, the House added \$4.6 billion to the Administration's request of \$68.7 billion for weapons procurement. The Senate added \$4.2 billion. Primarily these increases relate to accounting matters—placing some equipment purchases in different accounts. The most significant changes were the House increase for the Navy's CVN(X) aircraft carrier program (\$229 million) and the Senate increase for the Virginia-class submarines (\$415 million) and the F/A-18E/F programs (\$240 million).

House and Senate conferees are working this month on a final version of the Fiscal 2003 national defense authorization bill.

Administration Cites New Anthrax Vaccine Policy

Bush Administration officials from the Pentagon and Health and Human Services announced a new policy in which DOD would continue vaccinating troops in higher risk areas and stockpile some of the currently limited quantity of vaccine for domestic use.

The Pentagon had initiated a plan in 1998 to vaccinate all military members. Since then the program was reduced several times as the supply became increasingly scarce.

The sole US supplier, Bioport of Lansing, Mich., closed its production facility for renovations then had trouble regaining Food and Drug Administration approval. The FDA recertified the Bioport facility and its manufacturing processes in January 2002.

At a Pentagon press briefing on June 28, William Winkenwerder Jr., assistant secretary of defense for health affairs, said that the number of DOD personnel receiving vaccinations will increase from the current level. He would not specify a number.

"Our policy will be to vaccinate service members, essential civilians, and contractor personnel who are assigned or deployed for more than 15 days in higher-threat areas of the world, whose performance is essential for certain mission-critical capabilities," said Winkenwerder. The new policy will continue, he said, until more vaccine is available.

The Administration plans to stockpile about half the current production for emergency civil use. Winkenwerder said the amount could change, depending on threat conditions. He said Bioport is producing hundreds of thousands of doses per month.

He dismissed concerns about the safety of the vaccine. "It has a not-insignificant set of local reactions associated with it, but not different from things like typhoid vaccine, or influenza, or hepatitis A; it's in that same range of side effects." The local reactions include swelling, redness, and pain at the injection site. He added that the percentage of serious side effects "really is quite small."

DOD administered about 2.1 million doses of the vaccine to 525,000 service personnel. Out of those, the services reported only 441 members who refused vaccination.

Winkenwerder cited a March 6 National Academy of Sciences study that concluded the vaccine is safe and effective.

"As with any vaccine, there probably are a very, very small number of people who may have what one would call a serious reaction," he said.

The current vaccination schedule calls for a six-shot series, taken at the first day, two weeks, four weeks, six months, 12 months, and 18 months. Winkenwerder said those personnel who had already received some of the shots in the six-shot regimen would be able to pick up where they left off. "There is a level of immunity that's there that can be picked back up with the resumption of the series."

Service members who must take the vaccine will begin their shot series 45 days before deployment, so they will receive three of the six doses. The series would continue during their deployment.

On the civilian side, the Administration intends to use the stockpile as a post-exposure measure and provide a combination of vaccination and antibiotics. Once the supply of the vaccine improves, it might be offered in advance for first responders.

Officials also said DOD, HHS, and other federal agencies are working on a new generation anthrax vaccine that could potentially require fewer doses.

sion of the Air Force Museum began to take shape earlier this summer. The \$16.6 million addition to the Dayton, Ohio, facility is expected to be completed in time for next spring's centennial of flight celebration, according to officials.

The Air Force Museum Foundation is funding the expansion, which in-

cludes as its centerpiece a 200,000-square-foot third building. Follow-on phases will add a hall of missiles, a space gallery, and an education center.

Museum officials said the new building will house aircraft and exhibits from the Cold War to present day. They plan a massive movement of

display aircraft this fall to realign the flow of exhibits and aircraft into a more chronological format. They said the museum will remain open during construction and movement of displays, although some areas may be temporarily closed.

The new building will be called the Eugene W. Kettering Gallery to honor the first head of the foundation board of trustees.

Senate Wants Speicher Updates

The Senate tacked an amendment onto its Fiscal 2003 defense authorization bill that requires written reports every three months on measures taken to locate a Navy pilot shot down during the Gulf War.

Senators unanimously agreed the Bush Administration should do more to determine the fate of Lt. Cmdr. Michael S. Speicher.

Iraq has said it has no information about Speicher, but it formally offered earlier this year to allow a US team to investigate. Administration officials have said they plan to determine Speicher's true status, but critics say the Pentagon is dragging its feet.

The Pentagon initially reported the Navy pilot was killed in 1991 when his F-18 was shot down. However, last year, the Navy changed his status to missing in action, based on new information.

Earlier this year, Sen. Pat Roberts (R-Kan.), member of the Senate Select Committee on Intelligence, wrote to Defense Secretary Donald Rumsfeld, asking him to change Speicher's classification once again, this time to prisoner of war, based on intelligence reports that he might still be alive. Roberts had been instrumental in getting the pilot's status changed last year.

Sen. Bill Nelson (D-Fla.) said defense officials told him July 10 that Secretary of State Colin Powell likely will be responding to a three-month-old offer from Baghdad via a diplomatic note to be sent to Iraq through the International Committee of the Red Cross.

Nelson said, "We need to be skeptical of anything Iraq offers, but confirming whether they have new information about Commander Speicher is the right thing to do."

Nelson and Roberts were chief sponsors of the budget amendment.

Chinese Flying Close Again

Two Chinese fighters flew within 150 feet of a US Navy P-3 reconnaissance aircraft June 24, reported the *Washington Times*.

This was the first incident since a collision last year between a Navy EP-3 and a Chinese F-8. (See "The Last Flight of Wang Wei," July 2001, p. 51.)

In the June encounter, which occurred in international airspace near the Chinese coast north of Taiwan, two F-7 interceptors flew parallel to the P-3. They flew very close for several minutes.

One official called the intercept troubling. Another said intercepts since last year's collision are being handled with more professionalism by the Chinese. The June event was described as nonthreatening.

It took place as Peter W. Rodman, assistant defense secretary for international security affairs, was meeting with Chinese officials in Beijing. Rodman was there to explore a re-

sumption of military-to-military exchanges.

Creating a Third Force?

Defense officials have been pondering the right mix of active and reserve forces for some time, but the issue has been under sharper scrutiny lately with the heavy use of reserves in the war on terror.

The Defense Planning Guidance for 2004 has a requirement to study creation of a third force as a means to bridge the gap between active and reserve personnel.

Lt. Gen. James R. Helmly, the new chief of the Army Reserve, revealed the initiative in a meeting with reporters in late June.

Helmly said the concept is to create a force that would be part-time, like present reserves, but would

agree to deploy for a longer block of time, perhaps six months every two years. In return, the third-force members might receive more benefits and higher pay than typical reservists.

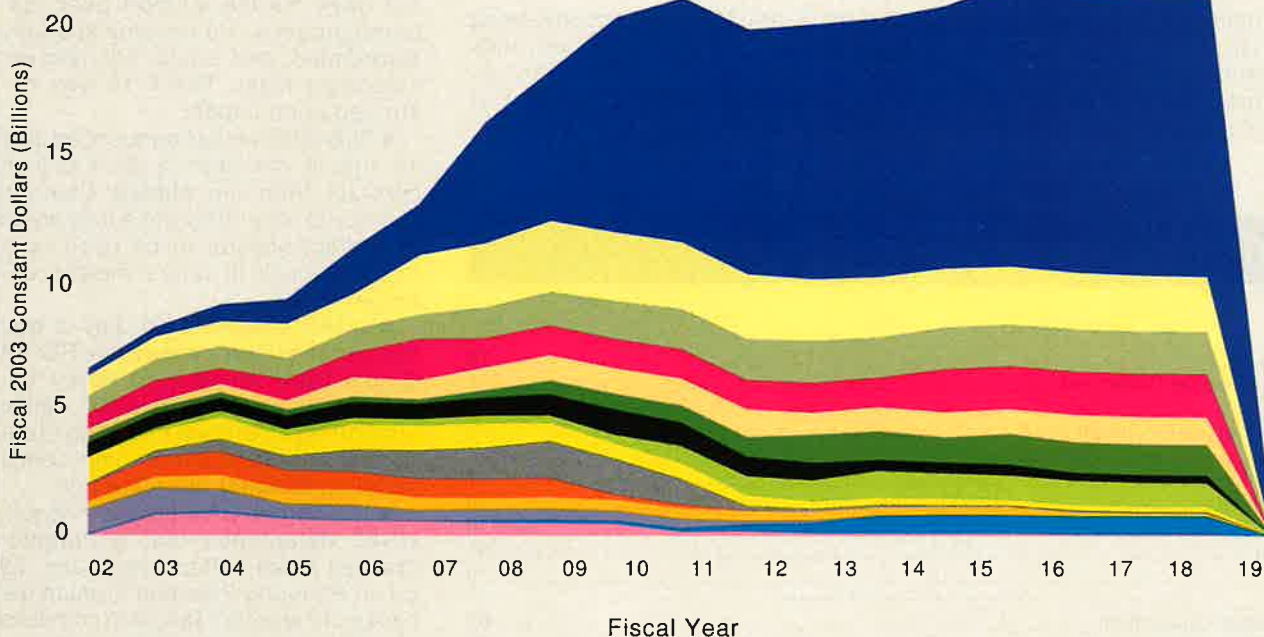
News Notes

■ Stephen A. Cambone, Defense Secretary Donald Rumsfeld's right hand man, moved from principal deputy undersecretary of defense for policy to serve as director of program analysis and evaluation. He will still report directly to Rumsfeld, according to a July 1 release.

■ The Administration proposed to NATO July 2 that the US leave the position of Supreme Allied Commander, Atlantic vacant when the current commander, Army Gen. William F. Kernan, retires in October.

Rumsfeld's "Bow Wave" Chart on the Army's Top Investment Programs

This briefing chart, used by Defense Secretary Donald Rumsfeld in a May 16 hearing of the Senate Armed Services Committee, shows where the Army expected to spend its investment money over the next two decades. As one can see, the Crusader artillery piece accounted for only a small portion of the total. The largest part of the "bow wave"—cited by Rumsfeld as a major future problem—can be attributed to the new Future Combat System.



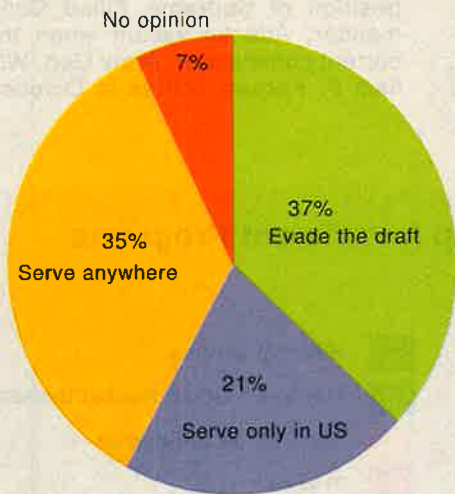
Would More Than One-Third Shirk a Draft?

According to a poll released June 20, 37 percent of college students would evade a military draft if one were reinstated.

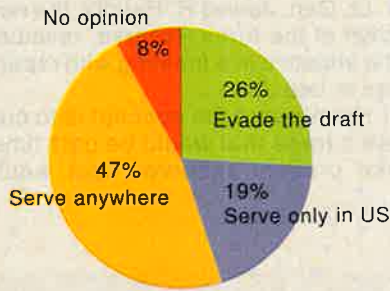
More men than women said they would comply with a draft call. Men indicated they'd be more willing to serve anywhere, while women were split on whether they'd serve anywhere or just in the US.

The nationwide survey of 634 students at 96 four-year schools was conducted by Republican pollster Frank Luntz for the Americans for Victory Over Terrorism.

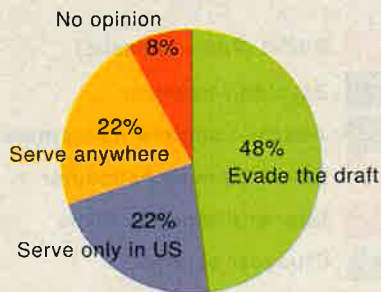
All College Students



Men



Women



Kernan holds the SACLANT post as part of his Joint Forces Command assignment. JFCOM lost its geographic area responsibility under the Pentagon's Unified Command Plan

revision, and NATO is also reviewing its overall command structure. Vice Adm. Edmund P. Giambastiani Jr. was nominated to replace Kernan at JFCOM.

■ The Chinese government said last month that it will permit the US to search for the remains of two American pilots who died nearly 50 years ago when their airplane crashed during a CIA spy mission. The Pentagon said an eight-member team from the Army's identification lab in Hawaii would conduct the search.

■ In Joint Strike Fighter news, the Pentagon said July 11 that Turkey had signed a \$175 million partnership package, making it the seventh nation to join the US in development of the JSF. On June 24, Italy, which plans to invest \$1.03 billion, became the sixth to join and the second largest partner. Norway signed an agreement June 20, becoming the fifth country to participate.

■ BAE Systems announced July 2 that Austria had selected the Eurofighter for its air force and will purchase 24 of the new aircraft.

■ The White House announced June 27 that retired Air Force Gen. John A. Gordon replaced retired Army Gen. Wayne A. Downing on the National Security Council as the President's point man for combating terrorism.

■ World military spending grew by two percent last year, according to the Stockholm International Peace Research Institute. They estimated the total spending at \$839 billion.

■ USAF officials said June 17 that an Air National Guard F-16 pilot caused his aircraft to crash near Atlantic City, N.J., on Jan. 10 by failing to "accurately perform standard flight procedures while rejoining other aircraft." The pilot, who ejected and received only minor injuries, also did not have his life support gear fastened properly. He became spatially disoriented and could not recover controlled flight. The F-16 was destroyed upon impact.

■ Orbital Sciences announced July 11 that it had won a \$7.4 million contract from the Missile Defense Agency to fully integrate a new liquid propellant booster to be used as a target vehicle in future missile defense tests.

■ USAF officials said July 3 that structural failure caused an RQ-4A Global Hawk Unmanned Aerial Vehicle to crash Dec. 30, 2001, while supporting Operation Enduring Freedom. The culprit was an improperly installed actuator nut plate bolt.

■ In another UAV accident report, USAF determined that a Predator crashed shortly after takeoff Jan. 22 on an Enduring Freedom mission because of the crew's failure to complete checklist items in the proper order.

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■ A five-person Air Force security forces team beat 20 other teams in its first appearance at the Energy Department/National Nuclear Security Administration security police officer training competition in June. The USAF team: TSgts. Timothy Arnold (Scott AFB, Ill.) and Joseph Provo (McChord AFB, Wash.) and SSgts. Louis Buck and Cesar Ochoa (F.E. Warren AFB, Wyo.) and Anthony Fleming (Kirtland AFB, N.M.).

■ The 71st Fighter Squadron, Langley AFB, Va., won the 2001 Raytheon Hughes Achievement Award, proclaiming them the best air defense unit in the Air Force, for the third time in less than 10 years, stated a USAF release.

■ DOD, VA, and Centers for Disease Control and Prevention announced the launch of a Web site June 18 called Medsearch (www.GulfLINK.osd.mil/medsearch). It is a central repository of Gulf War-related medical research.

■ USAF announced the top controllers for 2001 in a Pentagon ceremony June 17. They were Capt. Matthew Davidson (Pope AFB, N.C.), MSgt. Bart Decker (Hurlburt Field, Fla.), TSgt. Mario Marcoccia (Pope), and SrA. Jose Navarez (Hurlburt).

■ The Air Force selected 2,175 officers who met the calendar 2002A board for promotion to major. The selection rate for line officers was

88.6 percent. For the judge advocate general corps, it was 87.1 percent; nurse corps, 73.6 percent; medical service corps, 89.7 percent; biomedical sciences corps, 87.8 percent.

■ USAF personnel won 11 first-place honors in the 2001 DOD Thomas Jefferson Awards competition for print and broadcast journalists. Among the Air Force winners was SSgt. Michael Noel, Air Force News Agency, San Antonio, named DOD broadcast journalist of the year.

■ Vandenberg AFB, Calif., successfully launched a Titan II booster June 24. It carried a National Oceanic and Atmospheric Administration weather satellite into orbit. Vandenberg now has only two Titan II launch vehicles remaining; they are scheduled for launch by January 2003.

■ A 4th Special Operations Squadron AC-130 gunship from Hurlburt Field, Fla., helped local officials find two 19-year-olds stranded in a bay near Pensacola, Fla., after their jet ski quit working June 13. It was about 10:30 p.m. when the gunship, which was already in the air heading for a training range, got the request. After about 2.5 hours, the infrared sensor operator spotted the teenagers.

■ USAF selected 6,340 out of 19,081 eligible technical sergeants for promotion to master sergeant, for a selection rate of 33.23 percent. The service selected 11,571 of 34,530

eligible staff sergeants for promotion to technical sergeant, a 33.51 percent rate. The master sergeant rate dropped about 5.75 percent from last year, while the tech sergeant rate was comparable to last year's rate.

■ MSgt. Mike Barber, assigned to NORAD at Peterson AFB, Colo., won second place in the Masters National Powerlifting Championships held in June at Charlottesville, Va. At 5 foot 6 inches and 198 pounds, Barber almost claimed first, but a torn bicep limited his bench press to 425 pounds. That left his 675-pound squat and 650-pound dead lift to carry the day.

■ Air Force Reserve Command transferred its first sergeant training from Robins AFB, Ga., to the First Sergeant Academy at Maxwell AFB, Ala. The academy now trains all Air Force first sergeants—active, Air National Guard, and AFRC.

■ The Joint Air-to-Surface Stand-off Missile System Program, led by the Air Force, received the David Packard Excellence in Acquisition Award June 18 for its innovative teaming arrangements with industry and government that provided the missile in one-third the time and at half the unit price of comparable programs, announced a DOD release.

■ The Federal Long-Term Care Insurance Program, available to military members, federal employees, and their spouses, opened a six-month window July 1 for a streamlined application process. The insurance is offered by John Hancock and MetLife insurance companies through a contract with the Office of Personnel Management. Open season information kits and application instructions are available on the Web (www.ltcfeds.com) or by calling 1-800-582-3337 (TDD: 1-800-843-3557).

■ The Air Force selected eight NCOs, all from the communications and information career field, for master's degree programs starting this month. Five will study computer science, two will study electrical engineering, and one will study information systems management. They were CMSgt. Donald J. Clabaugh; SMSgts. Stephanie E. Carroll and Francis Szabo; and MSgts. Charlie Cruz, James B. Kuntzelman, Edward A. Mathews, Duane C. Sorgaard, and Daniel E. Swayne.

■ USAF announced that the director of manpower and organization realigned July 1 under the deputy chief of staff for personnel. The move leads the way for a service-wide merger of the manpower and personnel career fields. ■

Senior Staff Changes

NOMINATION: To be **Brigadier General:** Frederick F. Roggero.

RETIREMENTS: Maj. Gen. Robert J. Courter Jr., Maj. Gen. Gary R. Dylewski, Maj. Gen. Lawrence D. Johnston, Brig. Gen. James W. Morehouse.

CHANGES: Gen. Ralph E. Eberhart, from CINC, NORAD and SPACECOM, Peterson AFB, Colo., to CINC, NORAD and NORTHCOM, Peterson AFB, Colo. ... Brig. Gen. (sel.) Gregory J. Ihde, from Cmdr., 52nd FW, USAFE, Spangdahlem AB, Germany, to Dir., Air Component Coordinating Element, Bagram, Afghanistan ... Brig. Gen. John C. Koziol, from Vice Cmdr., 8th AF, ACC, Barksdale AFB, La., to Dep. Dir., ISR, DCS, Air & Space Ops., USAF, Pentagon ... Brig. Gen. (sel.) Michael N. Madrid, from Cmdr., AF Legal Services Agency, Bolling AFB, D.C., to Staff Judge Advocate, AFMC, Wright-Patterson AFB, Ohio ... Maj. Gen. Michael C. Mushala, from Spec. Asst. for Transformation, AFMC, Wright-Patterson AFB, Ohio, to Dir., Rqmts., AFMC, Wright-Patterson AFB, Ohio ... Brig. Gen. Peter U. Sutton, from Cmdr., 12th FTW, AETC, Randolph AFB, Tex., to Dir., Personnel Force Dev., DCS, Personnel, USAF, Pentagon ... Brig. Gen. Richard E. Webber, from Dep. Dir., Ops., AFSPC, Peterson AFB, Colo., to Dir., Comm. & Info. Sys., AFSPC, Peterson AFB, Colo.

SENIOR EXECUTIVE SERVICE RETIREMENTS: Thomas F. Bachman, Otha B. Davenport.

SES CHANGES: Elizabeth T. Corliss, to AF Faculty Advisor, Federal Executive Institute, Charlottesville, Va. ... Richard M. McCormick, to Spec. Asst. to Dir., DARPA, Arlington, Va. ... Thomas J. Robillard, to Dir., Counterair Jt. Sys. Prgm. Office, Air Armament Ctr., AFMC, Eglin AFB, Fla. ■

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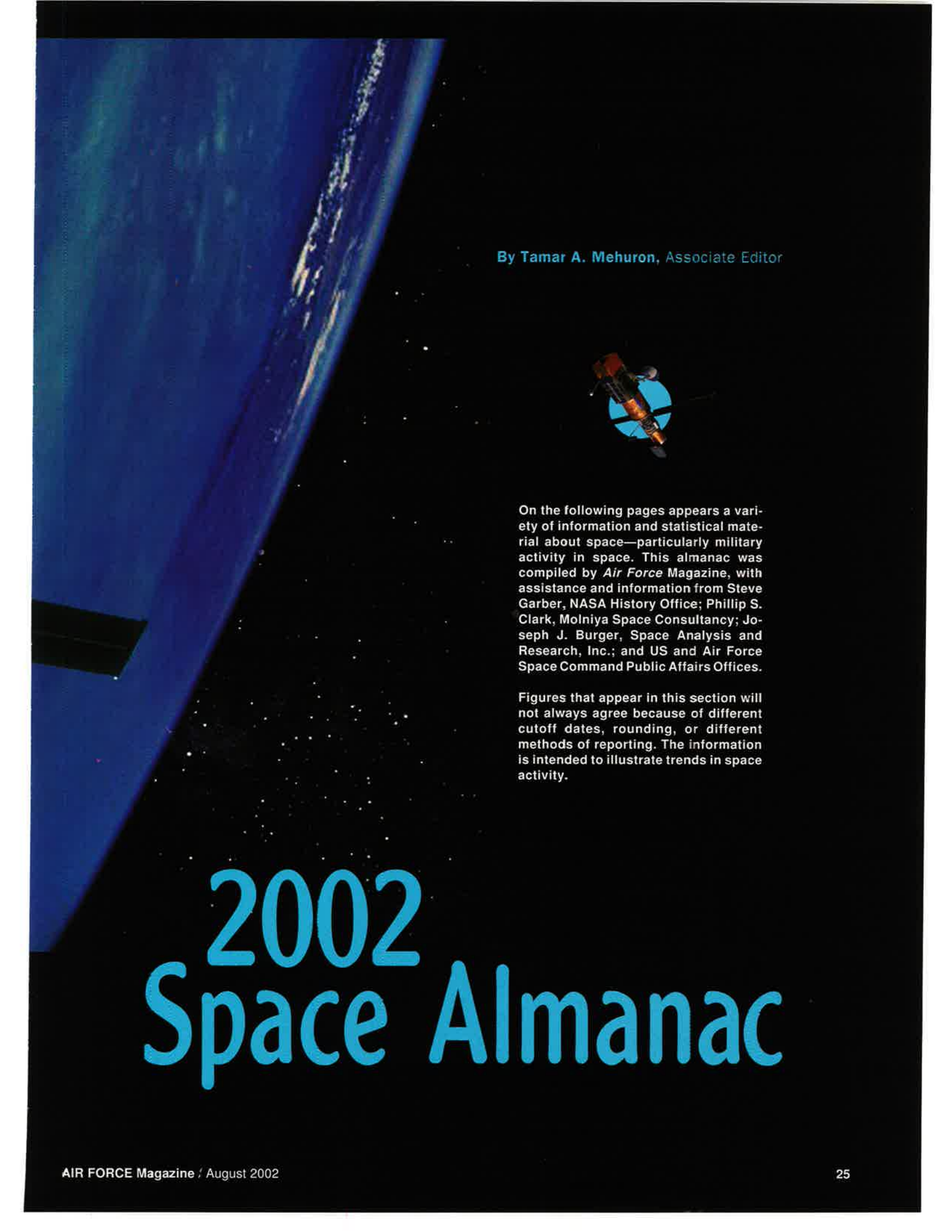
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Artist's concept by Erik Simonsen

The spacecraft depicted in this artist's concept represents a generic electronic intelligence-gathering satellite.



By Tamar A. Mehuron, Associate Editor

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 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.

2002 Space Almanac

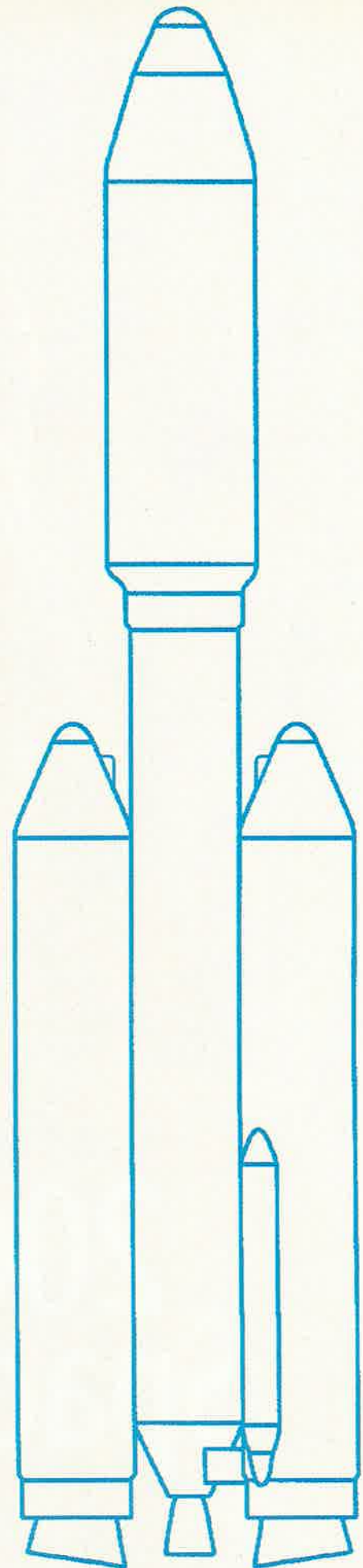


Introduction

What's Up There

As of May 31, 2002

Country/Organization	Satellites	Space Probes	Debris	Total
CIS (Russia/former USSR)	1,336	35	2,507	3,878
USA	878	46	2,815	3,739
People's Republic of China	34	0	299	333
European Space Agency	32	2	282	316
India	22	0	175	197
Japan	72	5	48	125
Intl. Telecom Sat. Org.	60	0	0	60
Globalstar	52	0	0	52
France	33	0	14	47
Orbcomm	35	0	0	35
United Kingdom	21	0	1	22
Germany	18	2	1	21
European Telecom Sat. Org.	20	0	0	20
Canada	17	0	0	17
Italy	11	0	3	14
Luxembourg	13	0	0	13
Brazil	10	0	0	10
Sweden	10	0	0	10
Australia	7	0	2	9
Indonesia	9	0	0	9
Intl. Maritime	9	0	0	9
NATO	8	0	0	8
Arab Sat. Comm. Org.	7	0	0	7
Sea Launch (Launch Demo)	1	0	6	7
South Korea	7	0	0	7
Mexico	6	0	0	6
Argentina	5	0	0	5
Spain	5	0	0	5
Czech Republic	4	0	0	4
Intl. Space Station	1	3	0	4
Thailand	4	0	0	4
Turkey	4	0	0	4
Asia Sat. Telecom Co.	3	0	0	3
Israel	3	0	0	3
Malaysia	3	0	0	3
Norway	3	0	0	3
Egypt	2	0	0	2
France/Germany	2	0	0	2
Philippines	2	0	0	2
Saudi Arabia	2	0	0	2
Chile	1	0	0	1
China/Brazil	1	0	0	1
Denmark	1	0	0	1
Nico	1	0	0	1
Pakistan	1	0	0	1
Portugal	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
South Africa	1	0	0	1
UAE	1	0	0	1
Total	2,782	93	6,153	9,028



Worldwide Orbital Launch Sites, 1957–2001

Launch Site	Owner	Total
Plesetsk	Russia	1,526
Tyuratam/Baikonur, Kazakhstan	Russia	1,176
Vandenberg AFB, Calif.	US	617
Cape Canaveral AFS, Fla.	US	575
Kourou, French Guiana	ESA	155
JFK Space Center, Fla.	US	127
Kapustin Yar	Russia	101
Xichang	China	33
Tanegashima	Japan	32
Kagoshima	Japan	30
Wallops Flight Facility, Va.	US	30
Shuang Cheng-tsu/Jiuquan	China	28
Edwards AFB, Calif.	US	20
Sriharikota	India	15
Taiyuan	China	13
Indian Ocean Platform	US	9
Pacific Ocean Platform	Sea Launch	7
Woomera, Australia	Australia	5
Hammaguir, Algeria	France	4
Palmachim	Israel	4
Svobodny	Russia	4
Alcantara	Brazil	2
Barents Sea	Russia	1
Kodiak, Alaska	US	1
Kwajalein, Marshall Islands	US	1
Musudan ri	North Korea	1
Gando AB, Canary Islands	Spain	1
Total		4,518

Space on the Web

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

Defense

	Web address
US Space Command	www.spacecom.mil
Air Force Space Command	www.spacecom.af.mil/hqafspc
21st Space Wing	www.spacecom.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

Boeing Space Systems	www.boeing.com/defense-space/space
Lockheed Martin Astronautics	www.ast.lmco.com
Orbital Sciences	www.orbital.com
TRW	www.trw.com

NASA

Integrated Launch Schedule (Launch forecast for shuttle and NASA payloads on ELVs)	www-pao.ksc.nasa.gov/kscpao/schedule/mixfleet.htm
Jet Propulsion Laboratory	www.jpl.nasa.gov
Mars Global Surveyor	mars.jpl.nasa.gov/mgs
NASA Human Spaceflight	spaceflight.nasa.gov
Space Center Houston	spacecenter.org

Other

European Space Agency	www.esa.int
Florida Today (Current and planned space activity)	www.flatoday.com/space
Space and Technology	www.spaceandtech.com
Quest: The History of Spaceflight Quarterly	www.spacebusiness.com/quest

Space and Missile Badges



Space/Missile Badge



Astronaut Pilot*



Missile Badge



Missile Badge with Operations Designerator

*The astronaut designerator 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 designerator on the wings.



The Year in Space

July 13, 2001

AFSPC announces Schriever AFB, Colo., as the site of the Space Based Infrared System mission control backup station. The main SBIRS mission control station will be at Buckley AFB, Colo. The Schriever SBIRS backup station is expected to achieve initial operational capability in Fiscal 2005.

July 14

In a missile defense test, a Minuteman ICBM prototype interceptor, launched from the Ronald Reagan Missile Site, Kwajalein Atoll, in the Pacific Ocean, successfully targets and destroys an unarmed Minuteman II ICBM launched from Vandenberg AFB, Calif., about 20 minutes earlier. The test is to support the Ground-based Midcourse Defense Segment, formerly called the National Missile Defense program.

Aug. 10–Sept. 7

The 527th Space Aggressor Squadron from Schriever Air Force Base participates for the first time in the annual Red Flag warfighting exercise. Acting as an adversary, the unit uses electronic warfare equipment carried on a truck to jam Global Positioning System satellite signals. The loss of GPS signals so hampers search-and-rescue efforts for “downed” airmen that the truck is targeted and “destroyed” by an F-16.

Aug. 24

Russian Space Forces launch a classified military satellite, Kosmos 2379, into orbit aboard a Proton-K rocket from the Baikonur Cosmodrome in Kazakhstan.

Sept. 29

An Athena I rocket launches one NASA and three military research satellites into polar orbit from the Kodiak Launch Complex in Alaska. It is the first orbital launch from Kodiak, which earlier had successfully conducted three Air Force missile tests on suborbital missions.

Oct. 1

The Space and Missile Systems Center at Los Angeles AFB, Calif., realigns from Air Force Materiel Command to Air Force Space Command—folding space procurement and operations activities into one organization. The realignment fulfills one of several recommendations of the Space Commission.

Oct. 9

Space Launch Complex 37 at Patrick AFB, Fla., is completed and ready for the new Boeing Delta IV, part of USAF's Evolved Expendable Launch Vehicle program.

Oct. 10

Vandenberg Air Force Base launches its third National Reconnaissance Office spy satellite in two months.

Oct. 25

Russian Space Forces launch a Molniya-M military communications satellite into orbit from the northern cosmodrome in Plesetsk, Russia.

Nov. 9

A rocket fired from Alaska's Kodiak Launch Complex as part of the missile defense program is destroyed just seconds after liftoff when launch officials lose telemetry data and data transmission.

Nov. 10

Maxwell W. Hunter, 79, dies. He led the design of the Nike anti-aircraft missile and later oversaw development of the Thor intermediate-range ballistic missile. The Thor evolved into the Delta rocket, still used to lift payloads into orbit.

Dec. 1

Russia launches three military navigation satellites to resupply its global positioning constellation, the GLONASS network.

Dec. 13

Peter B. Teets is sworn in as undersecretary of the Air Force and director of the National Reconnaissance Office. The dual tasking was a Space Commission recommendation, as was making Teets the Air Force acquisition executive for space. The Air Force was named DOD executive agent for space in May 2001.

Jan. 8, 2002

Secretary of Defense Donald H. Rumsfeld announces that the Ballistic Missile Defense Organization is now the Missile Defense Agency.

Jan. 15

A Titan IVB rocket blasts off from Cape Canaveral AFS, Fla., and inserts a Milstar 2 satellite into orbit 22,300 miles above the equator. The new military communications satellite cuts the transmission of air tasking orders from one hour to just six seconds. The transmission of images the size of an 8X10 picture will no longer take 22 hours, but just two minutes.

Feb. 11

A Boeing Delta II rocket launches from Vandenberg Air Force Base, placing five Iridium communications satellites into orbit. They join 73 other Iridium satellites operating in Low Earth Orbit. DOD is a key customer, with a \$72 million contract for Iridium's global mobile phone system services.

March 15

The Missile Defense Agency achieves a fourth successful intercept in six attempts when an ICBM target launched from Vandenberg Air Force Base is intercepted by a prototype interceptor launched from the Ronald Reagan Missile Site, Kwajalein Atoll, in the Pacific Ocean.

March 18

Media reports reveal that NASA will not disclose launch times for the space shuttle until 24 hours in advance, as a security precaution against terrorist attack.

March 22

Officials approve the appointment of Robert S. Dickman, a retired Air Force major general, as the deputy for military space, a new office established by Teets, undersecretary of the Air Force, as he revamps the national security space apparatus.

March 25

China launches its third unmanned spacecraft, Shenzhou III. The craft is boosted into orbit from the Jiuquan launch center in the northwestern province of Gansu aboard a Long March II-F rocket. China plans manned spaceflights by 2005 and hopes to put a man on the Moon.

April 17

DOD announces Unified Command Plan revisions, one of which realigns NORAD from US Space Command to a new entity chartered with homeland defense and called US Northern Command. The head of NORTHCOM will also serve as head of NORAD.

April 19

Gen. Lance W. Lord becomes commander of Air Force Space Command. The position was boosted to four-star level and separated from US Space Command, following a Space Commission recommendation. Since March 1992 the commander in chief of SPACECOM had also served as commander of AFSPC.

April 26

Lord announces that AFSPC officials are developing a space concepts of operation to identify capabilities for the future. The concepts will address six key areas: command and control for space forces; space situational awareness; global information services such as weather and mapping; global surveillance, tracking, and targeting; rapid global strike; and space control (counterspace).

May 1

The last Titan IVB to be launched from Cape Canaveral Air Force Station arrives at the station. The Cape's last Titan IVB launch is scheduled for 2003.

May 2

The last Titan IVB to be launched from Vandenberg Air Force Base arrives at the base and is scheduled for launch in 2005. After that, payloads in the 10,000-lb. class will be boosted using either the Boeing Delta IV or Lockheed Atlas V, both part of USAF's EELV program.

May 28

Israel launches a military spy satellite, Ofek 5, to fill a year-long gap in intelligence coverage. It follows the failed 1998 launch of Ofek 4 and the loss of Ofek 3 last year. The new satellite will focus its cameras on Syria, Iraq, and Iran, according to media reports.

June 26

Defense Secretary Rumsfeld announces the merger of US Space Command, headquartered at Peterson AFB, Colo., and US Strategic Command, headquartered at Offutt AFB, Neb. The new command, which is likely to reside at Offutt, will handle both early warning of and defense against missile attack, as well as long-range conventional attacks.



Military & Civilian Space Budgets

US Space Funding, Current Dollars

(Millions, as of Sept. 30, 2001)

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	4,074	2,443	211	6,728
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	1,073	28,703
Total	\$291,695	\$307,822	\$17,697	\$617,214

US Space Funding, Constant Dollars

(Millions, as of Sept. 30, 2001)

FY	NASA	DOD	Other	Total
1959	\$1,275	\$2,395	\$166	\$3,836
1960	2,215	2,689	206	5,110
1961	4,397	3,866	323	8,586
1962	8,420	6,082	932	15,435
1963	16,783	7,174	1,190	25,147
1964	22,946	7,315	974	31,235
1965	23,203	7,108	1,088	31,400
1966	22,490	7,500	950	30,940
1967	20,567	7,086	907	28,559
1968	18,654	8,093	734	27,480
1969	15,520	8,174	692	24,385
1970	13,790	6,524	548	20,861
1971	11,442	5,579	598	17,619
1972	10,772	4,935	468	16,176
1973	10,349	5,431	493	16,273
1974	8,827	5,650	506	14,983
1975	8,708	5,652	471	14,831
1976	11,068	6,637	574	18,279
1977	8,433	5,913	474	14,820
1978	8,517	6,436	531	15,484
1979	8,871	6,683	546	16,100
1980	9,557	7,858	472	17,886
1981	9,387	9,078	441	18,905
1982	9,482	11,456	536	21,475
1983	10,160	14,480	525	25,165
1984	10,538	15,665	607	26,810
1985	10,257	18,911	865	30,032
1986	10,279	20,265	684	31,227
1987	13,744	22,821	653	37,218
1988	11,360	24,133	1,012	36,504
1989	13,353	23,679	741	37,773
1990	14,590	19,881	644	35,115
1991	16,002	17,394	947	34,342
1992	15,603	17,759	943	34,305
1993	15,103	16,308	845	32,257
1994	14,683	14,845	713	30,242
1995	13,825	11,732	836	26,393
1996	13,567	12,428	894	26,889
1997	13,192	12,419	836	26,447
1998	12,830	12,869	874	26,573
1999	12,810	13,575	1,010	27,394
2000	12,708	13,134	1,071	26,914
2001	13,304	14,326	1,073	28,703
Total	\$533,579	\$471,938	\$30,592	\$1,036,108

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; the National Science Foundation; and the Environmental Protection Agency (only through 1998). (Note: NSF recalculated its space expenditures since 1968, making them significantly higher in some years than previously reported.) Fiscal 2001 figures are preliminary.



People & Organizations

Space Leaders

(As of July 1, 2002)

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–

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 (acting)	May 24, 1988–July 11, 1988
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	March 28, 2001–April 30, 2001
Lt. Gen. Joseph M. Cosumano Jr.	April 30, 2001–

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

National Reconnaissance Office

Joseph V. Charyk	Sept. 6, 1961–March 1, 1963
Brockway McMillan	March 1, 1963–Oct. 1, 1965
Alexander H. Flax	Oct. 1, 1965–March 11, 1969
John L. McLucas	March 17, 1969–Dec. 20, 1973
James W. Plummer	Dec. 21, 1973–June 28, 1976
Thomas C. Reed	Aug. 9, 1976–April 7, 1977
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 Space Command

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

USECAF/DNRO Organization

(As of July 1, 2002)

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

Deputy for Military Space
Robert S. Dickman

Deputy Director of NRO
Dennis Fitzgerald

Director of Air Force Space Acquisition
Maj. Gen. Joseph B. Sovey

Program Executive Officer for Air Force Space
Lt. Gen. Brian A. Arnold

Director of National Security Space Integration
Maj. Gen. Franklin J. Blaisdell

National Security Space Architect
Brig. Gen. Stephen J. Ferrell, USA

Air Force Space Command, Peterson AFB, Colo.

(As of July 1, 2002)

Commander
Gen. Lance W. Lord

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

Defense Meteorological Satellite System Program Office
Launch Programs SPO
Advanced Systems SPO
Satellite and Launch Control SPO
Space Based Laser Project Management Office
Space & Missile Test & Evaluation Directorate, Kirtland AFB,
N.M.

Space Warfare Center
Schriever AFB, Colo.
Cmdr.: **Brig. Gen. Douglas M. Fraser**

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.

20th Air Force
Hq., F.E. Warren AFB, Wyo.
Cmdr.: **Maj. Gen. Timothy J. McMahon**

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	FY03 Budget	Functions
US Space Command Peterson AFB, Colo.	844	\$87.3 million	Coordinates the use of Air Force, Army, and Navy space forces to provide space support, force enhancement, space control, force application, computer network defense, computer network attack, and information operations.
Service Commands			
Air Force Space Command Peterson AFB, Colo.	37,400	\$8.0 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 Space Command Dahlgren, Va.	475	\$101.4 million	Operates assigned space systems for surveillance and warning; provides spacecraft telemetry and on-orbit engineering; develops space plans, programs, concepts, and doctrine; advocates naval warfighting requirements in the joint arena.
Army Space Command Colorado Springs, Colo.	650	\$59.0 million	Manages joint tactical use of DSCS; operates space support teams; operates Joint Tactical Ground Stations for missile early warning to deployed forces; acts as Army focal point for terminal missile defense system; manages Army astronaut program.

National Imagery and Mapping Agency (NIMA)

Headquarters: Bethesda, Md.
 Established: Oct. 1, 1996
 Director: James R. Clapper Jr.

Mission, Purpose, Operations

Provide timely, relevant, and accurate imagery intelligence and geospatial information to support national security objectives. This DOD-chartered combat support agency is also a member of the Intelligence Community.

Structure

Major facilities in Virginia, Maryland, Washington, D.C., and Missouri, with the National Geospatial Intelligence College located at Ft. Belvoir, Va. Also, customer support teams and technical representatives stationed around the world at major customer locations.

Personnel

Classified.

Central Intelligence Agency (CIA)

Headquarters: McLean, Va.
 Established: 1947
 Director: George J. Tenet

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.

This photo from Corona, the first US photoreconnaissance satellite program, shows an airfield in the Soviet Union in August 1960.

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 four deputy directors for resources, oversight, and management; national support; military support; and systems engineering. Three offices and four directorates report up to the level of the director. Offices are management services and operations, human resources, and space launch. Directorates are signals intelligence systems acquisition and operations, communications systems acquisition and operations, imagery systems acquisition and operations, and advanced systems and technology.

Personnel

Staffed by CIA (40 percent), USAF (50 percent), Navy/Marines (9 percent), Army (2 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

Classified.

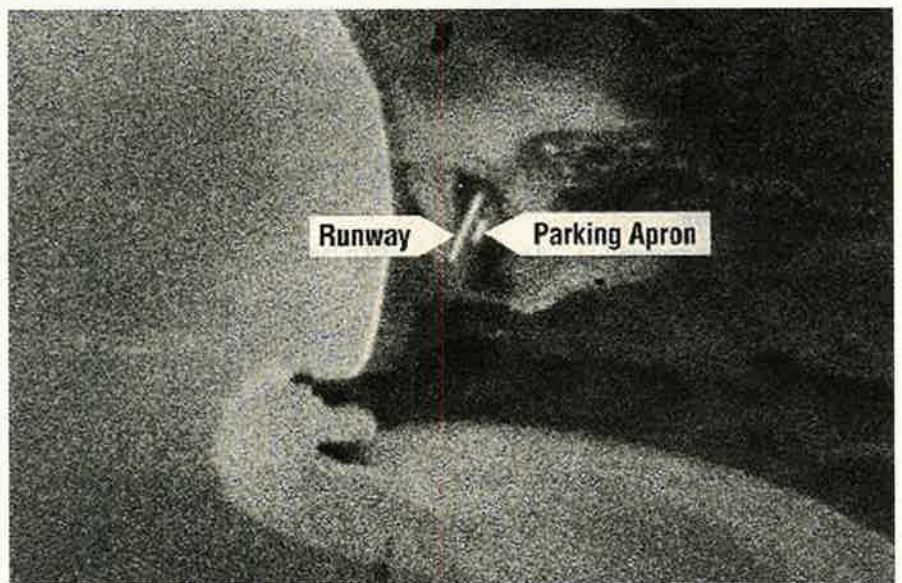


Photo courtesy National Reconnaissance Office



Space Operations

US Space Launch Sites

Military Sites (Orbital)

Cape Canaveral AFS, Fla.

Location: 28.5° N, 80° W. USAF's East Coast launch site.

Mission/operations: 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: 575.

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 it became Cape Canaveral Air Force Station again in 1974.

Acres: 15,700.

Vandenberg AFB, Calif.

Location: 35° N, 121° W. USAF's West Coast launch site.

Mission/operations: Satellite (weather, remote sensing, navigation, communications, and reconnaissance) launches 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: 617.

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: 99,099.

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.

Status: Construction of Kodiak Launch Complex is complete. Funding secured by Alaska Aerospace Development Corp., Alaska's spaceport authority. Complex designed for all indoor processing of payload and launch vehicles.

Launches: Four.

Launch vehicles: Athena I, suborbital.

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 and 41 and manages a multiuser launch control facility, space experiments research and processing laboratory, and other facilities.

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: 127.

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).

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: Seven.

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 1 million pound thrust; payload processing facility for small and heavy satellites.

Launches: Two.

Launch vehicles: MM II-Delta III class.

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

Virginia Space Flight Center

Location: 38° N, 76° W (south end of Wallops Flight Facility).

Mission/operations: State-owned, commercially operated launch facility 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: DynSpace Corp.

Launches: 12 (since 1995).

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

Wallops Flight Facility, Va.

Location: 38° N, 76° W.

Mission/operations: East Coast launch site for Orbital Sciences' Pegasus and DOD missions.

Launches: 30.

Launch vehicles: Pegasus.

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

Acres: 6,166.

Note: Launches 1957–2001, except where noted.

Military Functions in Space

Communications

Provide communications from national leaders to Joint Force Commander. Provide communications from JFC to squadron-level commanders. Permit transfer of imagery and situational awareness to tactical 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 Space 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

Operate GPS network. Enable commanders to determine precise locations of friendly and enemy forces and targets. Permit accurate, timely rendezvous of combat forces. Map minefields and other obstacles. Provide precise time standard for forces deployed globally.

On-Orbit Support

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

Reconnaissance and Surveillance

Identify possible global threats and surveillance of specific activity that might be threatening to US or allied military forces or US territory. Reduce effectiveness of camouflage and decoys. Identify "centers of gravity" in enemy forces. Accurately characterize electronic emissions.

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. This mission is assigned to USCINCSpace in the Unified Command Plan.

Space Environment/Meteorological Support

Operate ground-based systems and direct National Oceanic and Atmospheric Administration on the operations of space-based DMSP weather satellite systems to provide solar/geophysical support to the warfighter. Provide data on worldwide and local weather systems affecting combat operations.

Spacelift

Oversee satellite and booster preparation and integration. Conduct launch countdown activities. Operate Eastern and Western Ranges to support ballistic and spaceflight missions.

Strategic Early Warning

Operate satellites to give national leaders early warning of all possible strategic events, including launch of ICBMs. Identify launch locations and impact areas. Cue area and point 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. US Space Command carries out similar tactical warning in other theaters.

ANG photo by MSGt. Shaun Withers

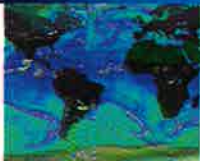


A Florida Air National Guard F-15 on combat air patrol flies above the space shuttle Endeavour. The John F. Kennedy Space Center is NASA's primary launch base for shuttle missions.

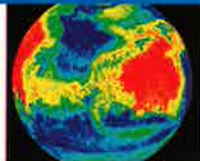
Multimission Space Sensors



A legacy of remote sensors unmatched in the industry



Remote Sensing



Planetary Exploration



Meteorological



Intelligence Support

Raytheon's space sensor legacy began in 1966 with the development of a single weather sensor. Today we produce some of the most sophisticated multimission space sensors available. These sensors operate reliably in the harsh environment of space, monitoring Earth's global weather and resources and gathering vital research and operational data. With over 35 years of proven designs and more than 450 years of on-orbit experience, we don't have to go back to the drawing board to produce the advanced space sensors of the future. Advanced sensors currently in development include: Japanese Advanced Meteorological Imager, Visible/Infrared Imaging Radiometer Suite, Space Based Infrared System Low, and Space Based Radar.

www.raytheon.com

Raytheon Electronic Systems
Surveillance & Reconnaissance Systems

Continued from p. 34.

US Military/Civil Launches (As of Dec. 31, 2001)			
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
Total	566	674	1,240

US Satellites Placed in Orbit and Deep Space (As of Dec. 31, 2001)			
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
Total	803	920	1,723

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

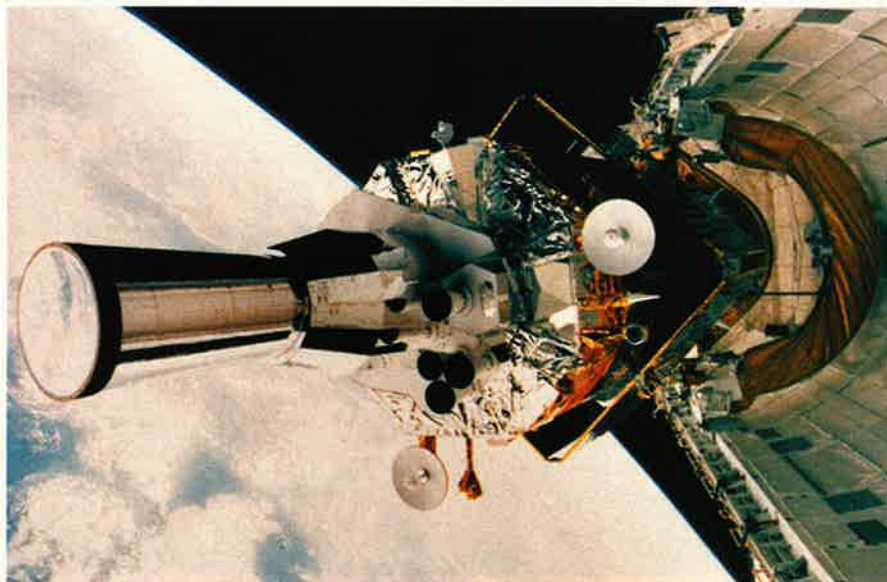
Month/Year	Mission	Name
10/2002	STS-113	<i>Endeavour</i>
1/2003	STS-114	<i>Atlantis</i>
4/2003	STS-115	<i>Endeavour</i>
6/2003	STS-116	<i>Atlantis</i>
9/2003	STS-117	<i>Endeavour</i>

US Military Payloads by Mission, 1958–2001 (Orbital only)

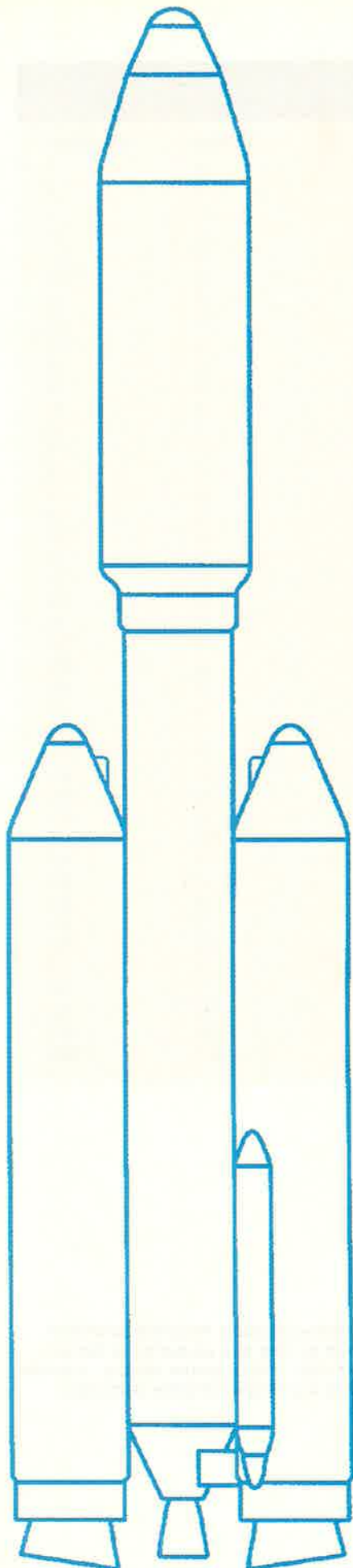
Category	Number
Applications	334
<i>Communications</i>	120
<i>Weather</i>	43
<i>Navigation</i>	88
<i>Launch vehicle/spacecraft tests</i>	3
<i>Other military</i>	80
Weapons-related Activities	46
<i>SDI tests</i>	11
<i>Anti-satellite targets</i>	2
<i>Anti-satellite interceptors</i>	33
Reconnaissance	434
<i>Photographic/radar imaging</i>	250
<i>Electronic intelligence</i>	48
<i>Ocean surveillance</i>	45
<i>Nuclear detection</i>	12
<i>Radar calibration</i>	40
<i>Early warning</i>	39
Total	814

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
Total	137	695

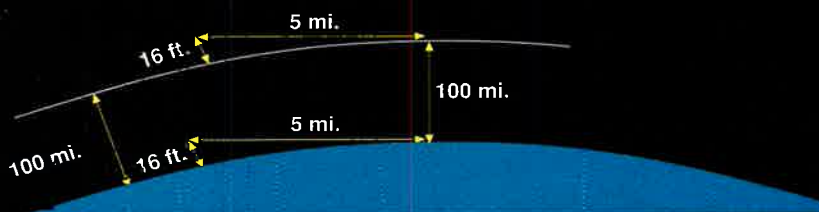


Defense Support Program satellites, such as this one launched in November 1991 from a space shuttle, provide early warning of missile launches.



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 1g. 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.

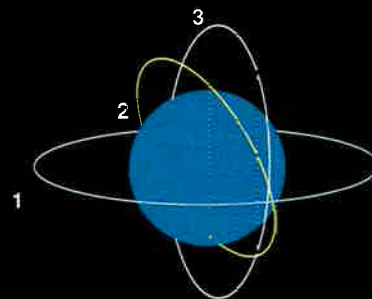


Orbital Altitude

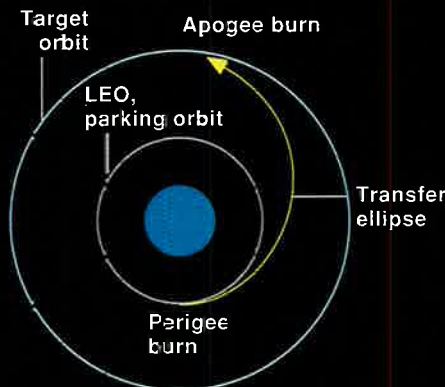
- LEO Low Earth Orbit
- MEO Medium Earth Orbit
- GEO Geosynchronous Earth Orbit
- HEO High Earth Orbit

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.

Flight	Mission	Launch	Return
1	STS-1	4/12/81	4/14/81
2	STS-2	11/12/81	11/14/81
3	STS-3	3/22/82	3/30/82
4	STS-4*	6/27/82	7/4/82
5	STS-5	11/11/82	11/16/82
6	STS-6	4/4/83	4/9/83
7	STS-7	6/18/83	6/24/83
8	STS-8	8/30/83	9/5/83
9	STS-9	11/28/83	12/8/83
10	STS-10	2/3/84	2/11/84
11	STS-11	4/6/84	4/13/84
12	STS-12	8/30/84	9/5/84
13	STS-13	10/5/84	10/13/84
14	STS-14	11/8/84	11/16/84
15	STS-15*	1/24/85	1/27/85
16	STS-16	4/12/85	4/19/85
17	STS-17	4/29/85	5/6/85
18	STS-18	6/17/85	6/24/85
19	STS-19	7/29/85	8/6/85
20	STS-20	8/27/85	9/3/85
21	STS-21*	10/3/85	10/7/85
22	STS-22	10/30/85	11/6/85
23	STS-23	11/26/85	12/3/85
24	STS-24	1/12/86	1/18/86
25	STS-25	1/28/86	No Landing
26	STS-26	9/29/88	10/3/88
27	STS-27*	12/2/88	12/6/88
28	STS-29	3/13/89	3/18/89
29	STS-30	5/4/89	5/8/89
30	STS-28*	8/8/89	8/13/89
31	STS-34	10/18/89	10/23/89
32	STS-33*	11/22/89	11/27/89
33	STS-32	1/9/90	1/20/90
34	STS-36*	2/28/90	3/4/90
35	STS-31	4/24/90	4/29/90
36	STS-41	10/6/90	10/10/90
37	STS-38*	11/15/90	11/20/90
38	STS-35	12/2/90	12/10/90
39	STS-37	4/5/91	4/11/91
40	STS-40	6/5/91	6/14/91
41	STS-43	8/2/91	8/11/91
42	STS-48	9/12/91	9/18/91
43	STS-44*	11/24/91	12/1/91
44	STS-39*	4/28/91	5/6/91
45	STS-42	1/22/92	1/30/92
46	STS-45	3/24/92	4/2/92
47	STS-49	5/7/92	5/16/92
48	STS-50	6/25/92	7/9/92
49	STS-46	7/31/92	8/8/92
50	STS-47	9/12/92	9/20/92
51	STS-52	10/22/92	11/1/92
52	STS-53*	12/2/92	12/9/92
53	STS-54	1/13/93	1/19/93
54	STS-56	4/8/93	4/17/93
55	STS-55	4/26/93	5/6/93

Flight	Mission	Launch	Return
56	STS-57	6/21/93	7/1/93
57	STS-51	9/12/93	9/22/93
58	STS-58	10/18/93	11/1/93
59	STS-61	12/2/93	12/13/93
60	STS-60	2/3/94	2/11/94
61	STS-62	3/4/94	3/18/94
62	STS-59	4/9/94	4/20/94
63	STS-65	7/8/94	7/23/94
64	STS-64	9/9/94	9/20/94
65	STS-68	9/30/94	10/11/94
66	STS-66	11/3/94	11/14/94
67	STS-63	2/3/95	2/11/95
68	STS-67	3/2/95	3/18/95
69	STS-71	6/27/95	7/7/95
70	STS-70	7/13/95	7/22/95
71	STS-69	9/7/95	9/18/95
72	STS-73	10/20/95	11/5/95
73	STS-74	11/12/95	11/20/95
74	STS-72	1/11/96	1/20/96
75	STS-75	2/22/96	3/9/96
76	STS-76	3/22/96	3/31/96
77	STS-77	5/19/96	5/29/96
78	STS-78	6/20/96	7/7/96
79	STS-79	9/16/96	9/26/96
80	STS-80	11/19/96	12/7/96
81	STS-81	1/12/97	1/22/97
82	STS-82	2/11/97	2/21/97
83	STS-83	4/4/97	4/8/97
84	STS-84	5/15/97	5/24/97
85	STS-94	7/1/97	7/17/97
86	STS-85	8/7/97	8/19/97
87	STS-86	9/25/97	10/6/97
88	STS-87	11/19/97	12/5/97
89	STS-89	1/22/98	1/31/98
90	STS-90	4/17/98	5/3/98
91	STS-91	6/2/98	6/12/98
92	STS-95	10/29/98	11/7/98
93	STS-88	12/4/98	12/15/98
94	STS-96	5/27/99	6/6/99
95	STS-93*	7/22/99	7/27/99
96	STS-103	12/19/99	12/27/99
97	STS-99	2/11/00	2/22/00
98	STS-101	5/19/00	5/29/00
99	STS-106*	9/8/00	9/19/00
100	STS-92	10/11/00	10/24/00
101	STS-97	11/30/00	12/11/00
102	STS-98*	2/7/01	2/20/01
103	STS-102*	3/8/01	3/20/01
104	STS-100	4/19/01	5/1/01
105	STS-104*	7/12/01	7/24/01
106	STS-105*	8/10/01	8/22/01
107	STS-108	12/5/01	12/17/01
108	STS-109	3/1/02	3/9/02
109	STS-110	4/8/02	4/19/02
110	STS-111	6/5/02	6/19/02

*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, 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: 2006, planned.

Constellation: four.

Orbit altitude: 22,300 miles.

Contractors: Lockheed Martin, TRW.

Power plant: N/A.

Dimensions: N/A.

Weight: approx. 13,000 lb (on orbit).

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.

Function: environmental monitoring satellite.

Operator: NPOESS Integrated Program Office.

First launch: May 23, 1962.

Constellation: two (primary).

Orbit altitude: 500 miles (nominal).

Contractor: Lockheed Martin, Northrop Grumman.

Power plant: solar array, 500–600 watts.

Dimensions: width 4 ft, length 20.2 ft (with array deployed).

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

Defense Satellite Communications System III

Common name: DSCS III

In brief: nuclear-hardened and jam-proof spacecraft used to transmit high-priority C² messages to battlefield commanders.

Function: SHF communications.

Operator: AFSPC.

First launch: October 1982.

Constellation: five.

On orbit: 10.

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: rectangular body is 6 ft x 6 ft x 7 ft; 38-ft span (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: TRW.

Power plant: solar array, 1,485 watts.

Dimensions: width 22 ft (on orbit), length 32.8 ft (on orbit).

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.

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 anywhere on Earth.

Function: worldwide navigation.

Operator: AFSPC.

First launch: Feb. 22, 1978.

Constellation: 28.

Orbit altitude: 12,636 miles (Block IIA); 12,532 miles (Block IIR).

Contractors: Boeing, Lockheed Martin.

Power plant: solar array, 700 watts (Block IIA); 1,136 watts (Block IIR)

Dimensions: body 8 ft x 8 ft x 12 ft, including solar arrays 11 ft x 19 ft (II/IIA); body 8 ft x 6 ft x 10 ft, span including arrays 37 ft (IIR).

Weight: 2,174 lb (Block IIA, on orbit); 2,370 lb (Block IIR, on orbit).

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: four.

On orbit: four.

Orbit altitude: 22,300 miles.

Contractor: Lockheed Martin, Boeing.

Power plant: solar array, almost 5,000 watts.

Dimensions: length 51 ft; solar array 116 ft (deployed).

Weight: approx. 10,000 lb.

Polar Military Satellite Communications

Common name: Polar MILSATCOM

In brief: USAF deployed a modified Navy EHF payload on a host polar-orbiting satellite to provide an interim solution for a cheaper alternative to Milstar to ensure warfighters have protected polar communications capability.

Function: 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.

Space Based Infrared System

Common name: SBIRS

In brief: advanced surveillance system for missile warning, missile defense, battlespace characterization, and technical intelligence. System includes High (satellites in GEO and HEO) and Low (satellites in LEO) components

Function: infrared space surveillance.

Operator: AFSPC.

First launch: planned, High FY07; Low TBD.

Constellation: High: four GEO sats, two highly elliptical orbit sensors. Low: TBD.

On orbit: none.

Contractor: Lockheed Martin (High); TRW and Spectrum Astro for preliminary system designs (Low).

Power plant: N/A.

Dimensions: N/A.

Weight: N/A.

Continued on p. 42.

**TWO WORDS FOR EVERY WARFIGHTER
WHO'S EVER USED GPS TO COMPLETE
A MISSION. WELCOME HOME.**

Where would they be without global positioning technology? GPS has become an indispensable tool of the battlefield. Soon a new generation system will join the constellation of satellites. GPS III. With more power. Greater accuracy. Higher availability. Improved systems integrity. And, with significantly enhanced anti-jamming capability, tighter security. To build GPS III, the Air Force needs a partner with a proven record for building the highest-precision satellites, integrating critical complex systems, and developing quality software. One company passes every test. Lockheed Martin. To provide the GPS of tomorrow, look to the people who got it to where it is today.

WE NEVER FORGET WHO WE'RE WORKING FOR.™

LOCKHEED MARTIN



Continued from p. 40.

UHF Follow-On Satellite

Common name: UFO

In brief: new generation of satellites providing secure, anti-jam communications; replaced FLTSATCOM satellites.

Function: UHF and EHF communications.

Operator: Navy, AFSPC.

First launch: March 25, 1993.

Constellation: four primary, four redundant.

On orbit: nine.

Orbit altitude: 22,300 miles.

Contractor: Hughes Space & Communications (now Boeing Satellite Systems).

Power plant: solar array, 2,500–3,800 watts.

Dimensions: length 60 ft (F-2–F-7); 86 ft (F-8–F10) (deployed).

Weight: 2,600–3,400 lb.

Wideband Gap-Filler System

Common name: WGS

In brief: high data rate satellite broadcast system meant to bridge the communications gap between current systems—DSCS and GBS—and an advanced wideband system, tentatively scheduled for launch in Fiscal 2004.

Function: wideband communications and point-to-point service (Ka-band, X-band frequency).

Operator: AFSPC.

First launch: FY04, planned.

Constellation: three to six.

Orbit altitude: GEO.

Contractor: Boeing.

Power plant: solar arrays, 9,934 watts.

Dimensions: based on Boeing 702 Bus.

Weight: 7,022 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. Details of the Keyhole optical imaging systems in the Corona program have been released.

Major Civilian Satellites in US Military Use

Advanced Communications Technology Satellite

Common name: ACTS

In brief: technology demonstration satellite for new types of K- and Ka-band communications technologies.

Function: communications.

Operator: NASA.

First launch: Sept. 12, 1993.

Constellation: one.

Orbit altitude: 22,300 miles.

Contractor: Lockheed Martin.

Power plant: solar array, 1,400 watts.

Dimensions: width 29.9 ft, length 47.1 ft (deployed).

Weight: 3,250 lb.

Geostationary Operational Environmental Satellite

Common name: GOES

In brief: hovers over the equator 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.

Orbit altitude: 22,300 miles.

Contractor: Space Systems/Loral.

Power plant: solar array, 1,050 watts.

Dimensions: 6.6-ft cube, length 88.6 ft (deployed).

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: width 4.9 ft, length 35.3 ft (deployed).

Weight: 990 lb.

Ikonos

Common name: Ikonos

In brief: one-meter resolution Earth imaging.

Function: remote sensing.

Operator: Space Imaging, Inc.

First launch: Sept. 24, 1999.

Constellation: one.

Orbit altitude: 423 miles.

Contractor: Lockheed Martin.

Power plant: solar array.

Dimensions: 5.9 ft x 5.9 ft x 5.2 ft.

Weight: 1,600 lb.

Inmarsat

Common name: Inmarsat

In brief: sometimes used for peacetime mobile communications services.

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: width 6.9 ft, length 5.9 ft, 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: Lockheed Martin (Intelsat 8).

Power plant: solar array, 4,800 watts.

Dimensions: width 8.3 x 7.2 ft, length 11.3 ft, 35.4 ft (deployed) (Intelsat 8).

Weight: 7,480 lb (Intelsat 8).

Iridium

Common name: Iridium

In brief: voice, fax, data transmission.

Function: handheld, mobile communications.

Operator: Iridium LLC.

First Launch: May 5, 1997.

Constellation: 66 (six on-orbit spares).

Orbit: 485 miles.

Contractor: Motorola, Lockheed Martin.

Power plant: solar array, 590 watts.

Dimensions: diameter 3.3 ft, length 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/NOAA.

First launch: July 23, 1972.

Constellation: one.

Orbit altitude: 438 miles (polar).

Contractor: Lockheed Martin.

Power plant: solar array, 1,550 watts.

Dimensions: diameter 9 ft, length 14 ft.

Weight: 4,800 lb.

Loral Orion

Common name: Telstar (formerly Orion)

In brief: commercial satellite-based, rooftop-to-rooftop communications for US Army and other DOD agencies.

Function: communications.

Operator: Loral Orion.

First launch: November 1994.

Constellation: three.

Orbit altitude: 22,300 miles.

Contractor: Space Systems/Loral (Orion 2).

Power plant: solar array, 7,000 watts.

Dimensions: width 5.6 ft, length 6.9 ft, 72.2 ft (deployed).

Weight: 8,360 lb (Orion 2).

NOAA-15 (NOAA-K) and NOAA-16 (NOAA-L)

Common name: NOAA (with number on orbit) (also known as Television Infrared Observation Satellite or TIROS)
In brief: weather updates for all areas of the world every six hours.
Function: long-term weather forecasting.
Operator: NOAA (on-orbit); NASA (launch).
First launch: October 1978 (TIROS-N).
Constellation: two.
Orbit altitude: 530 miles.
Contractor: Lockheed Martin.
Power plant: solar array, 1,000+ watts.
Dimensions: diameter 6.2 ft, length 13.8 ft (NOAA-15).
Weight: approx. 4,900 lb (NOAA-15).

Orbcomm

Common name: Orbcomm
In brief: potential military use under study in Joint Interoperability Warfighter Program.
Function: mobile communications.
Operator: Orbcomm Global LP.
First launch: April 1995.
Constellation: 35.
Orbit altitude: 500–1,200 miles.
Contractor: Orbital Sciences.
Power plant: solar array, 160 watts.
Dimensions: width 7.3 ft, length 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 ft x 8.8 ft x 12 ft width (stowed) (Galaxy III-R). Length solar arrays: 86 ft width, antenna 24 ft (Galaxy III-R).
Weight: 6,760 lbs (Galaxy III-R).

Quickbird 2

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

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: TRW.
Power plant: solar array, 1,800 watts.
Dimensions: width 45.9 ft, length 57.4 ft (deployed).
Weight: 5,000 lb.

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: planned for summer 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: planned for summer 2002.
Launch site: CCAFS, VAFB.
Contractor: Boeing.

Evolved Expendable Launch Vehicle

Function: lift medium to heavy weights.
Note: Atlas V and Delta IV (see individual entries) are participating in USAF's 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.

Taurus

Function: lift low weights.
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, 2001)

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	
Total	66	137	10	11	3	54	2,579	1

Russian Military vs. Civil Launches

(As of Dec. 31, 2001)

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
Total	1,645	1,016	2,661

Russian Military Launches for 2001

	Launches	Spacecraft
Communications	4	6
Electronic intelligence (ocean recon)	1	1
Navigation	2	3
Photoreconnaissance	1	1
Early warning	1	1
Total	9	12

Russian Operational Military Spacecraft

(As of Dec. 31, 2001)

Mission	Type	Number
Communications	Kosmos (Geizer)	1
	Kosmos (Strela-3)	4
	Molniya-1	4
	Molniya-3	6
	Raduga/Raduga-1	6
Early warning	Kosmos (Oko)	4
	Kosmos (Prognoz)	1
Electronic intelligence	Kosmos (EORSAT)	1
	Kosmos (Tselina-2)	1
	Kosmos (GLONASS)*	9
Navigation	Kosmos (Parus)	6

*Kosmos (GLONASS) is both civilian and military.

Russian Military/Civil Payloads by Mission, 1957-2001

(As of Dec. 31, 2001)

Anti-satellite target tests	18
Anti-satellite interceptor tests	20
Communications	325
Early warning	80
Earth orbital science	211
Earth resources	100
Electronic intelligence	133
Fractional orbital bombardment system tests	18
General engineering and materials processing	15
Geodesy	34
Navigation	227
Ocean electronic intelligence	85
Photographic reconnaissance	806
Theater communication	535
Undefined military operations	162
Weather	75
Total	2,844

Russian Launch Site Activity

(As of Dec. 31, 2001)

Vehicle	Number of launches
Baikonur Cosmodrome, Tyuratam, Kazakhstan	
Proton-K/Blok DM-2	3
Proton-K/Blok DM-3	2
Proton-M/Briz-M*	1
Soyuz-FG*	2
Soyuz-U	6
Tsyklon-M	1
Zenit-2	1
Total	16
Svobodny Cosmodrome, Svobodny, Russia	
Start-1	1
Total	1
Odyssey Platform, Pacific Ocean (Sea Launch)	
Zenit-3SL	2
Total	2
Plesetsk Cosmodrome, Plesetsk, Russia	
Kosmos-3M	1
Molniya-M	2
Soyuz-U	1
Tsyklon (three stages)	2
Total	6

*New launch vehicle variants

Russian Manned Spaceflights

(As of Dec. 31, 2001)

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
Total	92	211

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

Spacefarers

(As of Dec. 31, 2001)

Nation	Persons
Afghanistan	1
Austria	1
Belgium	1
Bulgaria	2
Canada	8
Cuba	1
Czechoslovakia	1
France	8
Germany	9
Hungary	1
India	1
Italy	3
Japan	5
Mexico	1
Mongolia	1
Netherlands	1
Poland	1
Romania	1
Russia	95
Saudi Arabia	1
Slovakia	1
Spain	1
Switzerland	1
Syria	1
Ukraine	1
United Kingdom	1
United States	258
Vietnam	1
Total	408

Payloads in Orbit

(As of Dec. 31, 2001)

Launcher/operator	Objects
Russia	1,359
United States	1,008
Japan	73
Intl. Telecommunications Satellite Orgn.	58
France	51
ESA	38
China	37
United Kingdom	31
Germany	21
India	21
Canada	17
Italy	12
Luxembourg	12
Brazil	10
Sweden	10
Indonesia	9
Saudi Arabia	9
Australia	8
NATO	8
South Korea	7
Mexico	6
Spain	6
Argentina	5
Czechoslovakia	4
International Space Station	4
Thailand	4
Turkey	4
Israel	3
Malaysia	3
Norway	3
Chile	2
Egypt	2
France/Germany	2
Philippines	2
Denmark	1
Pakistan	1
Portugal	1
Singapore	1
South Africa	1
Taiwan	1
United Arab Emirates	1
Total	2,866

US Navy photo by Michael J. Bloomfield



Astronauts from a December 2000 Endeavour space shuttle mission installed this huge solar array on the International Space Station.



Military Space Lore

Military Space Firsts

March 22, 1946

First US 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

First successful USAF Atlas ICBM test flight.

Dec. 18, 1958

Project Score spacecraft conducts first US active communication from space.

Aug. 7, 1959

Explorer 6 spacecraft transmits first television pictures from space.

April 1, 1960

TIROS 1 becomes first US weather satellite to go aloft.

April 13

Transit 1B becomes first US navigation satellite in space.

May 24

Atlas D/Agema A booster places MIDAS II, first early warning satellite, in orbit.

Aug. 19

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

Lt. Cmdr. Alan B. Shepard Jr., aboard Freedom 7 Mercury capsule, becomes first American in space, climbing to 116.5 miles during suborbital flight lasting 15 minutes, 28 seconds.

Feb. 20, 1962

Project Mercury astronaut Lt. Col. John H. Glenn Jr., aboard Friendship

7 capsule, completes first US manned orbital flight.

July 17

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.

Oct. 17, 1963

Vela Hotel satellite performs first space-based detection of nuclear explosion.

Aug. 14, 1964

First Atlas/Agema D standard launch vehicle successfully fired from Vandenberg.

March 18, 1965

First space walk conducted by Alexei Leonov of Soviet Voskhod 2.

June 4

Gemini 4 astronaut USAF Maj. Edward H. White II performs first American space walk.

Jan. 25, 1967

Soviet Kosmos 139 anti-satellite weapon carries out first fractional orbital bombardment system test.

Jan. 27

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.

Oct. 20, 1968

Soviet Kosmos 248 and Kosmos 249 spacecraft carry out first co-orbital anti-satellite test.

July 20, 1969

Apollo 11's Neil A. Armstrong is first human to walk on moon.

April 19, 1971

First space station, Salyut 1, goes aloft.

Nov. 2

Titan IIIC launches first Defense Satellite Communications System (DSCS) Phase II satellites into GEO.

Feb. 22, 1978

Atlas booster carries first Global Positioning System (GPS) Block I satellite into orbit.

Dec. 13

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 Defense Meteorological Satellite Program (DMSP) Block 5D-2 satellite launched.

Sept. 13, 1985

First US anti-satellite intercept test destroys Solwind scientific satellite by air-launched weapon.

Oct. 3

Shuttle *Atlantis* performs first launch of pair of DSCS III satellites from space shuttle using Inertial Upper Stage.

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.

Jan. 17, 1991

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

Jan. 13, 1993

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

July 19

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

First launch of Taurus booster places two military satellites in orbit.

Feb. 6, 1995

USAF Lt. Col. Eileen M. Collins is first woman to pilot a US spaceship, doing so when *Discovery* and space station Mir perform first US-Russian space rendezvous in 20 years.

March 8, 1996

First successful launch of Pegasus XL rocket from beneath modified L-1011 aircraft sends Air Force Radiation Experiment-II satellite into polar orbit.

May 29, 1998

First transfer of operational military space system to civilian agency occurs when Air Force hands to NOAA control of DMSP spacecraft.

July 23-27, 1999

Air Force Col. Eileen M. Collins becomes first woman to command shuttle mission when *Columbia* (STS-93) places Chandra X-Ray Observatory, world's most powerful X-ray telescope, in orbit.

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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Then—Lt. Gen. Bernard Schriever, commander of Air Research and Development Command, inspects an instrument package similar to one from a Discoverer satellite in 1960. On his right is E.A. Miller, manager of the Discoverer program for General Electric. Then—Brig. Gen. Richard Curtin is on Schriever's left.



The Highs and Lows of Northern Watch

By James Kitfield

**Everyone
understands
that one mishap
could cause
an international
incident—
even war.**

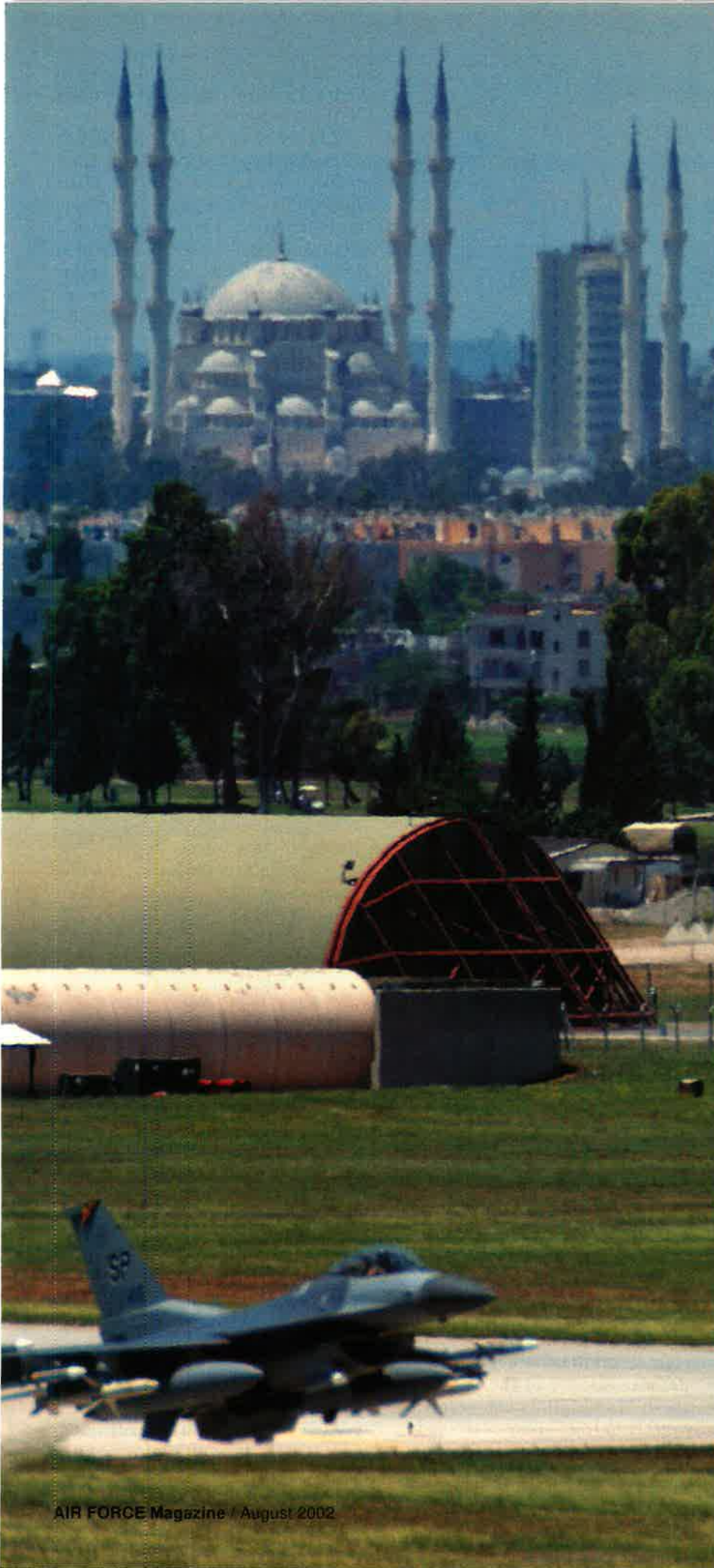
THE scene on the runway at Incirlik AB, Turkey, these days often resembles an international air show. Pilots of Operation Northern Watch Combined Task Force come from the United States, both the Air Force and Navy, Britain, and Turkey. Their sleek aircraft provide a truly eclectic mixture of weaponry.

Out come Air Force F-16CJs armed with their distinctive high-speed anti-radiation missiles. Then come F-15C air superiority fighters sporting air-to-air weapons. Next out are the A-10 attack aircraft laden with tank-killer missiles and 30 mm cannon.

Joining the group is a Navy EA-6 tactical jammer. Next are British Jaguar fighters fitted with special photoreconnaissance pods. At the end come a British VC-10K and USAF and Turkish KC-135 aerial tankers and the orchestrator of the day's mission: an Air Force E-3 Airborne Warning and Control System aircraft.

This, of course, is no air show. Each "performance" costs \$800,000. The audience does not cheer. It fires advanced surface-to-air missiles and





USAF photo by S/FA James Harper

An F-16CJ from the 23rd Fighter Squadron—based at Spangdahlem AB, Germany—launches from Incirlik AB, Turkey, in support of Operation Northern Watch.

anti-aircraft guns. “If the Iraqis didn’t shoot at us this would be a boring mission,” said Brig. Gen. Edward R. Ellis, commander of the Northern Watch task force at Incirlik. “The Iraqi air force won’t dare enter the no-fly zone.”

And shoot they do. “Not only do they shoot at us on nearly every mission,” said Ellis, “but Saddam has put a bounty on our heads, payable to anyone who brings down one of our airplanes. After 10 years the Iraqis have also gotten smarter about parking their air defense weapons near mosques and even in water parks for children, knowing that we won’t strike back at them.”

Smarter Version

It makes for a tense and sometimes deadly game. “Saddam has gotten smarter about our methods,” concluded Ellis, “and he knows we care more about Iraqi civilians than he does. That makes the mission more difficult and sometimes more frustrating.”

In many ways, Northern Watch has become emblematic of the gray, no-war, no-peace zone in which the Air Force finds itself. That ambigu-



SrA. Charles Shilling, a crew chief from the Louisiana ANG's 159th Fighter Wing, directs an F-15 prior to a launch. USAF pilots face a complex tactical picture over Iraq.

ous realm poses political and diplomatic constraints that frequently outweigh tactical considerations.

In Northern Watch, restrictive rules of engagement are dictated by Turkey, which is the host nation because of the central importance of Incirlik. Turkey wants to avoid any major confrontation with Iraq. ONW pilots have little latitude for responding aggressively to Iraqi fire.

Moreover, the straight jacket of military and economic sanctions the United States put on Iraq after the Gulf War has steadily frayed over the past decade, greatly complicating the tactical picture in northern Iraq. It is something ONW pilots must constantly monitor.

The average Northern Watch patrol lasts about three hours, though the time "in the box" can be stretched to seven hours with some additional assets. In that period, chances are Iraqi air defense gunners will fire on coalition aircraft somewhere between two and five times, either with surface-to-air missiles or anti-aircraft artillery. Due largely to very restrictive rules of engagement, the chances that Northern Watch pilots will be able to fire back are limited.

Indeed, by far the most unpopular restrictions dictated by Turkey are their rules for responding to Iraqi fire.

Unlike their counterparts on Operation Southern Watch missions, flown primarily from Saudi Arabia, Northern Watch pilots can only counterattack against a specific SAM site



Brig. Gen. Edward Ellis, Operation Northern Watch commander, performs a preflight check of an F-15 before taking it out on a patrol. The complicated rules of engagement for ONW can be frustrating to pilots, Ellis acknowledged.

or AAA battery, as opposed to other elements of the Iraqi air defense network.

Even more important, Northern Watch pilots can respond only at the time of an incident and are barred from returning to base to plan a coordinated attack on a provocative Iraqi air defense site.

Add in concerns about collateral damage to civilian structures near air defense sites, and the result is Northern Watch pilots can respond only rarely to Iraqi gunners trying to shoot them down. Over a 10-month period, for instance, Northern Watch

pilots responded only eight times to the Iraqi gunfire that greets virtually all of their patrols.

In June, however, US and British officials reported an increase in Iraqi attacks on coalition aircraft. Officials said there had been 10 separate Iraqi attacks over a two-day period in late June against Northern Watch aircraft. On June 26, coalition fighters dropped precision guided munitions on a portion of the Iraqi integrated air defense system. A few days later, following another Iraqi threat, ONW pilots again responded by dropping precision munitions against the offending Iraqi system.

"Fighter pilots being fighter pilots, there is extreme frustration that we can't be more aggressive in our response to the AAA and SAM fire we see virtually every day," said Lt.

Col. Tim Strawther, commander of an F-16 fighter squadron taking part in Northern Watch.

The Golden BB

Strawther continued, "I'm proud of the discipline my guys have shown in deciding not to take a shot because the risks of collateral damage were too high or the rules of engagement didn't allow it, but I do worry that the Iraqis are going to get lucky and down one of our people with a 'golden BB.' The Las Vegas oddsmakers will tell you that sooner or later your luck will change."

Concern that Iraqi air defense gunners will eventually get lucky, or mechanical failure will force a US aircrew down inside Iraq, permeates Northern Watch. One F-16 pilot involved in a Northern Watch mission did suffer engine failure that forced him to eject, but he was picked up by a US search-and-rescue helicopter. In another incident, an EA-6 Prowler on the way home from Northern Watch experienced catastrophic engine failure that forced its crew to eject.

Individuals at US Air Forces in Europe, which oversees USAF forces in ONW, maintain that Turkey's desire to avoid any move that might be interpreted as an escalation has also prompted Ankara to veto the requested deployment to Incirlik of U-2 reconnaissance airplanes and even the use of towed decoys to protect Western aircraft.

Predictably, such restrictions rub many pilots the wrong way. The Incirlik oddsmakers believe it is only a matter of time before someone comes up snake eyes.

"I know the rules of engagement are sometimes frustrating for my pilots, whose natural reaction when they get shot at is to want to go level something," said Ellis. "But anyone who thinks that military action shouldn't be governed by political constraints is naive. The political reality is we're not at war with Iraq at this point, and if we reacted rashly we could force the hand or limit the options of US policy-makers who are trying to figure out what to do about Saddam Hussein."

Having said that, Ellis went on to note, "There is merit to the argument that the policy-makers might want to address this issue sooner rather than later because of the inherent jeopardy of this mission. The bottom line is: We continue to fly and the Iraqis continue to shoot at us. Nobody should be especially surprised if eventually they happen to hit something."

These so-called operations other than war have a schizophrenic nature. They combine certain aspects of a permanent duty station with some of an emergency deployment. In the case of the northern no-fly zone, Air Force pilots have flown nearly 21,000 sorties in a decade of continuous operations, more than in the entire Korean War. Even so, Air Force personnel generally rotate through on



USAF photo by TSgt. Cecil D. Daw Jr.

US officials take extraordinary precautions to prevent losses over Iraqi territory. An EA-6B crew was lucky a catastrophic engine failure came after they completed a mission.

90-day temporary-duty cycles. They live in an elaborate tent city. Ellis said the average annual turnover rate for personnel involved in the operation is a staggering 900 percent.

In Northern Watch, as in so many other ongoing operations, the Air Force is also struggling to provide Low-Density, High-Demand assets—airborne early warning aircraft, command-and-control platforms, electronic countermeasures aircraft, air base security units—which are must-have items.

Fighting Complacency

Finally, the long duration of the Northern Watch mission, and the fact that so many Air Force personnel have rotated to the assignment multiple times, can make the mission seem routine and take the edge off day-to-day flying. As in other gray-area missions, Northern Watch commanders wage a constant battle against complacency.

Everyone understands a Northern Watch mishap could provoke an international incident, even war. Iraqi forces fire at ONW aircraft 34 times a month, on average. In Northern Watch, pilots go to war with Iraq a little bit each day.

The studied quiet inside the darkened Combined Air Operations Center at Incirlik belies the hectic pace of ongoing operations. At any one time, the 45 or so personnel in the CAOC are juggling three operational cycles—advanced planning three

days in advance of a Northern Watch patrol, fine-tuning of the next day's mission, and close monitoring of patrols in the air that day. The CAOC each month plans about 18 Northern Watch patrols, on average. Of these, an average of 13 actually take place. The operational cycle can seem never-ending.

Mission planners say the most important safety item is unpredictability. "Saddam has a very robust early warning system of radars that track our movements, so we try and mix it up as much as possible by flying different profiles and going to different places on each mission," said one CAOC shift commander, who like most persons interviewed for this article will remain unnamed for security reasons. "We also rely heavily on our intelligence, surveillance, and reconnaissance assets—be they overhead satellites or recon aircraft—to avoid those places where we know Saddam has air defense weapons. If someone has a gun, the best course is to stay out of its range."

Bitter experience has taught the Iraqis not to use their integrated air defense radars to "paint" Northern Watch aircraft; that can easily lead to a bullet between the eyes. However, nearly every Northern Watch mission will attract what American intelligence analysts call Iraqi "science projects."

"The Iraqis have become very innovative at taking various parts and



Restrictive rules mean Northern Watch pilots rarely can respond to Iraqi gunners trying to shoot them down. Here, an F-15E from the 48th Fighter Wing, RAF Lakenheath, UK, has returned to Incirlik from an ONW mission.

pieces of their air defense weapons and combining them to create something new to throw at us," said the CAOC commander. "He may take a booster element from one surface-to-air missile and combine it with the guidance system of another or adapt an air-to-air missile and figure out how to launch it from a truck.

"These science projects are much less accurate than an integrated air defense system, but our pilots still have to dodge these giant bullets that come up at them on nearly every mission. It's also widely understood that Baghdad has offered bounties on our pilots, and everyone knows that Saddam would consider it a huge feather in his cap to parade a US airman through the streets of the city."

More Autonomy

In the decade-long and potentially lethal game of cat-and-mouse covering the northern no-fly zone, Air Force commanders have also noticed that the Iraqis these days have more autonomy to act independently of Baghdad.

"My counterpart in the fourth air defense sector in northern Iraq has evolved more decentralized control," said Ellis, an F-16 pilot who routinely engages in Northern Watch patrols. "In the early years, almost all actions were controlled out of Baghdad, and Saddam kept a very tight grip. Today, my counterpart

clearly has the ability to move his air defense elements around and employ them as he sees fit. The mission has also become more complicated as a result of far more commercial traffic and other activities than existed in the early years."

A striking aspect of Northern Watch is the degree to which the sanctions designed to limit Saddam Hussein's freedom of action have steadily eroded.

Once, Iraqi territory and airspace north of the 36th parallel were calm and quiet. Now, the area is crisscrossed by commercial air traffic and

thriving land trade between Baghdad and its neighbors.

This marks a big change from the days when anything that flew in the northern no-fly zone was fair game. Now, ONW pilots must distinguish Iraqi bogies from regular international commercial flights between Syria and Iraq and domestic civilian flights between Baghdad and the northern Iraqi city of Mosul. Defensive counterstrikes must steer clear of a rail line running between southern Turkey and inner Iraq. Likewise, US pilots must avoid strikes near an oil pipeline linking Iraq and Turkey.

The United Nations approved limited use of helicopters for crop dusting in the northern no-fly zone. Predictably, Iraq has continued with unauthorized helicopter crop-dusting flights, raising the specter of nerve gas attacks such as those Saddam launched against Iraqi Kurds in the 1980s.

Helicopter flights also played a pivotal role in crushing the uprisings against the Iraqi regime that followed the Gulf War. Opposition Shiites in the south and Kurds in the north captured 14 of Iraq's 18 provinces before Saddam Hussein struck back.

Lt. Col. Lee Alexander and other Reservists from the 513th Air Control Group, Tinker AFB, Okla., are walking poster boys for the strains real-world contingencies such as Northern Watch are placing on the



The Northern Watch complement includes British aircraft, such as this Jaguar fitted with special photoreconnaissance pods, USAF, US Navy, and Turkish aircraft.

Air Force, especially on those units that operate Low-Density, High-Demand assets such as the AWACS aircraft. In 1999, two months after the 513th's air arm, the 970th Airborne Air Control Squadron, reached initial operational capability, it was activated for the Kosovo air war. Its recent activation after the Sept. 11 attacks was its second active duty call-up in three years.

"As soon as the attacks of Sept. 11 took place, I knew that it was just a matter of time before we were activated," said Alexander. "I immediately packed my clothes, locked down my apartment, and headed for Tinker, because whatever the United States' response was, I knew it would require the AWACS."

Alexander, a United Airlines pilot in his civilian life, was sent to command the Incirlik-based detachment of the 970th AACS. On Sept. 11, volunteer crews flew a 22-hour mission, he said, and aircrews have been going virtually nonstop ever since. On Sept. 20, the official activation order came through.

Retention Concerns

Because AWACS aircraft and crews are both scarce and in high demand, two Reserve crews from the 970th will handle Incirlik operations for six months, thus relieving active duty crews for deployment to Central Asia and other theaters. Rather than deploy like their active duty counterparts for a full 90-day cycle, the Reservists will switch out with other Reserve crews in 45-day cycles, the better to minimize disruption to civilian careers.

The Reservists of the 513th were eager to pitch in after the Sept. 11 attacks, but they concede that the nearly nonstop pace of operations is causing serious strains.

"The fact that we've essentially undergone back-to-back activations ... has raised some concerns about retention," said Alexander. "I worry that it might be tougher to get some of our top people to re-up when the time comes. People pay a price when they are gone from their jobs and career tracks for such long periods. The longer the unit is activated and



USAF photo by SSgt. Scollie T. McCord

AWACS is one of the scarce assets crucial to Northern Watch and other operations around the world. Here, airmen deployed from Tinker AFB, Okla., prepare to launch an AWACS aircraft at Incirlik for an ONW tour.

the more it affects jobs and families, the harder it will be on the unit as a whole."

Other LD/HD assets required for Northern Watch include air base security units. While the Sept. 11 attacks increased threat-condition levels for virtually all US military units, the war on terror and Incirlik's proximity to the volatile Middle East and Central Asian theaters make security a continuing concern. In the 1990s Turkey also fought its own bloody war against Kurdish terrorists, raising concerns about residual terror cells in the region.

"We're guests on a Turkish air base here," said Ellis, "and the Turkish police do a great job guarding the gates and fence line. Inside that perimeter, our own security forces and force protection measures make us feel pretty secure."

Turkish officials are highly sensitive to the political dangers of Northern Watch, and they do not wish to gratuitously inflame Turkey's overwhelmingly Muslim population. That explains why the mission continues to carry temporary duty status 10 years after no-fly zone operations began.

The Incirlik tent city ranks among the most impressive anywhere in the Air Force. It has air-conditioned

tents, private vestibules, a fully equipped morale and welfare center, swimming pools, volleyball and basketball courts, barbecue facilities, and more. Still, the base has the atmosphere of a hardship posting. The Air Force's permanently stationed 39th Wing handles all base operations, freeing Joint Task Force personnel to concentrate on the Northern Watch mission.

The conditions are not stellar, but USAF officials worry more about the 900 percent turnover rate in personnel every year. Officials say the Expeditionary Air and Space Force system has helped by pairing units scheduled to deploy to Northern Watch together in the predeployment training cycle.

"The quality of our great Air Force people, and the fact that they are trained and ready the day they arrive at Incirlik, is what allows us to manage that 900 percent turnover rate," said Ellis.

He went on, "What I tell my people is that our host country views this as a contingency operation, and as long as that's the case, we'll lack more permanent facilities. As long as we wear this uniform, however, and our country thinks it's important that we enforce the no-fly zone over Iraq, we'll keep doing this mission—whether it takes five months, five years, or five decades. Look at Korea. People expected we'd be finished there quickly, and we're still there 50 years later." ■

James Kitfield is the defense correspondent for National Journal in Washington, D.C. His most recent article for Air Force Magazine, "The Guard and Reserve Step Up," appeared in the January 2002 issue.

The Guard and Reserve take on responsibilities once held exclusively by the active force.

New Horizons for the



Staff photo by Guy Aceto

THE Air Force plans to establish, within the next two years, the 116th Air Control Wing—a “blended wing” part active duty, part Air National Guard—at Robins AFB, Ga.

It will be formed by the merger of the Guard’s 116th Bomb Wing, which has lost its B-1 bombers, with the active duty 93rd Air Control Wing.

This new unit, the first of its kind, will operate all of the Air Force’s Joint STARS aircraft. It is a mission of considerable importance and prestige. These aircraft, which can find



Total Force

By John T. Correll



The new blended wing, expected to be completed in October 2004 or sooner, will operate the E-8 JSTARS aircraft—always in high demand by theater commanders.

and track moving targets on the ground deep in enemy territory, are prized assets and constantly in demand by theater commanders.

The wing commander will be an Air National Guard officer. The deputy commander will be from the active force.

The blended wing initiative is just one example of how far the Air Force's two reserve components, the Air National Guard and Air Force Reserve Command, have come in their integration with the active force.

■ Hundreds of Guard and Reserve pilots are serving as flight instructors with Air Education and Training Command. They work at a dozen bases and account for about one-fifth of the Air Force's total instructor pilot force.

■ Maj. Gen. Ronald J. Bath, director of Air Force Strategic Planning, is an Air National Guardsman from Washington state. Maj. Gen. Craig R. McKinley, deputy inspector general of the Air Force, is a Florida Air Guardsman. One-third of the Air Force people working on the Qua-

drennial Defense Review are from the Guard and Reserve.

■ When the Air Force deploys abroad, either in response to crisis or to perform ongoing duties like patrolling the no-fly zones in Iraq, it draws forces from designated "buckets of capability" called Aerospace Expeditionary Forces. In the last AEF deployment cycle, the Guard and Reserve contributed 25 percent of the aviation and 29 percent of the expeditionary combat support.

Lt. Gen. James E. Sherrard III, commander of Air Force Reserve Com-



AFRC crew chiefs from Missouri and Louisiana walk off the flight line at Bagram airfield in Afghanistan. As of July 10, more than 36,000 ANG and AFRC members were still mobilized for duty.

mand, says that his organization now “plays an integral role in the day-to-day Air Force mission and is not a force held in reserve for possible war or contingency operations.”

“Once upon a time, the reserve forces of the US military were exactly that: reserve forces,” said John J. Miller, writing last year in *National Review*. “Our country held them back like fire extinguishers in the basement, hoping we wouldn’t have to use them but knowing where to find them in an emergency. Today, however, the reserves are more like an air conditioner, turned on whenever the temperature hits a certain point.”

ARCs in the War on Terror

However, the traditional mission of the reserve components—activation at a time of national crisis—has not gone away. Three days after the terrorist attacks last September, President Bush ordered a partial mobilization of reserve members from the Air Force, Army, Navy, Marine Corps, and Coast Guard.

As of April 17, the Air National Guard and Air Force Reserve Command had a total of 37,866 people mobilized, more than the reserve components of any other service. So far, that is the peak for the current operations.

In Enduring Freedom in Afghanistan, the Guard and Reserve have flown bomber and fighter combat missions, most of the air mobility missions, and much more.

Through the middle of May, the armed forces had flown more than 22,000 combat air patrol sorties over American cities in Operation Noble Eagle. Of these, some 80 percent were flown by the Air National Guard and Air Force Reserve Command.

“Air Force Reserve aeromedical evacuation aircrews were among the first to respond and provided almost half of the immediate [aeromedical evacuation] response that was provided,” Sherrard told the Senate in February. “Tragically, we found there was little need for their service. The larger need was in mortuary affairs support, of which the Air Force Reserve provides more than 75 percent of our Air Force’s capability. One hundred eighty-six trained Reservists immediately stepped forward, in volunteer status, for this demanding mission.”

USAF Lt. Gen. Russell C. Davis, chief of the National Guard Bureau, also testifying in February, said, “In all of the attention to the war on terrorism, some may forget that we also have had over 1,700 National Guardsmen on duty in Bosnia through this same period. About 1,000 more are supporting operations from Germany and elsewhere in Europe. Hundreds more are helping to enforce the no-fly zones over northern and southern Iraq.”

Air Force and Total Force

In 1970, Melvin B. Laird, who was then Secretary of Defense, pro-

claimed a “Total Force” policy whereby the armed forces would put greater reliance on their National Guard and Reserve units.

From the beginning, the Air Force was the leader in implementing the policy. Even today, the Army has an uneasy relationship with its reserve components. There is a strong Naval Reserve, but the Navy does not have a National Guard element.

In the Air Force, the Guard and Reserve account for more than 65 percent of the tactical airlift, 35 percent of the strategic airlift capability, 60 percent of air refueling, and 38 percent of fighters. They also make significant contributions to rescue, bomber, and combat support missions and have an increasing presence in space, intelligence, and information operations.

The two Air Reserve Components look much alike, but the Guard is larger and it has more aircraft. Although both of them are assigned a full range of Air Force missions, Air Force Reserve Command is weighted more toward mobility and the Guard more toward fighters.

The biggest difference is that the Air National Guard is organized as state militia which can be called to federal duty.

“If you ask an Air National Guardsman or Air Force Reservist what are you, they will tell you they are part of the US Air Force,” Bath said. “A member of the Army National Guard, asked the same question, is more likely to identify himself as a Pennsylvania Guardsman or a Missouri Guardsman, identifying more closely with their states.”

The Air Reserve Components “identify with their parent service very closely. They also identify around the missions of the Air Force,” he added.

“Wherever you find the United States Air Force, at home or abroad, you will find the active and reserve, side by side,” Sherrard said. “You can’t tell us apart, and that’s the way it should be.”

Bath himself is an example of the Air Force’s openness to Total Force integration. He began his military career in the enlisted ranks, as a boiler operator and heating specialist with the Nevada Air National Guard.

Watching RF-101s take off and land at the Reno airport, young Bath

decided he wanted to fly airplanes. In short order, he finished college and became an officer and was soon flying RF-101s instead of watching them.

When the Gulf War began, Bath was a lawyer in private practice in Reno. He was also an RF-4C pilot with the Guard, deployed in that capacity to the Gulf.

In 1996, Bath was named Air National Guard advisor to the National Defense Review team. He moved from there to USAF's new Quadrennial Defense Review team, becoming deputy head and, in 2001, director. Since 1998, he has been affiliated with the Washington state Air National Guard.

This March, he was named director of Air Force strategic planning, a choice Air Staff assignment held in the past by rising stars of the active duty force.

Demands of a New Strategy

One of Bath's concerns in his new job is how the Air Force will develop and fit its capabilities to emerging demands. The Air Force will have its combat power packaged into 10 Aerospace Expeditionary Forces, and it will take some doing to get all of them properly modernized and equipped.

Citing the 1999 air campaign in the Balkans, Bath said that "Kosovo itself put demands on our people and our iron that was the equivalent of a Major Theater War, of five-plus AEFs."

However, the force sizing standard for the armed forces has changed since then. In the Quadrennial Defense Review last fall, Secretary of Defense Donald H. Rumsfeld threw out the "two MTW" standard, which specified that the services should be able to respond to two nearly simultaneous Major Theater Wars.

In its place is a "4-2-1-plus" standard. It prescribes that the force be ready to defend the homeland and deter aggression forward in four critical theaters—Europe, Northeast Asia, the East Asian Littoral, and the Middle East/Southwest Asia. In addition, the force must be able to swiftly defeat aggressors in any two of the critical regions in overlapping time frames, while preserving the option to defeat one of the aggressors in a fight that could require occupation of the enemy's home-

land or a change in its leadership regime.

"It doesn't appear that the small-scale contingencies are coming off the plate," Bath said. "But it doesn't appear that we need to think of the classic two MTWs like we used to. So we need to start thinking about taking some of the forces that we were earmarking in the war plans for an occupation in the second MTW and use those in that classic 'deter forward' or 'swiftly defeat' in two of the four regions."

For the Air Force, the new standard does not lead to reduced requirements.

"What we have found is that future demands, predicated upon specific war games, are going to drive a demand for aerospace capabilities that is far greater than the numbers we used in Kosovo," Bath said. "I think the demand here on our air and space forces is greater than the demands that came out of the older, two MTW strategy."

One of those watching the situation unfold is retired Maj. Gen. Donald W. Shepperd, former director of the Air National Guard, who has argued for years that the Air Reserve Components can and should make a strong contribution to current Air Force operations.

"The uncertain world demands continued military involvement, and it's not likely we are going to get much help in increasing the size of the active force," Shepperd said. "So

we are left with deciding how to best use what we have."

The Force Mix

What percentage of the force can be safely put into the Guard and Reserve?

For some of the services, that question might have quality connotations, but not for the Air Force. The Air Reserve Components are at least as good as the active duty force, and everybody knows it.

The Guard and Reserve have always picked up a lot of the action in wartime. One out of every five Air Force people who deployed to the Gulf War, for example, was a member of the Guard or the Reserve.

In years gone by, though, it was often assumed that there had to be a fairly low ceiling on the Guard and Reserve share of the force mix because of a factor called the "rotation base."

In those days, a significant part of the active duty force was stationed overseas. Air Force members expected several overseas tours during a career, but they also expected to spend part of their careers at bases in the United States.

If too much of the force structure at home was in the ARC, it would eat into the number of Stateside assignments to which active duty people could return in between their overseas tours. Obviously, active duty people could not spend their entire careers abroad, so preserva-



USAF photo by SSGT Jerry Morrison

The Georgia ANG's 116th Bomb Wing lost its aircraft and mission when USAF decided to cut the B-1 bomber fleet from 93 aircraft to 60. The fallout from that decision helped expedite the blended wing initiative.

tion of the rotation base was fundamental.

A related consideration was that contingency deployments—a staple of Air Force life in the 1990s—fell mostly to the active duty force. As late as 1999, the Guard and Reserve were covering only a small fraction of the deployments to the Southwest Asia “Sandbox.”

If the force mix got too thin, the contingency deployments would come around even more often for the active duty force, and the frequency of deployment was already a problem.

To top matters off, Bath pointed out, “As we drew down the forces post-Cold War, we drew down more on the active side than on the Guard and Reserve sides.”

Taken together, these considerations could be expected to point toward a lesser presence for the ARC in the force mix, and that might have been so, except for several developments.

As the Air Force drew down in size in the 1990s, it also pulled back from overseas bases. Today, most of the force is based in the continental United States and projects power in an expeditionary mode. That has greatly reduced the rotation base problem.

Another change is that the Guard and Reserve have become expeditionary, too. They account for about one-fourth of the aviation assets on the “iron list,” available to deploy as part of the Aerospace Expeditionary Forces. For the AEF rotation cycle that began in March, the Guard and Reserve signed up to provide 13 per-

cent of the expeditionary combat support but, in fact, supplied 29 percent.

Future Total Force

Many of the innovations seen today, including the blended wing, grew out of a broad concept from the 1990s called “Future Total Force.” It proposed combining active duty, Guard, and Reserve components in new ways to better take advantage of the unique strengths of each of them.

In the late 1990s, for example, the ratio of experienced to inexperienced pilots in the active duty force had fallen to about 40-to-60, far below the desired ratio of 55-to-45. There were not enough experienced pilots to team with the new pilots to train and upgrade them efficiently.

Meanwhile, the Air Reserve Components were pilot rich, with experience levels around 80 percent, and looking for available cockpits, which the active force had in abundance. How about putting inexperienced active pilots with experienced ARC pilots in a “hybrid” wing that would yield benefits for all concerned?

Air Force Reserve “associate” units had been operating for years at active duty airlift and refueling wings, but blended fighter organizations had not been tried until Air Force Reservists were assigned on a test basis to the 78th Fighter Squadron at Shaw AFB, S.C., in 1998.

Future Total Force also proposed that the Guard and Reserve could carry more of the contingency deployment workload, especially if the

tasking could be given well in advance and broken up, if need be, into smaller packages in which a 90-day rotation could be shared by different crews, each covering 15 days. That proposal is now in effect and working well with the AEFs.

ARC-active integration was nudged along by Shepperd during his tour as director of the Air National Guard from 1994 to 1998. He assigned officers to each of the Air Force’s major commands—in addition to, not instead of, those traditionally assigned as Guard assistants—to help with daily operations, exercises, and planning.

Shepperd absorbed manpower losses in his own staff in order to place Guard people with their active duty counterparts, but the integration worked every bit as well as he had hoped it would.

The Wing at Robins

Secretary of the Air Force James G. Roche told Congress in February that experimentation in the Future Total Force concept would be exploring still other new organizational structures.

“Blended units,” Roche said, “will integrate active, civilian, Guard, and Reserve capabilities in creative new ways that may appear as radical departures from the past but which have already been part of the Air Force business practice for years. Flying and support functions, for example, will be so integrated with component personnel as to be invisible to outside observers.”

What Roche had in mind, first and foremost, was the blended 116th Air Control Wing at Robins. It was a solution, not only to more effective Air Force operations but also to a burning political problem.

Last summer, the Department of Defense and the Air Force decided to cut the B-1 bomber fleet from 93 aircraft to 60 as an economy measure. One of the results was that the 116th Bomb Wing at Robins would lose both its mission and its aircraft.

The Pentagon did not handle either the announcement or the Congressional notification very well, and the political heat expedited the idea of the blended wing.

The aircraft the blended wing will fly—the E-8 Joint STARS—is one of the most heavily tasked systems in the Air Force. It made its combat

People and Airplanes

As of September 2001

	ANG	AFRC
Personnel Strength	109,727	79,428
Bombers	16	8
Fighter/Attack	650	104
Helicopters	15	21
Recon/BM/C ³ I	3	4
Special Operations	4	12
Tanker	211	73
Airlift	259	168
Total Aircraft	1,158	390

debut in the Gulf War, where a prototype performed better than its developers expected.

Joint STARS did not officially reach initial operational capability until several years later, but the demand for its services has never let up.

Up to now, the mission and the aircraft have been assigned to Air Combat Command's 93rd Air Control Wing, also based at Robins. The wing presently has 13 E-8s, the most recent one delivered in May. Eventually, there will be at least 17 of these aircraft, although the total could conceivably go as high as 21.

The 93rd has begun mission and maintenance training for the 116th, which switches to the air control wing designation in October. For a time, the two wings will operate side by side, both performing the Joint STARS mission.

According to the plan, the transition to the blended wing will be completed in October 2004, if not sooner, with an Air National Guard officer in command. Thus, the Joint STARS mission gains resources, and a major Guard unit remains at Robins.

"Developing blended units will not be without challenge," Roche said. "Outdated laws and policies would have to change to reflect requirements in command-and-control, fiscal, and personnel issues."

One such glitch is that Guard officers report to their state governors under Title 32 of the US Code. They cannot simultaneously hold Title 10 authority—carrying federal status and control over active duty airmen under the Uniform Code of Military Justice—without giving up their Title 32 status.

The Air Force has requested legislative relief to head off that problem, which would present difficulties for a Guard officer in command of a blended wing.

The Frictions of Change

The world of the ARC has changed, and not everybody likes it. They would like to go back to the days of weekend training, an annual tour of duty, and activation that might come once or twice in an ARC career.

"Seamless integration is killing the



Staff photo by Guy Acelo

The active duty 93rd Air Control Wing has already begun mission and maintenance training on Joint STARS aircraft for the Guard members who will share the Joint STARS mission with them in the new blended wing, the 116th ACW.

Air Guard, and we are well on our way to supplementing the Regulars as the track to the airlines," said a major from the Pennsylvania Guard, venting his spleen in a letter to *Air Force Magazine* last year.

He said the feeling among pilots of his acquaintance was that "I quit the Regular Air Force once, and if you make the Guard like what I left, I'll quit again."

Expressing a similar view, Paul Connors, Air Force editor of *Defense Watch*, wrote in April that "AFRC and ANG personnel are suffering from a serious case of 'mission creep' as local commanders—eager to show what their units can perform—have volunteered their personnel and units for an expanding number of missions worldwide such as support for assorted Air Expeditionary Force packages that Air Force planners need staffed."

The flip side of the argument is that the nation's requirements have changed, and the Guard and Reserve must change with them if they want to stay relevant.

So far, the predictions of personnel problems caused by the change have not been borne out.

Air Force Reserve Command continues to exceed both recruiting and retention goals, Sherrard said.

Last October, Maj. Gen. Paul A. Weaver Jr., then director of the Air National Guard, told the Defense Writers Group that retention "has never been better."

Ironically, the ANG missed its recruiting goal last year, but the reason was that "I had to pull off our recruiters and pull back on recruiting because the retention in the Guard was so good," Weaver said. "And if you looked at the units that are the busiest, normally they have the highest retention rates as well."

In May, however, National Guard officials told *Inside the Air Force* newsletter that the extended mobilization and workload of the past year could prompt "a significant number" of Guardsmen to resign.

"It's not wise to commit the reserves in a wartime capacity for a long period of time," Sen. Max Cleland (D-Ga.), chairman of the Senate armed services personnel subcommittee, said in April. "Otherwise, you'll have no reserves left to commit when something else happens."

There is no question that the reserve components are presently employed—as are the active forces—at a level that is hard to sustain. But what to do about it is something else.

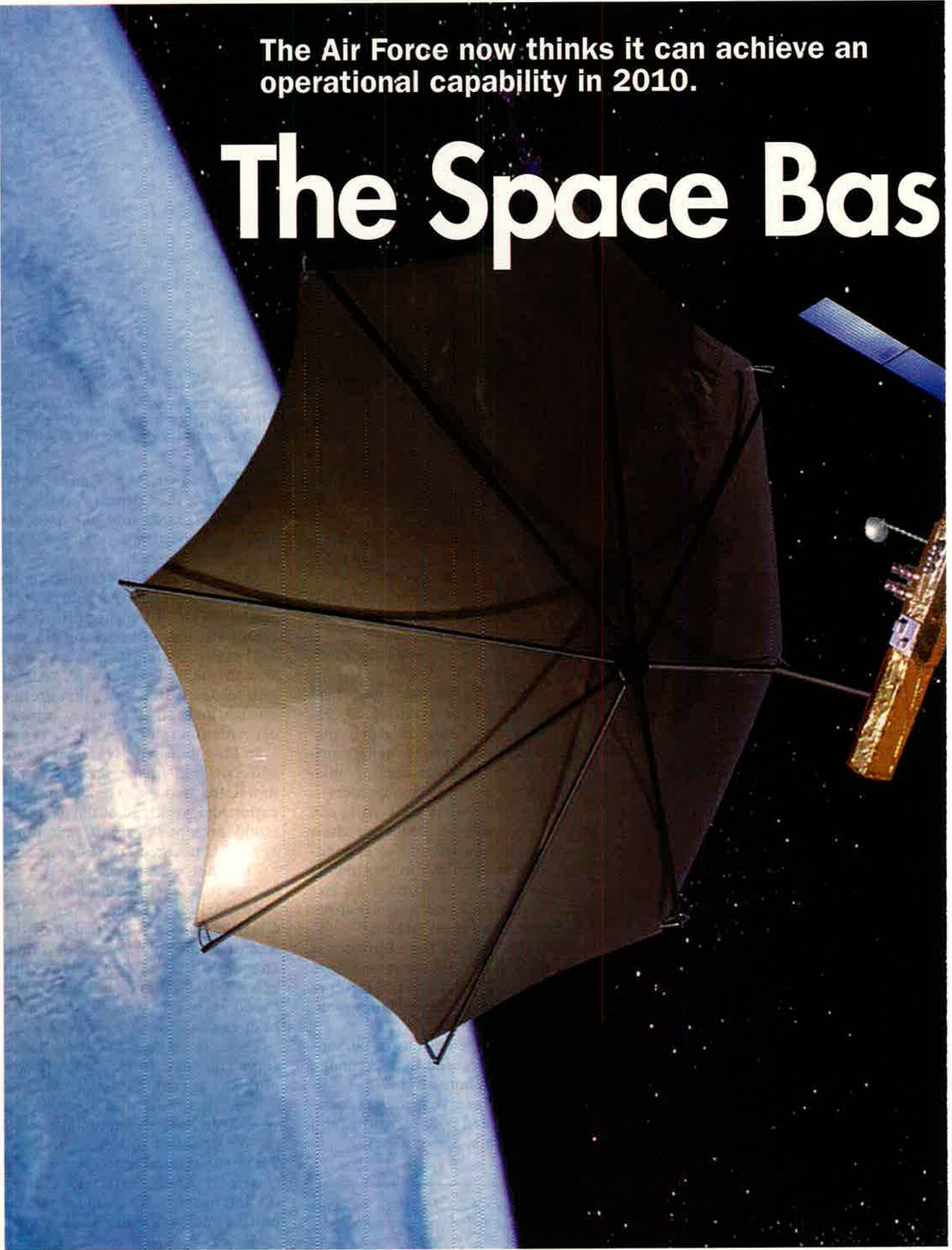
"We couldn't prosecute the war without the Guard and Reserve," said Charles S. Abell, assistant secretary of defense for force management policy, and "it's going to be a very long war." ■

John T. Correll was editor in chief of Air Force Magazine for 18 years and is now a contributing editor. His most recent article, "The EAF in Peace and War," appeared in the June 2002 issue.

The Air Force now thinks it can achieve an operational capability in 2010.

The Space Bas

Artist's concept illustration by Erik Simonsen



ed Radar Plan

By John A. Tirpak, Executive Editor

THE reorganization of military space around the Air Force might prove to be key in making a new Space Based Radar program work, just as the old, fractured style of space management caused the demise of its predecessor, Discoverer II.

The new arrangement aims to harmonize requirements for space data-collection systems and their acquisition management. This will likely produce a workable SBR capability within the decade. It would be as if Discoverer II simply had gone forward, only with even more capabilities.

Discoverer II would have yielded on-orbit experiments, but it would not have been a particularly useful military tool. SBR as now envisioned will provide battlefield intelligence almost from the moment it goes into orbit.

The program aims to achieve an initial SBR capability in 2010. It would give US forces Ground Moving Target Indicator data day or night, in any weather, from orbit. It will augment the GMTI capability in today's fleet of E-8C Joint STARS aircraft. The GMTI can be foiled or undermined by mountainous terrain or heavy foliage.

SBR's value stems from the fact it can look directly down from orbit. An enemy cannot hide behind obscuring terrain features to avoid detection. It will also be able to look deeper into enemy territory than would be possible with Joint STARS. Its use would put at risk no aircrew members or unmanned vehicles, and it would be available in wartime or peacetime. It will have other inherent functions, as well, such as detailed mapping capabilities.

"This system will complement

other manned and unmanned systems," said Lt. Gen. Brian A. Arnold, head of Space and Missile Systems Center, Los Angeles AFB, Calif. "During peacetime, obviously, it would be great for intel preparation of the battlefield. ... During wartime, especially in high-threat areas, it may be the only thing you can get into an area."

Discoverer II was meant to be a technology demonstrator. Plans called for flying two proof-of-concept satellites this decade, to be followed by a full constellation of perhaps 20 SBRs as much as 10 years later. The demonstrators would not have been operational craft and would not have had a system for disseminating the data they collected. Only when the experiment was concluded would work have begun on designing and lofting a working constellation.

The Requirements Dilemma

However, there were competing requirements from other branches of the military and the Intelligence Community, and little had been done to fully explore how the system's information could best be forwarded directly to battlefield commanders. Moreover, both the services' leadership and Congress wanted a space based radar capability more quickly than looked possible with the Discoverer approach.

Congress canceled the Discoverer II project in 2000, complaining about uncertain costs and schedule, poorly



Artist's concept

Undecided is whether SBR will be a constellation in low or medium Earth orbit or a combination of the two. Higher satellites provide greater coverage and can be fewer in number; lower satellites use less power and can be smaller.

explained requirements, and a lack of coherent vision for how the system would transition to operational use. However, it gave \$30 million to the National Reconnaissance Office to pursue enabling technologies for the concept.

When the Bush Administration arrived and made the Air Force the executive agent for military space activities—and also assigned the USAF undersecretary as the acquisition authority for space systems—plans for a better-thought-out SBR began to take shape.

In February, the Air Force-led

Joint Program Office for SBR gave Congress a roadmap for the program. At the end of this month, a midterm report on an SBR analysis of alternatives will be presented to Air Force Undersecretary Peter B. Teets. If all goes as planned, Teets this fall will approve a program go-ahead. The service has penciled in an unofficial goal of awarding hardware contracts in Fiscal 2004–05, with a first satellite to be lofted about 2010.

"The conclusions of the roadmap were that a Space Based Radar in the next decade is feasible," said Col. Robert Shofner, acting director of the SBR Joint Program Office. "Then it laid out some proposed technologies that need to be [developed], the requirements work that should be done, and ... it said that we don't need to go out and fly another Discoverer II."

Technologies deemed necessary for the SBR have been advancing since Discoverer II was killed, and the key ones—active electronically scanned arrays and synthetic aperture radar, to name two—are considered largely in hand, Shofner said. The roadmap declared that the SBR program could begin "in the normal, stepwise fashion of building a satellite program," said Shofner, although "it did not specify a specific solution" to the GMTI requirement.

Shofner went on, "Air Force Space Command said, 'Let's get the requirements right.' OSD [Office of the Secretary of Defense] looked at



USAF photo by TSgt. Jack Braden

SBR's objective will be to provide data in an integrated, seamless way. If the system is set up as envisioned, the user will not be able to tell whether the data he sees came from a satellite, sensor aircraft, or other intel source.

it and said, 'This is all good. We've got requirements work going on, we've got the technology work going on, we believe in SBR. Let's push forward. Let's make it happen.' We delivered a roadmap to Congress in February, we appropriated money in [Fiscal] '02, and we're off and running."

Officials expect the Navy and National Imagery and Mapping Agency to join the JPO in the near future.

From Scratch

Space Based Radar will be the first "clean sheet of paper" concept to enter development since the Air Force assumed executive agent status for all military space programs. The status was conferred last year in response to advice by the so-called Space Commission, an independent panel chaired by Donald H. Rumsfeld. He resigned that position to accept nomination as Secretary of Defense.

In June, Air Force acquisition chief Martin R. Sambur designated SBR as one of five key programs that are deemed to be "pathfinders" for new, innovative, and streamlined acquisition strategies. The goal will be to more rapidly design, develop, and field new capabilities while at the same time lowering technical risk and achieving greater collaboration between designers, contractors, testers, and users of new systems.

Such designated systems are to make maximum use of spiral development, which allows the service to field hardware that meets only 60 to 80 percent of its final desired capability, while it makes incremental improvements toward meeting the full requirement.

Gen. Lance W. Lord, head of Air Force Space Command, said SBR will be developed "in a way that we don't ask it to do too much, too fast," but which in any case is grounded in a solid operational requirement and thinks through the dissemination aspects of the system before any hardware is built.

Notionally, SBR will be a constellation of small satellites, perhaps 20 to 25 in all. Much of the concept work being done now is in trying to decide if they will be in low Earth orbit, or medium orbit, or a mix of the two.

"You don't want the signal to be too far away from the target," Lord said, because of limitations on radar

power. Higher-altitude satellites can be fewer in number and require less frequent "turnover" to other satellites as the world rotates below, but require more power and bigger antennas. Low Earth orbit satellites require smaller antennas and less power, but more would be needed for full coverage because of shorter "dwell time" over a target.

Lord also noted that a larger constellation would require more launch capability, driving costs and risks up.

A clear picture has not yet emerged as to what SBR would physically look like, Shofner noted. There is a desire for a large antenna, except "the bigger the aperture, the more rigidity that you need in it," possibly requiring a larger vehicle. Dispersed satellites creating a synthetic aperture are a more likely solution.

"We're looking at a number of different ways," Shofner said, but SBR will definitely fit the label of a small satellite.

Manned, Unmanned, Space

SBR will be the centerpiece of the edict by Gen. John P. Jumper, USAF Chief of Staff, that all new starts must focus on "the integration of manned, unmanned, and space platforms," Lord said. SBR data will be fused with data collected by Joint STARS, Unmanned Aerial Vehicles, and other platforms to present a single coherent picture of an area to field commanders. The Air Force wants SBR data to be piped directly into

aircraft cockpits, tactical vehicles on the ground, and ship command centers, as well as to Stateside intelligence analysis hubs.

Jumper told Lord not to get "hung up" on the platform, but on the desired effect.

"The subject of the sentence has been GMTI ... to the warfighter ... as opposed to ... Space Based Radar," Lord said.

Another priority is to make sure the data acquired get to the users and not get stalled in endless analysis, Lord said. Today's intelligence agencies, he observed, are awash in information, but often can't make much sense of it enough to turn it into what Jumper calls "actionable" information.

"We get a lot of data," Lord said. "We're collecting it more and enjoying it less."

Not part of the SBR program per se, but still part of what the program will assess, are the "cost implications for all the exploitation systems on the ground," said Shofner.

"Part of the work we need to do as a department is to understand what the implications are. What do we think this is going to cost other programs? That's something that's just begun." The actual satellite is probably on firmer ground now than "the exploitation part of this," he said.

No one has yet decided how much of the processing of data will be done aboard the satellite itself. One idea is to do much of the processing



Artist's concept illustration by Erik Simonsen

SBR will be the first program to be developed under the new pan-agency space hardware acquisition system now headed by the Air Force. It will employ spiral development, allowing early fielding and rapid improvements in capability.

off-board, then spiral additional processing onto the platform in later versions.

The system will have to be able to “talk” to NIMA computers, as well as the Army’s Tactical Exploitation System and Navy ship-based systems. The cost to create this connectivity has not yet been estimated, Shofner said.

The decision to proceed far more deliberately with SBR has to some extent been colored by unexpected and substantial cost growth on the Space Based Infrared System, or SBIRS, said Arnold.

The Stigma

“The space community is suffering from a sort of stigma—that we rush to judgment, and we go out, and before we get complete knowledge of something, we rush in to build these systems, and we misunderstand or miscalculate the complexity of the task,” Arnold observed.

“We have an opportunity now to take a lot of the lessons learned on some space systems we’ve developed recently and apply those in a proper manner. ... We need to go along slowly. And a lot of people want this system right away, but we need to be very prudent in our approach to this system,” he added.

“We don’t want to create the same kinds of problems for us that perhaps we had on SBIRS High.”

Neither radar nor power system nor satellites will be the main challenges of the program, Arnold went on to say.

“Integration has always been the most difficult thing. The other [difficult] thing is ... software.”

With so many other major initiatives—SBIRS High and Low, GPS III, and a new “transformational [communications] architecture”—Arnold said one of his main concerns in making SBR work is having enough systems engineering talent available to tie everything together.

Arnold said the JPO will be “really careful about writing an [Operational Requirements Document].” He added, “We don’t have a notion exactly what this thing is going to look like, nor do we know what the [concept of operations] are. That’s what we’re doing right now.”

One potential use for SBR concerns missile defense, said Arnold, because “intel preparation of the battlefield ... is the front end of mis-



Artist's concept illustration by Erik Simonsen

Part of the conceptual chore facing USAF is deciding what part of the intelligence picture each system will provide. The Global Hawk UAV will be key in the ISR network but does not compete with SBR.

sile defense. ... It could ... provide a source of data for them, and I think it would be useful for them, too.”

Arnold declined to say much about the possibility of using SBR as an offensive weapon. With so much wattage available, the satellites presumably could be used as a directed-energy weapon. Current studies are taking into account such possibilities.

SBR does not compete with the Global Hawk UAV or the so-called Common Wide-body Intelligence, Surveillance, and Reconnaissance aircraft, Arnold said. They are “more near-term” than SBR. However, SBR will have to compete with other space systems and prove it will provide true value to earn its way to orbit.

SBR was originally conceived as replacing the E-3 Airborne Warning and Control System as well, Shofner said. That task is too technically challenging at this time. “We see that as several generations away, ... something we really don’t envision before 2015, 2020,” he said.

Special Problem

Airborne moving targets pose a special problem for a space radar. Shofner explained: “We haven’t been able to develop radars that are powerful enough and sensitive enough in space to be able to track fast-moving airborne targets. There’s a lot of clutter, a lot of backgrounds you have to sort out. ... It’s still a very difficult problem.”

While the Defense Advanced Re-

search Projects Agency is working on the problem, no one foresees a solution in time to get it aboard an SBR fielded in 2010, Shofner said.

To meet an on-orbit target of 2010 for the first spacecraft, a formal program must get started about 2004. It would take at least six years to build, integrate, and test such a system, AFSPC officials said.

A single contractor probably would be selected in 2005 in order to have at least two spacecraft built for launch in 2010. Lockheed Martin and TRW were competitors on the Discoverer II program, but AFSPC officials said there was no guarantee they would be involved in SBR. A new competition would likely be structured to demonstrate an SBR in individual pieces and in as integrated a fashion as possible on the ground.

Notional funding profiles suggest SBR could cost some \$700 million to \$800 million per year by 2008. At that point, spacecraft fabrication would be in full swing and launch services would have to be acquired.

Shofner said he fully expects that users will swoop in and try to hang many more missions on SBR, which could threaten its affordability.

“They absolutely will try,” he said, “and we’re going to work awfully hard to spiral it in and start slowly, so we can field it on time.”

He said he expects Teets and Jumper to watch the program “very carefully,” the goal being “to make sure we don’t get out of control.” ■



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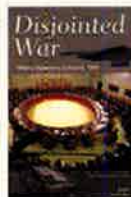
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Compiled by Chequita Wood, Editorial Associate

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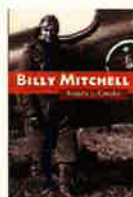
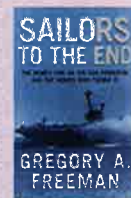
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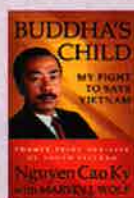


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Patriotism notwithstanding, getting and holding the right number of service members takes skill and effort.

Stabilizing the Force



By Bruce D. Callander

In honor of USAF's 54th anniversary, 54 airmen gathered at the Pentagon Sept. 17 to re-enlist. A higher-than-usual number of members eligible to separate have elected to stay since Sept. 11.

THE war on terrorism has inspired many former Air Force members to return to active service; patriotic fervor has helped recruiting in general.

To the surprise of some officials, it also has caused some members who had planned to leave service to change their minds and stay.

Beginning in September 2001, all active and reserve members were barred from separating and retiring, under Stop-Loss rules enacted due to wartime demands. When USAF began removing Stop-Loss restraints, service officials braced for a flood of losses; by April, about a third of members in all skill areas were free to leave.

While there have been some separations, the feared heavy exodus did not occur. Even more encouraging was what happened among members who previously had said they would separate or retire as soon as Stop-Loss was lifted.

"What we have found was ... surprisingly positive," said Lt. Gen. Richard E. Brown III, USAF's deputy chief of staff for personnel, in a late April interview.

"The current data show that of the officers who had elected to separate or retire before Stop-Loss, 85 percent have left or still plan to. But 15 percent have said, 'No, I want to pull my papers. I want to stay.'" Normally, only about 2.3 percent of officers who have made the decision to leave have a change of heart later.

"On the enlisted side, the numbers are similar," Brown continued. About 89 percent said they would retire as planned, but the other 11 percent changed their minds. That rate normally runs about three or four percent. "So, again, the figures are very positive that people are wanting to stay with the Air Force," he said.

It's not clear whether the trend will continue. The Air Force released additional skills from Stop-Loss in

late June. Restrictions remained for three officer career fields (special operations pilot and navigator and security forces) and eight enlisted fields (flight engineer, airfield management, operations resource management, air traffic control, intelligence applications, pararescue, fuels, and security forces).

Uncertain, too, is what will happen when the service releases the reserve forces mobilized after Sept. 11. Some 38,000 Air National Guard and Air Force Reserve Command members were called up or volunteered for active duty and most remained aboard.

"We're attempting to reduce the number of folks that we have mobilized," said Brown. "Part of that is trying to determine what is the need for the future, what is the next step. As we get clearer guidance on that, we'll know what kind of people we need to conduct the next operations, and hopefully we can also bring our Guard and Reserve back to the normal state.

"We have to normalize ourselves somewhere in the future to bring those folks back into their hometowns. For example, some of the security forces for the Air Force came out of some local police department, so that police department has one or two or three fewer policemen. Well, that's tough on small-town America."

While the service faces the prospect

of filling the gaps left by departing active duty and reserve members, it also may face the added task of increasing overall strength.

Cut Too Far?

Since the late 1980s, "we drew down the Air Force from what was in the neighborhood of 608,000 active duty blue-suiters to where we are today, just a little over 350,000," Brown explained. "A lot of people don't realize that we also drew down our civilian employee force by almost 100,000, from about 250,000 to right around 150,000."

With increasing contingencies and small wars over the last decade, and now a full-up war on terrorism, "the question today ... is, have we gotten too small," Brown observed.

Despite the post-9/11 show of patriotism, officials concede that getting and holding enough members to meet both present requirements and the proposed increases won't be easy. In March, Brown and other service leaders testified on recruiting and retention before the Senate Armed Services Committee's personnel subcommittee. They said then that, patriotic enthusiasm notwithstanding, the military continues to struggle with the basic problem of getting and holding enough people, particularly in some critical specialties.

Enlistment figures released last October are encouraging. The Air

Force brought in 35,381 people during Fiscal 2001, against a goal of 34,600—102 percent of the goal.

"We have already met our recruiting goal this year for FY '02 and it's only April," Brown noted. "And our recruiters continue to work. They are actually putting people into the bank for next year. So we're in great shape, recruiting-wise."

Not all of the recent success was bringing in brand-new recruits; 1,155 of last year's total were prior service returning to active duty.

Many signed up before Sept. 11 and a sizable number were prompted to come back after the terrorist attacks. If it had had to rely on new recruits alone, the Air Force would not have met its goal.

The Air Force is making a conscious effort to attract more such veterans. In April, it opened a Voluntary Retired Enlisted Airman Extended Active Duty Recall program, which allows enlisted members who have not been out more than three years to return to hard-to-fill skills for 24 months. Earlier, it had made a similar offer to retired officers, and several hundred returned in the six months after Sept. 11, including more than 100 pilots. Most of those went into rated staff positions.

Prior-service recruits are particularly valuable because most already are experienced and can be moved into shortage skills with little or no additional training. This depends, however, on how long they've been out of service and whether they're still proficient in skills the Air Force needs. Most will not stay long enough to warrant additional training.

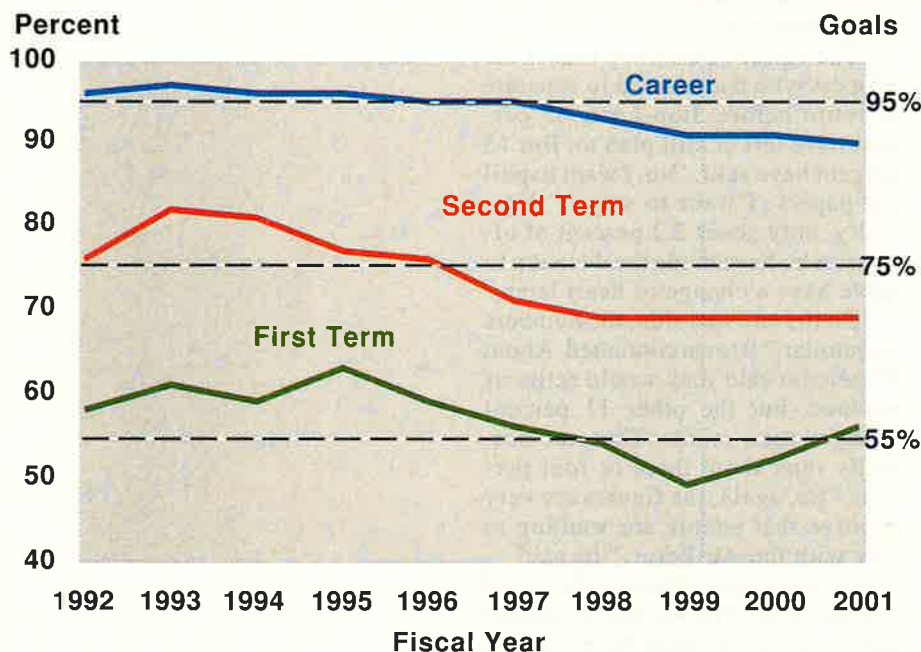
If the post-9/11 enthusiasm gave a boost to active duty recruiting, it has had a less fortunate side effect for the reserve forces.

The Reserve Impact

Lt. Gen. James E. Sherrard III, chief of the Air Force Reserve, testifying before the personnel subcommittee in February, said, "FY '01 started out as a very, very good year and continued for us, in terms of recruiting, where we were able to achieve 105 percent of our recruiting accession goals. ... Retention was at an all-time high of 89.3 percent."

Unfortunately, the Air Force's Stop-Loss restraints halted the exodus of active duty members and reduced the pool of potential recruits

Re-enlistment Rates



for AFRC, which normally draws about 30 percent of its annual accessions from among separated active duty members.

Sherrard said he is also concerned about the effect the heavy mobilization of Reserves will have on future recruiting and retention. He said that after the terrorist attacks, Reservists began volunteering for active duty before they were called. The Reserve then called up thousands more. By February of 2002, the general said, AFRC had mobilized more than 11,600 people, with more than 2,200 of those members deployed overseas.

For the active force, pilot retention also remains a major worry. "Despite the patriotic dividend," Brown testified, "we ended FY '01 short 1,239 pilots (nine percent) and project to end FY '02 short 902 pilots (seven percent)."

Statistics show that the navigator retention rate rose slightly in Fiscal 2001 but that rates among air battle managers and nonrated operations officers dropped. (See chart on p. 72.)

Many officers—particularly pilots—continue to be lured away by attractive civilian job offers. There are similar problems in the scientific and engineering officer skills.

Enlisted losses to the civilian world also remain a concern. Brown told the Senators, "Many of our skilled airmen—scientists, engineers, air traffic controllers, computer [specialists]—are also in high demand by the civilian sector, making retention even more challenging. Thanks to Congress and this committee, we've received several bonus authorities that provide us the flexibility to target our critical officer and enlisted skills. However, when we lose program funding, we lose our flexibility and our troops' trust and confidence."

Career Re-enlistment Down

Again, re-enlistment statistics show a mixed picture. The Air Force exceeded its goals for first-term re-enlistments in Fiscal 2001 for the first time in three years, but it missed its second-term and career goals for the fourth year in a row. (See chart on p. 70.) About 80 percent of the enlisted force—some 235,000 airmen—will be eligible to make a re-enlistment decision in the next five



Staff photo by Guy Aceto

Some 38,000 ANG and AFRC members were called up or volunteered for active duty after the terror attacks. Many are still on board performing missions for Operations Noble Eagle, Enduring Freedom, and more.

years. Encouraging more of them to stay longer will be a major priority.

"We are also concerned with our civilian force manning," Brown told the subcommittee. "In the next five years, more than 40 percent of our career workforce will be eligible for optional or early retirement. While we're meeting today's mission needs, without the proper civilian force shaping tools, we put at risk the possibility of not being ready to meet future challenges."

The Air Force has added some new wrinkles to its retention effort. Last fall, it launched a "re-recruiting" drive to influence officers in critically undermanned skills to stay on. The idea is to have midcareer and senior specialists talk one-on-one with undecided juniors in their fields and try to convince them to remain.

The first focus was on developmental engineers. "I can't tell you that X number of officers have just overnight changed their minds," said Brown, "but some did and many more are giving much more positive thought to staying in the Air Force. Many of those are anxious to see if we are really going to come through with a retention bonus."

Single Biggest Problem

During the hearings, Brown cited another serious problem—the continuing need for members in remote assignments. In recent years, the Air Force has reduced its overall over-

seas requirements, but it continues to require members to serve unaccompanied in some areas, particularly in South Korea.

Brown told the Senate subcommittee, "The single biggest problem we have in the assignment business is putting those 10,000 folks onto those remote assignments in Korea. ... The bulk of the people who go there go without their families. Now, we've got folks who continually raise their hand and go, but that is a tougher issue today than it ever was for us in our past."

For pilots, in particular, the Korea syndrome—great operational environment but too long away from family—is spreading. "Right now, they're more active than they've ever been," he said. "They're deployed all over the world." The young man or woman who is out there, whether it's in Afghanistan or Saudi Arabia or Korea, loves the camaraderie, Brown said. "They love the focus and the fact that they've got a mission. ... But we're starting to press to burnout because they've been deployed for a long time."

Brown emphasized, "We need to look at more incentives, more ways to encourage folks to serve in such places because we still have heavy requirements."

In recent years, the service has taken pains to discover what members want out of their careers and, where possible, to supply it. Much of its attention has focused on qual-

ity-of-life issues such as maintaining competitive compensation, balancing operating tempo, providing quality health care, safe and affordable housing, and educational opportunities.

Officials concede that the service has been slow to respond in some areas. In the past decade, for example, it neglected improvements to the workplace environment to concentrate on more pressing readiness and personnel issues. Now, however, the Air Force budget asks for funds to take care of existing facilities and fix deteriorated facilities. This, the officials say, will put USAF infrastructure on a path to recovery.

Better Record

In the pay and benefits area, the record has been better. The Fiscal 2002 pay raise increased basic pay by at least five percent for everybody and by more for midlevel enlisted members, senior NCOs, captains, and majors.

Rated personnel have received substantial increases in their specialty compensation.

- In FY99, Aviation Career Incentive Pay for fliers with 14 years of aviation service was raised from \$650 to \$840 per month.

- Air battle managers became rated and eligible for ACIP for the first time, and Career Enlisted Flier Incentive Pay was authorized and implemented for the first time, providing between \$150 and \$400 per month.

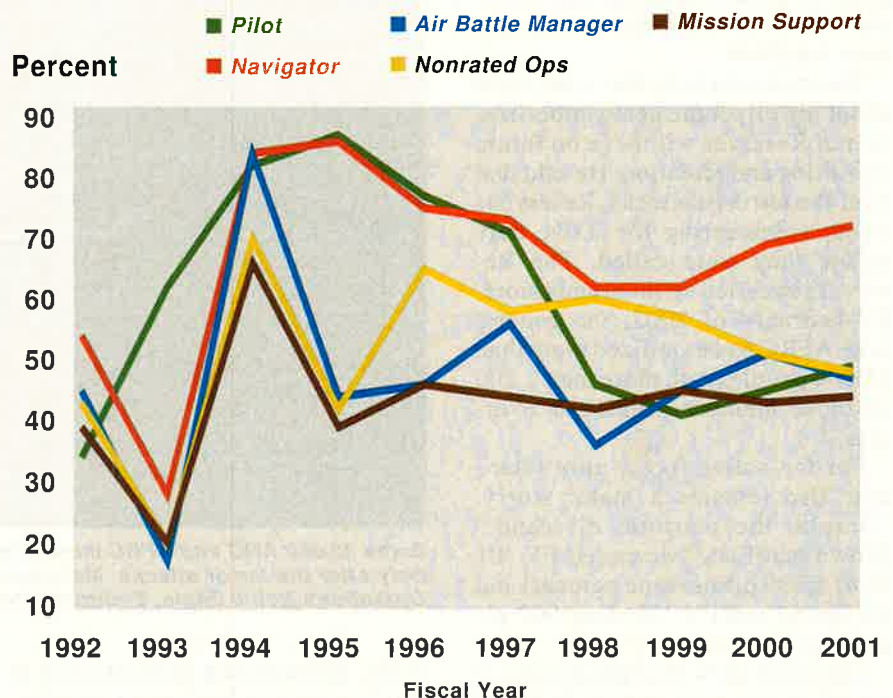
- Aviation Continuation Pay eligibility was expanded in FY00 to allow bonus payments through 25 years of aviation service rather than 14 years of commissioned service.

Two additional bonuses programs are pending for officers.

- In Fiscal 2002 an officer accession bonus of up to \$60,000 was authorized. The Air Force has asked for approval and funding to use it in such critical career areas as engineering.

- An even bigger critical skills retention bonus, which could pay up to \$200,000, was authorized in Fiscal 2001 for DOD-designated critical skills.

Officer Retention



“This is a nonrated officer bonus program that we’re going to target for scientists, [developmental] engineers, and acquisition [managers],” Brown said in the April interview. “We’re looking at what might be the next two or three most critical career manned fields behind those and we’d like to expand those in the future.”

The Air Force is authorized to make such bonuses and has notified Congress it will use them, beginning in Fiscal 2003.

“So on the first of October this year, we plan on offering a retention bonus to the first group of officers,” Brown said.

On the enlisted side, the Air Force has steadily poured more funds into Selective Re-enlistment Bonuses and expanded the number of skills in which they are payable. In Fiscal 1999, it spent \$74 million on SRBs for 135 specialties. In Fiscal 2002, it spent \$258 million and offered bonuses in 161 skills.

“Close to 85 percent of our enlisted [Air Force Specialty Codes] have some sort of SRB coverage,” observed Brown. “We need clearly

to continue the course on that program. It’s a supply and demand world.”

If officials are optimistic about reaching their recruiting and retention goals, they are haunted by past failures and cautious of becoming overconfident.

“Every year is a struggle,” Brown noted. “We missed our recruiting goal in 1999, and we were in shock. The Air Force had never missed a recruiting goal.”

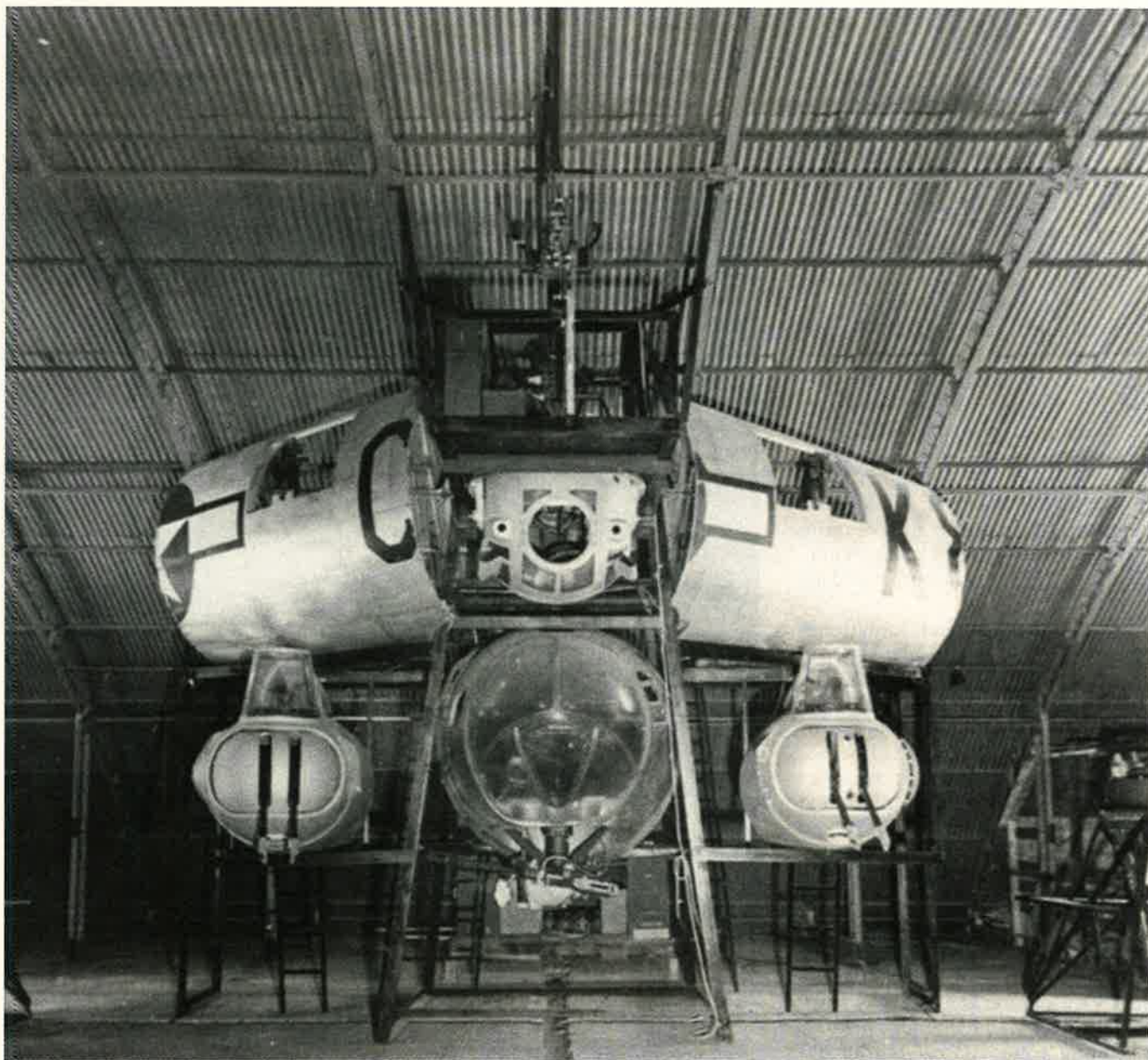
He went on to allow that “it was our own fault. We’d quit paying attention. We let our recruiter force get pretty small, and we just took things for granted. And, of course, we had been in a drawdown for the 10 years prior, so it has been pretty easy to meet goals because we kept lowering the numbers. But our retention also had gotten lower by then, so suddenly we had to recruit more people and we missed goals.”

Since then, Brown said, USAF began paying attention again, with a larger recruiting budget, a doubled recruiting force, and for the first time, prime-time TV ads.

The added emphasis has helped, but “we have to keep paying attention. We cannot sit back and say that everything is wonderful. We have to stay out on the step and keep putting our flag out so it’s seen and people want to join us.” ■

Bruce D. Callander is a contributing editor of Air Force Magazine. He served tours of active duty during World War II and the Korean War and was editor of Air Force Times from 1972 to 1986. His most recent article for Air Force Magazine, “Another Look at Pilot Retention,” appeared in the June 2002 issue.

Training Gunners



The specifics of this photo—the what, where, and when—have been lost over time, but this appears to be a World War II part task trainer for B-17 gunners. The split fuselage section has waist guns; the ball turret gun is in between. Below, tail gun positions flank the chin turret gun. Early training for Flying Fortress gunners was largely hit or miss. By one account, when then—

Col. Curtis E. LeMay began preparing his 305th Bomb Group for combat, he discovered that some of the gunners had never flown on an airplane. He said, “I got my gunners one ride in an airplane, shooting at the desert as you ran across at low altitude. That was it; then we went into combat.” Fortunately, B-17 gunners subsequently received air-to-air and air-to-ground training.

Photo courtesy Robert F. Dorr

Keeping Saddam away from mass-destruction weapons requires patience, perseverance, and an occasional bullet between the eyes.

Osirak and Beyond

By Rebecca Grant

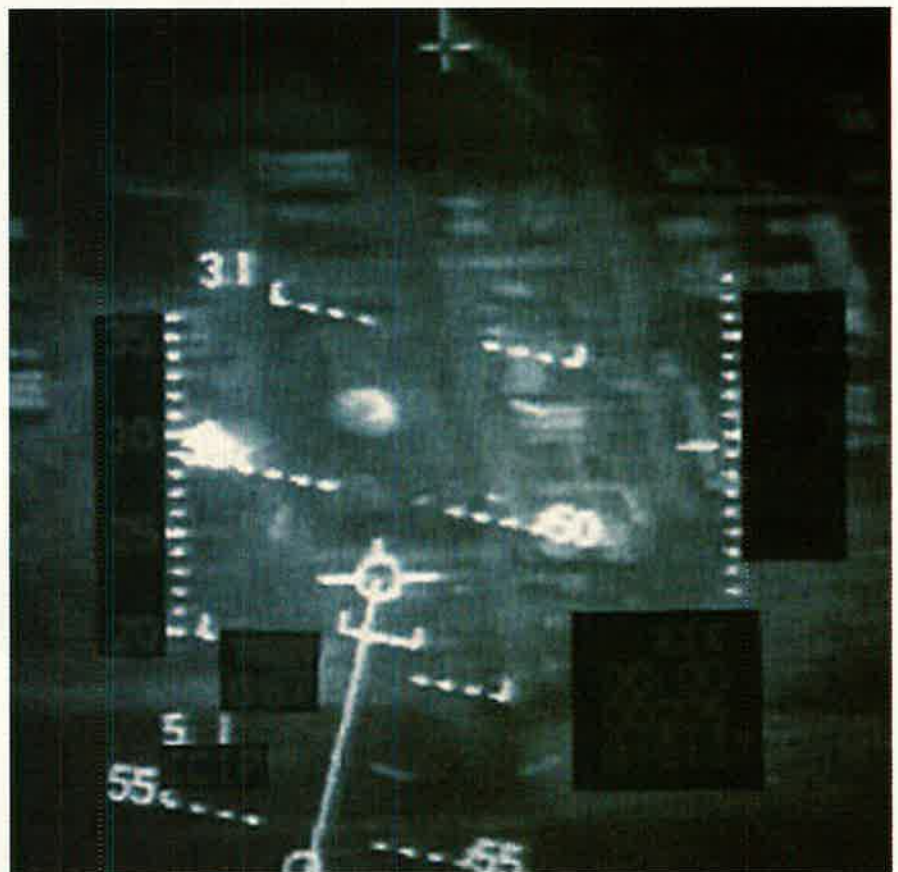
PREVENTING Iraq from building Weapons of Mass Destruction has been a US objective for more than two decades. Airpower has played a key role in that struggle, which is far from over.

Defense analyst Anthony H. Cordesman noted in a recent analysis, "Iraq is the only major recent user of Weapons of Mass Destruction." Iraq's Nuclear, Biological, Chemical, and missile programs have emerged as Saddam Hussein's personal projects and they have survived many efforts to kill them off. From Israel's raid on the Osirak nuclear reactor in 1981 to Desert Storm in 1991 and another seven years of UN monitoring, keeping Iraq's arsenal in check has generated sanctions, inspections, and air strikes.

From the beginning, international concern has focused on a specific problem: the danger Iraq would use its Osirak reactor to produce weapons-grade material for a bomb program. Iraq purchased the reactor from France in 1975. It was designed as a civilian power plant that could also produce highly enriched uranium.

Iraq's attempts to develop its own nuclear power sources dated to the 1960s. However, Saddam Hussein himself began the Iraqi nuclear bomb program in the 1970s while he was still vice chairman of the Revolutionary Command Council, prior to assuming total control of the nation.

The Osirak facility has been attacked several times. Iran actually was the first to bomb the reactor area. On Sept. 30, 1980, in the opening days of the Iran-Iraq War, an Iranian aircraft lightly damaged the Osirak facility. In response, the official Iraqi news agency issued the



An Israeli F-16 pilot's view as he lines up on Iraq's Osirak nuclear reactor in 1981.

Photo via Israeli Air Force Magazine

following statement: "The Iranian people should not fear the Iraqi nuclear reactor, which is not intended to be used against Iran, but against the Zionist entity." In other words, the target was Israel.

Israel's Shocker

Israel took note and on June 7, 1981, shocked the world with a daring and completely successful surprise attack on Osirak.

Long before they actually pulled the trigger, Israel's leaders had been debating such a move. Maj. Gen. David Ivry, who was then chief of the Israeli Air Force, recalled that one of the conditions for the attack was "we have to attack before uranium was going to get to the facility, because otherwise, after attacking with uranium inside, it can cause radiation damage to the environment and so on."

Even when faced with the looming threat of a functioning nuclear reactor, Prime Minister Menachem Begin struggled with the decision to attack. It took "about one year" to get a consensus, recalled Ivry, "because there were a lot of people who hesitated." Ivry remembered going "every two or three weeks in the Cabinet to talk about it again."

Even without a guarantee of final approval, Ivry set the wheels in motion, holding detailed rehearsals of the strike. Then—Maj. Gen. Yehoshua Saguy, head of the Israeli Defense Forces' intelligence division, was one who argued for a nonmilitary solution. On the eve of the strike, Ivry recalled, "our leading intelligence community recommended not to attack" because of the risk to the unfolding peace process with Egypt.

However, Begin eventually concluded that Israel could not wait and had to destroy the reactor. He saw it as "my chance to save the Jewish people."

After Begin made the decision to attack, the head of the Israeli Defense Forces, Gen. Rafael Eitan, briefed the pilots who were preparing to carry out the mission. "The alternative is our destruction," warned Eitan.

On June 7, 1981, all was in readiness. The starting point for the raid was Etzion Air Base, located in the Israeli-occupied eastern Sinai, close to the town of Eilat. Israeli Air Force F-15 and new F-16 fighters roared



Photo Via Israeli Air Force Magazine

IAF used F-16s (such as this one) and F-15s for the Osirak attack. The raid took Iraq off the fast track to nuclear weapons, but Baghdad then spent the next decade pouring money and manpower into WMD development.

off the 8,000-foot-long runway just before 4 p.m. They flew low and level throughout the flight to Iraq. At 5:35 p.m., they popped up to identify the target and release their bombs. "In one minute and 20 seconds, the reactor lay in ruins," reported an IDF statement. All aircraft returned to base.

World reaction was intense. Condemnations of Israel far outpaced congratulations. In the US, feelings were mixed, and yet there was a strong undercurrent of relief. Sen. Alan Cranston (D-Calif.) spoke for many when he wrote in the *New York Times*: "The bold Israeli move eliminates the immediate threat."

The destruction of Osirak took Iraq off the fast track to nuclear weapons. Iraq responded with a double approach. Baghdad put at least 20,000 people to work on the nuclear program, pressing ahead with development of gas centrifuges to produce bomb-grade material. The Iraqis also pursued a second, outdated method based on the use of calutrons for electromagnetic separation to produce highly enriched uranium.

Flush with oil money in the 1980s, Iraq spent at least \$10 billion to buy illicit components. Manufacturing and testing facilities were concealed at many sites in Iraq. The strategy worked: Former chief UN nuclear weapons inspector David A. Kay described how Iraq's nuclear efforts were dismissed by experts as a "shop

'til you drop" program. The fact is that Iraq, had it been left undisturbed, could have acquired a nuclear bomb by 1992.

Rude Interruption

A disturbance definitely was coming, however. Iraq's invasion of Kuwait on Aug. 2, 1990, soon raised the prospect of a war involving Weapons of Mass Destruction. During the Iran-Iraq conflict, Iraq used mustard gas and nerve agent weapons on 10 occasions between 1983 and 1988. About 25,000 Iranians and Kurds died, according to an estimate by Cordesman.

Biological and Chemical Weapons facilities were the top concerns of coalition planners. Gen. H. Norman Schwarzkopf judged Iraq's key military strength to be its "ability, evinced in the second Al-Faw campaign of the Iran-Iraq War, to wage an offensive with Chemical Weapons." In his book, *It Doesn't Take a Hero*, Schwarzkopf noted that it was "the possibility of mass casualties from Chemical Weapons" that constituted "the main reason we had 63 hospitals, two hospital ships, and 18,000 beds ready in the war zone."

For President George H.W. Bush, the need to clean out Saddam's Weapons of Mass Destruction was a compelling reason for going to war. In his now-famous Jan. 5 "last chance" letter to Saddam, Bush warned that the US "will not tolerate the use of

Chemical or Biological Weapons or the destruction of Kuwait's oil fields and installations."

Coalition air planners had identified "Nuclear, Biological, and Chemical Weapons" as one of 12 strategic target subsets and put NBC targets high on the priority list in case the war ended in just a few days. Most of these suspected sites were chemical and biological research, production, and storage facilities.

On Jan. 16, 1991, the target list contained just two nuclear facility targets—though more than 20 facilities later would be identified. Planners kept up the search for nuclear and other sites even after the start of the air campaign, but the task was daunting. As Kay later remarked, "There was little hard analysis that existed anywhere" on Iraq's nuclear capabilities.

The deployment of coalition forces spurred Iraq to accelerate its nuclear efforts. According to Cordesman's report, the goal was to produce a working bomb by April 1991. The crash program centered on recovering enriched fuel from Iraq's French and Russian-built reactors, in defiance of International Atomic Energy Agency safeguards supposedly in place.

Iraq also explored building a radiological "dirty" bomb that would spew radioactive material. It would furnish Iraq with a "nuclear" weapon without Baghdad's having to create a traditional nuclear explosion.

Back to Osirak

Coalition aircraft flew 970 strikes against NBC targets, using precision weapons for about 40 percent of those strikes. The air attackers struck both of the nuclear reactors built to replace Osirak. The Isis light-water reactor was destroyed, and a larger reactor was damaged, but the Iraqis hid whatever they could.

Air strikes hit hard against known biological warfare facilities like those at Salman Pak, but by then, the Iraqis "had relocated virtually all of their agent production equipment to Al-Hakam and other facilities and had buried all biological agent-filled munitions and agent stockpiles in areas likely to escape bombing," according to a Defense Department report.

Unfortunately, the lack of focused



USAF photo

Iraq's 1990 invasion of Kuwait raised the specter of a war involving WMD. Coalition aircraft, such as this F-117, targeted nuclear reactors and biological/chemical weapons facilities, setting back research and production capability.

intelligence meant that other targets appeared late in the game. One was the Al-Athir complex 40 miles south of Baghdad, which turned out to be the heart of the nuclear program. The official Pentagon report on the Gulf War recorded that Al-Athir "was not confirmed until late in the war." The very last bomb dropped by an F-117 during the war targeted Al-Athir, inflicting only light damage. In fact, subsequent inspections found that Al-Athir was where Iraq worked with design of charges for nuclear bombs.

The *Gulf War Air Power Survey*, sponsored by the Air Force, concluded: "Overall, the United States did not fully understand the target arrays comprising Iraqi Nuclear, Biological, Chemical, and ballistic missile capabilities before the Gulf War. The Iraqis had, in fact, made these target systems as elusive and resistant to accurate air attack as possible, with some success."

Iraq had learned the lessons of Osirak.

The war ended after just 43 days of air operations. That was enough to degrade Saddam's military capability, but not enough to fully identify, much less eliminate, the Nuclear, Biological, Chemical, and missile quartet. Coalition air strikes ended the immediate threat of an Iraqi nuclear bomb and set back research and production. Kay commented 10 years later that, if the war had not intervened, the Iraqis would have

"been producing enough material for somewhere around 10 to 20 nuclear weapons a year, maybe more."

The Gulf War suddenly ended before the coalition could ferret out all of Iraq's weapons workshops or fully assess what remained.

In April 1991, the United Nations passed Resolution 687, which was, in effect, a conditional cease-fire outlining an extensive plan for the disarmament of Iraq, as the Stockholm International Peace Research Institute described it. Iraq would remain under strict international sanctions until the UN certified it to be clear of Weapons of Mass Destruction.

The shooting had stopped, but the coalition military forces remained in theater and international diplomats still had a big job ahead of them.

The United Nations Security Council formed a special committee—UNSCOM—to verify Iraqi compliance with the resolution passed by the world body. It required Iraq to destroy and undertake never to use, develop, construct, or acquire non-conventional weapons or ballistic missiles with a range greater than 93 miles. The UN mandate gave the UNSCOM inspectors a free hand to inspect and verify destruction of existing capabilities and then monitor Iraq's continued compliance.

Another Iraqi Shock

Thus, the inspectors began what

would prove to be a seven-year effort to get to the bottom of the NBC and missile arsenals. However, intelligence agencies worldwide were in for a surprise. The magnitude of the Iraqi program “was a shock to everyone,” said Kay. From 1991 through February 1998, UNSCOM supervised destruction of large quantities of Chemical Weapons components, including 28,000 munitions already loaded with chemical agents.

Over the years, Iraq tried repeatedly to block inspectors from using aircraft and delayed their access to sensitive sites. It took continued pressure from the coalition to prod Iraq into letting the inspectors do their jobs.

Not until August 1995 did the inspectors get a big break. Lt. Gen. Hussein Kamel, Iraq’s minister of industry and minerals with responsibility for all Iraq’s weapons programs, defected to Jordan and started talking. Confronted with detailed information about its activities, Iraq retracted previous declarations and owned up to an extensive Biological Weapons program and in-depth research on long-range missiles.

The tally of Biological Weapons finally declared by Iraq truly was astonishing. Between 1985 and 1990, Iraq had fabricated 25 Biological Weapon missile warheads and 166 400-pound aerial bombs filled with anthrax, botulinum toxin, or aflatoxin. Raw supplies included at least 19,000 liters of botulinum toxin solution, 8,500 liters of anthrax solution, and 2,500 liters of aflatoxin. Iraq also admitted researching other virus strains. In all, Iraq had run 18 major Biological Weapons sites before the Gulf War. One report described them as “nondescript” with “no guards or visible indications they were a military facility.”

More shocking, the inspectors confirmed that Iraq was ready to use Biological Weapons. The research project at Taji produced 25 warheads for use on Iraq’s developmental long-range Al-Hussein missile. Right up until Jan. 13, 1991, four days before the air campaign, Iraq was practicing with Biological Weapons belly tanks on its Mirage fighters.

Fortunately for the coalition, airmen in 1991 quickly got the Iraqi air force under control, and surviving front-line Mirage jets bugged out to Iran after a few weeks.

The inspectors also found Iraq was still working on Weapons of Mass Destruction even after the Gulf War. In November 1995, Jordan turned back a shipment of missile components headed to Iraq. UNSCOM inspectors dredged up more missile components dumped in the Tigris River. Tips from defectors led the inspectors to more documents. As late as 1997, Iraq was believed to have 79 civilian facilities that could be quickly used for Biological Weapons manufacturing.

“Good Bureaucrats”

Overall, said Kay, the Iraqis are “very good bureaucrats.” They filed quarterly reports on weapons progress and kept detailed purchasing records. Kay recalled how the Iraqis stalled a team waiting to enter an eight-story building that was “jam packed with documents.” The Iraqis tried to move the documents out, but the building elevator broke, and they only managed to clear out the ground floor. The most sensitive items were on the floors above, and the UNSCOM team got them.

“Essentially, we managed to seize much of the file records of their nuclear program,” said Kay.

The run of success did not last long enough for UNSCOM to complete its mission. Iraqi intransigence—and splits in the UN Security Council—derailed the inspection efforts.

Trouble began in September 1991,

when Iraqi personnel started to delay or block the free access of the UN inspectors. By 1996, Iraq was regularly denying the inspectors access to sites. UNSCOM inspectors videotaped Iraqis burning and dumping files while waiting to enter one site in September 1997.

Iraq’s next tactic was to designate new “presidential” sites and then say they were off limits. At one point, Iraq expelled American nationals on the inspection team, letting them return only after diplomatic intervention by Russia. At the same time, China, France, and Russia cooled toward the inspection process and slowed the Security Council’s momentum. In October 1997, those three permanent members abstained from a Security Council finding that Iraq was not cooperating with inspectors.

Despite a visit to Baghdad by the UN Secretary-General Kofi A. Annan to meet with Saddam Hussein in February, the situation deteriorated further in 1998. That fall, Iraq ceased cooperation with UNSCOM entirely.

The only alternative left was military attack. In the fall of 1998, the Clinton Administration, with British backing, sought allied support for a limited air campaign to target missile production facilities, air defenses, and other key targets. The campaign was set to launch on Nov. 14, 1998. However, Clinton, on the advice of National Security Advisor Sandy Berger, called off the strike



DOD photo

After the Gulf War, a UN committee was to certify that Iraq was clear of WMD. Baghdad failed to cooperate. The US and Britain then led Operation Desert Fox, striking targets such as this missile research and development center.

with less than an hour to go before the first Tomahawk land attack missiles were to be airborne.

Disappointed Saudi allies retracted their support for offensive operations. With no further progress on inspections, the US and British settled on a scaled-down strike plan. Word was passed to the inspectors to leave Baghdad, and on Dec. 16, 1998, the US and British led a three-day air campaign under the name Operation Desert Fox.

"Saddam Hussein must not be allowed to threaten his neighbors or the world with nuclear arms, poison gas, or Biological Weapons," Clinton said. Secretary of Defense William S. Cohen said the first goal of the operation was "to degrade Saddam Hussein's ability to make and to use Weapons of Mass Destruction."

70-Hour War

In 70 hours, US forces struck about 100 targets with a combination of Navy and land-based fighters, bombers, and cruise missiles. Subsequent reports claimed good results on targets, including missile production facilities.

The UNSCOM process managed, despite Iraqi intransigence, to destroy weapons and uncover much more of Iraq's weapons programs. When the UN inspectors left Baghdad in December 1998, the chance to lift sanctions against Iraq went with them. Resolution 687—the conditional cease-fire—could not be fully verified. After years of propaganda about the impact of the sanctions on civilian life, the sanctions policy itself was a liability.

With inspectors out, there was no way to know whether Iraq had restarted its WMD programs. UNSCOM inspectors left behind automated video cameras to monitor sensitive sites, but by 1999, the Iraqis had dismantled them.

All along, Iraq insisted on keeping together the teams of scientists and experts from the weapons programs. Most of these key personnel remained in Iraq. In August 2000, the CIA told Congress that, after Desert Fox, "Baghdad again instituted a reconstruction effort on those facilities destroyed by the US bombing, to include several critical missile production complexes and former dual-use [Chemical Weapon] production facilities." The CIA de-

murred, saying that it had no "direct evidence" of renewed Iraqi WMD programs but said that "given its past behavior, this type of activity must be regarded as likely." The CIA then went on to describe Iraq's efforts to build short-range missiles and convert Czech L-29 jet trainers into unmanned aerial vehicles.

"The United Nations assesses that Baghdad has the capability to re-initiate both its CW and BW programs within a few weeks to months, but without an inspection monitoring program, it is difficult to determine if Iraq had done so," the CIA reported to Congress. Since Iraq retained a large pool of experts and some nonweapons-grade uranium, restarting a nuclear bomb program is also a possibility, especially if Iraq could import fissile material clandestinely. Clinton said at the time of Desert Fox in 1998, "left unchecked, Saddam Hussein will use these terrible weapons again."

Since Sept. 11, the focus on homeland security and the war against terrorism has put Iraq back in the spotlight. If the confrontation continues, airpower may once again be summoned to counter Weapons of Mass Destruction.

Pressure to develop a strategy to topple Saddam gained strength in fall 2001. The heat of the moment turned attention to Iraq as a supporter of terrorists and possible nest of Osama bin Laden sympathizers. Yet the anti-Iraq rhetoric was not just about settling old scores or expanding the war on terrorism right away. As it had a decade earlier, the issue of Saddam's ability and presumed lack of inhibition about using WMD lay at the heart of the Administration's cautious and cryptic remarks on Iraq.

In October 2001, Bush commented, "After all, he [Saddam] gassed his own people" and added "we know he's been developing Weapons of Mass Destruction." Former Congressman Newt Gingrich put it bluntly in a *New York Times* interview, say-

ing: "If we don't use this as the moment to replace Saddam after we replace the Taliban, we are setting the stage for disaster."

"Just a Dangerous State"

National Security Advisor Condoleezza Rice clearly drew the link. "We worry about Saddam Hussein," she said in an interview with Al Jazeera TV. "We worry about his Weapons of Mass Destruction that he's trying to achieve." A senior Pentagon official claimed in December that the situation with Iraq's WMD had "gotten worse since UNSCOM was driven out." He added, "Iraq is just a dangerous state, purely and simply."

Iraq is probably not in position to produce its own fissile material for as much as five years. Still, experts believe Iraq could buy black-market weapons material with relative ease. "I think everyone that I know of in the community agrees that if the Iraqis had the nuclear material, high-enriched uranium or plutonium, they would have a weapon in less than a year," said Kay. "The explosive manufacturing and missile program has gone ahead."

The United States and coalition partners have succeeded in containing Iraq. That, however, provides no guarantee that Iraq could not rebuild its WMD capability. In May 2002, the UN Security Council voted to relax sanctions, and initiatives to get inspectors back inside Iraq remain in play.

If experience is any guide, even the most capable UN inspectors will need years to hunt down what progress Iraq has made on Weapons of Mass Destruction since 1998. Meanwhile, Saddam's WMD are a potential threat to the world whether in his hands or—worse—those of sympathetic terrorists. The menace remains.

President George W. Bush told a television interviewer in April: "I made up my mind that Saddam needs to go." ■

Rebecca Grant is a contributing editor of Air Force Magazine. She is president of IRIS Independent Research, Inc., in Washington, D.C., and has worked for RAND, the Secretary of the Air Force, and the Chief of Staff of the Air Force. Grant is a fellow of the Eaker Institute for Aerospace Concepts, the public policy and research arm of the Air Force Association's Aerospace Education Foundation. Her most recent article, "In Defense of Fighters," appeared in the July 2002 issue.

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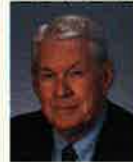
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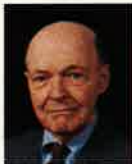
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Fledgling F-15C Eagle pilots learn the art of air superiority at Tyndall AFB, Fla.

The Air Dominanc



e School

Photography by Guy Aceto, Art Director, and Paul Kennedy



F-15C Eagles form a four-ship over the Gulf of Mexico during a training sortie.

Tyndall AFB, Fla., perched on a beautiful stretch of beach along the Gulf of Mexico in northern Florida, is home to the 325th Fighter Wing. The 325th includes three fighter squadrons—1st, 2nd, and 95th. Since 1983, the wing has been training F-15 pilots in the art of air superiority. In 1993, the wing's transfer to Air Education and Training Command from Air Combat Command signaled a more heightened emphasis on the wing's training mission. In 1994, USAF's air weapons controller training mission transferred to the wing as well.



Staff photo by Guy Accio



At left, 1st Lt. Jason Trew takes careful notes at the debriefing that comes after a morning's flight. A carefully monitored range, together with data from the Air Combat Maneuvering and Instrumentation system pod (below), means pilots are able to minutely dissect every aspect of every flight.



One-on-one instruction can be the best way to instill just the right mix of aggression and thoughtfulness in a new fighter pilot. At right, Maj. David Cool illustrates some fine points to Capt. Jay Moore.



Photos by Paul Kennedy



Above and right, four-ship formations of F-15s from the 95th Fighter Squadron cruise over the Apalachicola area. Good flying weather and a large instrumented range make the Florida panhandle an ideal training location.

Tyndall offers four basic training courses for pilots.

The "B" course is for newly minted pilots learning to fly the F-15. The students get 224 hours of classroom time over 115 training days, not including holidays and weekends. Completing the course takes about six months.



Photo by Paul Kennedy



Three other tracks transition already experienced pilots from other fighters into the F-15; requalify former F-15 pilots; and train senior officers and test pilots in the F-15.

Additionally, a 70-day instructor pilot course is mandatory for those coming to Tyndall to teach.

The B course students spend more than 47 hours in an F-15 simulator, practicing every imaginable contingency. Each "what if" has a correct response, and the instructors make sure that each pilot's reaction to a possible combination of events becomes automatic before the student takes to the skies.

After they master "the box," the novice fighter pilots will spend almost 57 hours in the cockpit of an Eagle, flying 46 sorties before completing the course.



The F-15 has long been the world's premier air superiority fighter, but USAF officials point out that by 2010 the nonstealthy F-15 will be well past its prime. The F-15 is due to be replaced by the F-22 Raptor, a stealthy supercruise fighter. The F-22 is scheduled to begin arriving at Tyndall in spring 2003.



Staff photos by Guy Acelfo



Student pilots practice aerial refueling, a skill just as critical as combat maneuvering. At left, Eagles take turns hooking up with a KC-135R from the Air National Guard's 186th Air Refueling Wing, Key Field, Miss.





F-15s served in the Persian Gulf War—where they accounted for 34 of 37 USAF air-to-air victories. They patrol the no-fly zones in Iraq and are helping to wage the war on terrorism.



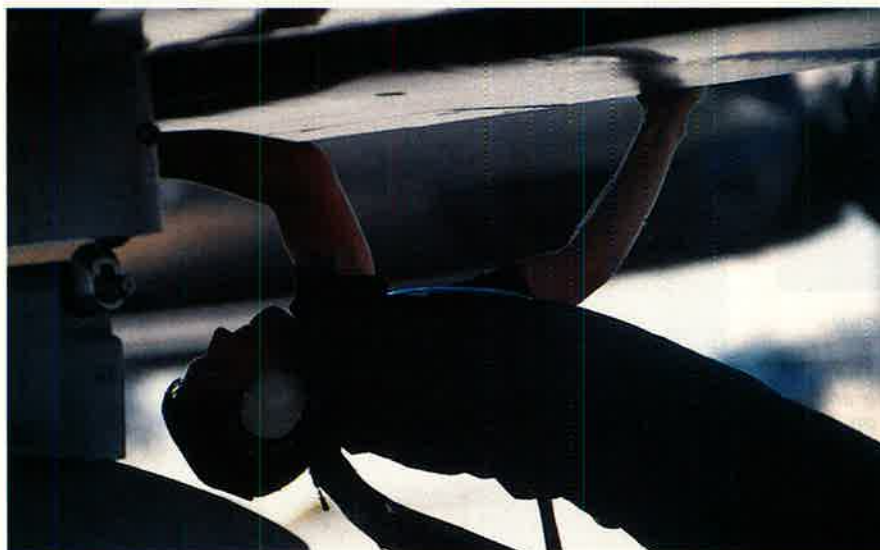
Staff photos by Guy Aceto



At left, Lt. Col. Leigh Hinkle, 325th Fighter Wing F-22 Integration Office chief, inspects an F-15 prior to takeoff. Hinkle is responsible for making preparations to ensure the successful beddown of two F-22 squadrons at Tyndall.

The air superiority team would not be complete without weapons loaders, and their training never stops. They undergo monthly proficiency training and quarterly evaluations. At right, SSgt. Kirk McManious works on fitting an AIM-120 missile to an F-15 launchrail.

Tyndall is also a training ground for F-15 crew chiefs. The 362nd Training Squadron, a tenant unit that is part of the 82nd Training Wing at Sheppard AFB, Tex., is responsible for crew chief training. In 2001, 477 USAF members underwent crew chief training at Tyndall. The projected total for 2002 is 538 graduates.



Instructors use sorties generated for the F-15 pilot trainees as classrooms for the future crew chiefs. The trainees actually have to bend over backward as they learn nearly every rivet on the fighter. Some day they may see their names stenciled on an F-15.





Above, a four-ship heads out for a training sortie. Below, crew chiefs carefully arrange their spots and wait for "their" jets to return.

For the USAF members at Tyndall, job No. 1 is providing the nation crews that are just as efficient as the fighters they fly and maintain.



The 325th FW considers its mission to be "building an air superiority team." Today, that means the F-15. Tomorrow, they'll provide the same level of commitment with the F-22.

For the United States military, air dominance is not optional. The team at Tyndall works hard to ensure that USAF maintains its edge on the enemies both present and future. ■



AFA Nominees for 2002-03



Politi



Steed



Hendrickson



Nelson

THE Air Force Association Nominating Committee met in Dallas on April 26, 2002, 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 National Convention in Washington, D.C., in September.

The Nominating Committee consists of the five most recent past National Presidents (not serving as National Chairman of the Board) and one representative from each of the 14 US regions.

Nominated for a one-year term as National Chairman of the Board was **John J. Politi** of Sedalia, Mo. Politi now serves as National President and

formerly served as an AFA National Director, National Vice President for the Midwest Region, Missouri State President, and Chairman of the Audit, Membership, and Ad Hoc Financial Committees.

Politi has received the AFA Presidential Citation, the Exceptional Service Award, and the Medal of Merit.

Politi was commissioned through the AFROTC program and entered the Air Force in March 1966 at Ellsworth Air Force Base in South Dakota. He is a 26-year veteran of the Air Force. He spent most of his career in USAF's strategic nuclear weapons systems. He commanded an air division and two wings and served on both the Joint Staff and the Air Staff. He retired as a colonel in 1992.

Currently, Politi is the President of the Excellence in Missouri Foundation, a nonprofit, private sector education organization. He is a graduate of the University of Colorado with a bachelor of arts degree in political science and of South Dakota State University with a master of science degree in economics.

He is married to the former Terri Hatch and has five children, Pam, Eileen, Jay, Stephanie, and Chip.

Jack H. Steed of Warner Robins, Ga., was nominated for a one-year term as National President. Steed is a senior business development consultant for Nichols, Cauley, and Associates, LLC, a certified public accounting and financial and business development advisory firm. He currently serves as an AFA National Director and Chairman of the Membership Committee. His past national positions include Vice President for the Southeast Region, member of AFA's Executive and Resolutions Committees, Aerospace Education Foundation Trustee, and member of the AEF Audit Committee. Steed is an active member of AFA's Carl Vinson Memorial Chapter where he has served in numerous positions and continues on the executive committee. He also served four years as Georgia State President.

In addition to numerous state AFA awards, Steed has been awarded AFA's Medal of Merit twice, the Exceptional Service Award, two AFA

Special Citations, and three Presidential Citations. He was selected AFA Member of the Year for 1999 and was a Storz Award recipient for 2000.

Steed retired as a chief master sergeant after 33 years of service in the Air Force, the last 10 of which were as a senior enlisted advisor. He served in the air traffic control, personnel, and first sergeant career fields. A highlight of his many Air Force accomplishments was his service on the task force that developed the highly successful Weighted Airman Promotion System.

Upon retirement, Steed joined Bank South as vice president for marketing until it was purchased by Bank of America in 1996. He became a director of the Bank of America's Advisory Board and continues to serve in that position. He assumed his present duties with Nichols, Cauley, and Associates in 1996.

Steed attended the University of North Carolina at Chapel Hill, Centenary College in Shreveport, La., and the University of Nebraska at Omaha. He is active in his local community and has received numerous awards, including the Charlie Jones Memorial Award, the highest given by the city of Warner Robins.

Steed is married to the former Betsy Chennault of High Point, N.C., and they have three grown daughters.

Nominated for a third one-year term as National Secretary is **Daniel C. Hendrickson** of Layton, Utah.

Hendrickson joined AFA in 1981. He is currently an Executive Committee member and Chairman of the AFA Resolutions Committee. Past offices held include National Vice President for the Rocky Mountain Region, Chairman of the Membership and Credentials Committees, Ogden Chapter President, Utah State President, and Utah State Chairman.

Among his many awards, Hendrickson has received AFA's Medal of Merit and Exceptional Service Awards, two Presidential Citations, and was designated a Doolittle Fellow in AEF where he served as a member of the Public Awareness and Development Committees.

Hendrickson is the Minuteman Chief Systems Engineer for Boeing

and in 1996 was named ICBM Engineer of the Year for the company.

Born in Upland, Calif., Hendrickson graduated from Chaffey High School in Ontario, Calif. He received his bachelor of science degree in mathematics with honors from California State Polytechnic University in 1967. He later received a master's degree in business administration from California State University at Fullerton.

After receiving his undergraduate degree, Hendrickson joined Autonetics, formerly a division of Rockwell International and now a division of Boeing. He developed inertial guidance equations and computer programs for the Minuteman III ICBM. Since then he has accepted increasingly more complex assignments related to the engineering, scientific, and business aspects of ICBM guidance. To better employ his expertise with the Air Force customer he relocated to Utah in 1975. In 1995, Hendrickson co-authored *A Brief History of Minuteman Guidance and Control*. In 2000, he was selected as an Associate Technical Fellow for Boeing.

He and his wife, Judy, have a son, Paul, who is a second lieutenant stationed at Hill AFB, Utah.

Charles A. "Chuck" Nelson of Sioux Falls, S.D., was nominated for a third 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



Goerges



Rutledge



Lee



Hood



Wetzel



Petrina



Sutter

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 is past President of the Gloria Dei Lutheran Church and has previously served as their Treasurer and Chairman of the Board of Administration. He also serves as Secretary and Treasurer of the South Dakota Air Show, Inc., 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 National Convention each year. For the 2002 election, the Great Lakes, Northeast, Northwest, Southeast, and Southwest have Director positions open, and there is one Director position open to be elected at large.

The nominees for Director to be chosen by their regions are:

Great Lakes: **W. Ron Goerges**, Ohio. Former Great Lakes Region President, Ohio State President, and Vice President; Wright Memorial Chapter President and Vice President.

Northeast: **Robert C. Rutledge**, Pennsylvania. Current Pennsylvania State President. Former Pennsylvania Vice President; Chapter President.

Northwest: **John Lee**, Oregon. Current Oregon State President.

Former AEF Trustee; National Vice President for the Northwest Region.

Southeast: **Stanley V. Hood**, South Carolina. Former National Vice President for the Southeast Region; South Carolina State President; Chapter President.

Southwest: **Emery S. "Scotty" Wetzel Jr.**, Nevada. Former Southwest Region President; Nevada State President; Chapter President.

One Director to be selected at large:

Julie E. Petrina, Maryland. Currently serving on the National Membership Committee. Former Under-40 National Director; Maryland State Vice President; Chapter President.

Joseph E. Sutter, Tennessee. Currently serving on the National Long-Range Planning Committee. Current Tennessee State President. Former Chapter President. ■

AFA State Contacts



Following each state name are the names of the communities in which AFA chapters are located. Information regarding chapters or any of AFA's activities within the state may be obtained from the appropriate contact.

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ARIZONA (Green Valley, Luke AFB, Phoenix, Prescott, Sedona, Sierra Vista, Tucson): **Arthur W. Gigax**, 3325 S. Elm St., Tempe, AZ 85282-5765 (phone 480-838-2278).

ARKANSAS (Fayetteville, Hot Springs, Little Rock): **Jerry Reichenbach**, 501 Brewer St., Jacksonville, AR 72076-4172 (phone 501-988-3602).

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LOUISIANA (Baton Rouge, Shreveport): **Peyton Cole**, 2513 N. Waverly Dr., Bossier City, LA 71111-5933 (phone 318-742-8071).

MARYLAND (Andrews AFB, Baltimore, College Park, Rockville): **Andrew Veronis**, 119 Bond Dr., Annapolis, MD 21403-4905 (phone 410-455-3549).

MASSACHUSETTS (Bedford, Boston, East Longmeadow, Falmouth, Taunton, Westfield, Worcester): **Donald B. Warmuth**, 136 Rice Ave., Northborough, MA 01532 (phone 508-393-2193).

MICHIGAN (Alpena, Battle Creek, East Lansing, Kalamazoo, Marquette, Mount Clemens, Traverse City, Southfield): **James W. Rau**, 466 Marywood Dr., Alpena, MI 49707 (phone 989-354-2175).

MINNESOTA (Duluth, Minneapolis-St. Paul): **Richard Giesler**, 16046 Farm to Market Rd., Sturgeon Lake, MN 55783-9725 (phone 218-658-4507).

MISSISSIPPI (Biloxi, Columbus, Jackson): **Leonard R. Vernamonti**, 1860 McRaven Rd., Clinton, MS 39056-9311 (phone 601-925-5532).

MISSOURI (Kansas City, St. Louis, Springfield, Whiteman AFB): **John D. Miller**, HCR 77, Box 241-5, Sunrise Beach, MO 65079-9205 (phone 573-374-6977).

MONTANA (Bozeman, Great Falls): **Al Garver**, 203 Tam O'Shanter Rd., Billings, MT 59105 (phone 520-749-9864).

NEBRASKA (Lincoln, Omaha): **Richard Gaddie**, 7240 41st St., Lincoln, NE 68516-3063 (phone 402-472-3605).

NEVADA (Las Vegas, Reno): **Kathleen Clemence**, 35 Austrian Pine Cir., Reno, NV 89511-5707 (phone 775-849-3665).

NEW HAMPSHIRE (Manchester, Portsmouth): **Eric P. Taylor**, 17 Foxglove Ct., Nashua, NH 03062 (phone 603-883-6573).

NEW JERSEY (Andover, Atlantic City, Camden, Chatham, Forked River, Ft. Monmouth, Jersey City, McGuire AFB, Newark, Old Bridge, Trenton): **Ethel Mattson**, 27 Maple Ave., New Egypt, NJ 08533-1005 (phone 609-758-2885).

NEW MEXICO (Alamogordo, Albuquerque, Clovis): **Peter D. Robinson**, 1804 Liano Ct. N.W., Albuquerque, NM 87107 (phone 505-343-0526).

NEW YORK (Albany, Binghamton, Buffalo, Jamestown, Nassau County, New York, Queens, Rochester, Staten Island, Syracuse, Westhampton Beach, White Plains): **Timothy G. Vaughan**, 7198 Woodmore Ct., Lockport, NY 14094 (phone 716-236-2429).

NORTH CAROLINA (Asheville, Charlotte, Fayetteville, Goldsboro, Kitty Hawk, Raleigh, Wilmington): **Gerald V. West**, 4002 E. Bishop Ct., Wilmington, NC 28412-7434 (phone 910-791-8204).

NORTH DAKOTA (Fargo, Grand Forks, Minot): **James M. Crawford**, 1720 9th St. S.W., Minot, ND 58701-6219 (phone 701-839-7268).

OHIO (Cincinnati, Cleveland, Columbus, Dayton, Mansfield, Youngstown): **Fred Kubli**, 823 Nancy St., Niles, OH 44446-2729 (phone 330-652-4440).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **George Pankonin**, 2421 Mount Vernon Rd., Enid, OK 73703-1356 (phone 580-234-1222).

OREGON (Eugene, Klamath Falls, Portland): **John Lee**, P.O. Box 3759, Salem, OR 97302 (phone 503-581-3682).

PENNSYLVANIA (Allentown, Altoona, Coraopolis, Drexel Hill, Harrisburg, Johnstown, Lewistown, Monessen, Philadelphia, Pittsburgh, Scranton, Shiremanstown, York): **Bob Rutledge**, 295 Cinema Dr., Johnstown, PA 15905-1216 (phone 724-235-4609).

RHODE ISLAND (Newport, Warwick): **Wayne Mrozinski**, 90 Scenic Dr., West Warwick, RI 02893-2369 (phone 401-841-6432).

SOUTH CAROLINA (Charleston, Clemson, Columbia, Myrtle Beach, Sumter): **Roger Rucker**, 112 Mallard Pt., Lexington, SC 29072-9784 (phone 803-359-1171).

SOUTH DAKOTA (Rapid City, Sioux Falls): **Ronald W. Mielke**, 4833 Sunflower Trail, Sioux Falls, SD 57108 (phone 605-339-1023).

TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tullahoma): **Joseph E. Sutter**, 5413 Shenandoah Dr., Knoxville, TN 37909-1822 (phone 423-588-4013).

TEXAS (Abilene, Amarillo, Austin, Big Spring, College Station, Commerce, Dallas, Del Rio, Denton, Fort Worth, Harlingen, Houston, Kerrville, San Angelo, San Antonio, Wichita Falls): **Dennis Mathis**, P.O. Box 8244, Greenville, TX 75404-8244 (phone 903-455-8170).

UTAH (Clearfield, Ogden, Salt Lake City): **Brad Sutton**, 5221 West Rendezvous Rd., Mountain Green, UT 84050-9741 (phone 801-721-7225).

VERMONT (Burlington): **Dick Strifert**, 4099 McDowell Rd., Danville, VT 05828 (phone 802-338-3127).

VIRGINIA (Alexandria, Charlottesville, Danville, Langley AFB, McLean, Norfolk, Petersburg, Richmond, Roanoke, Winchester): **Bill Anderson**, 3500 Monacan Dr., Charlottesville, VA 22901-1030 (phone 804-295-9011).

WASHINGTON (Seattle, Spokane, Tacoma): **Tom Hansen**, 8117 75th St. S.W., Lakewood, WA 98498-4819 (phone 253-984-0437).

WEST VIRGINIA (Charleston, Fairmont): **Jack G. Richman**, 13 Park Dr., Fairmont, WV 26554 (304-367-1699).

WISCONSIN (Madison, Milwaukee, General Mitchell IAP/ARS): **Chuck Marotske**, 5406 Somerset Ln. S., Greenfield, WI 53221-3247 (phone 414-325-9272).

WYOMING (Cheyenne): **Stephan Pappas**, 2617 E. Lincolnway, Ste. A, Cheyenne, WY 82001 (phone 307-637-5227).

By Frances McKenney, Assistant Managing Editor

Space Day 2002

Space Day 2002—the sixth edition of an annual event designed to inspire young people's interest in aerospace, science, math, and technology—got under way in Washington, D.C., at the National Air and Space Museum on May 2.

Space Day is held each year on the first Thursday in May and encompasses activities for students in elementary schools on up to the college level. Among Space Day's more than 60 partner organizations are the Air Force Association and the Aerospace Education Foundation. In addition, Charles P. Zimkas Jr., AEF Vice President and chief operating officer of the Space Foundation in Colorado Springs, Colo., is a member of Space Day's Educational Advisory Committee.

Opening ceremonies for the event this year featured former senator and astronaut John Glenn and astronaut Sally Ride. Other activities included a live, interactive Internet broadcast from the museum and the sharing of student projects about the challenges of living and working on Mars.

In Orange County, Fla., where County Chairman Richard T. Crotty declared May 2 as Space Day 2002, Richard A. Ortega, state VP for aerospace education, visited the classrooms of teachers Nancy Bridge—a **Central Florida Chapter** member—and Heather Lewandowski. He said their students observed Space Day by assembling and testing model rockets.

Ortega and Barbara Walters—Phillips, also a chapter member, later presented copies of Crotty's proclamation to the two teachers. Walters—Phillips was the recipient of AEF's Christa McAuliffe Memorial Award for Teachers in 1995.

Battlelabs on Capitol Hill

AFA joined the Air Force Office of Legislative Liaison and the Air Force Battlelab Office in sponsoring two evenings of Capitol Hill receptions in April. Nearly 400 guests attended the events.

Each gathering featured a room



At an AFA reception for USAF's Team of the Year, National Chairman of the Board Thomas McKee (left) and then-CMSAF Jim Finch pose with the team's members. They are (l-r): MSgt. Vicki Jones, MSgt. Todd Weinberger, SSgt. Travis Hartzell, SSgt. Brandon Sprague, and SrA. Andres Salazar. They represent the security forces career field.

full of storyboard displays to inform members of Congress and professional staff about the mission of USAF's seven battlelabs. The first reception took place on the Senate side of the Hill, the second on the House side.

Honored guests included Sens. Daniel K. Akaka (D—Hawaii) and Mary Landrieu (D—La.). On the House side: Reps. Sam Johnson (R—Tex.), Charles W. Stenholm (D—Tex.), Howard Coble (R—N.C.), Steve Buyer (R—Ind.), James A. Gibbons (R—Nev.), Norman D. Dicks (D—Wash.), and James R. Langevin (D—R.I.).

Air Force officials at the sessions included Chief of Staff Gen. John P. Jumper; Gen. Donald G. Cook, commander of Air Education and Training Command; Gen. Gregory S. Martin, commander of US Air Forces in Europe; Lt. Gen. Duncan J. McNabb, deputy chief of staff, plans and programs; Nelson F. Gibbs, assistant secretary of the Air Force for installations and environment; and Michael Montelongo, assistant secretary of

the Air Force for financial management and comptroller.

All battlelab commanders were on hand to explain their units' role in identifying and evaluating innovative ideas that improve USAF capabilities. The labs are the Air Expeditionary Force Battlelab, located at Mountain Home AFB, Idaho; Air Mobility Battlelab, at Ft. Dix, N.J.; Command and Control, at Hurlburt Field, Fla.; Force Protection, at Lackland AFB, Tex.; Information Warfare, also at Lackland; Space, at Schriever AFB, Colo.; and the Unmanned Aerial Vehicle Battlelab at Eglin AFB, Fla.

Pilot for a Day

With sponsorship from the **Northwestern Utah Chapter**, Adam Asay, a 15-year-old battling blood cell cancer, became a pilot for a day at Hill AFB, Utah.

The Pilot for a Day program brings children with chronic illnesses on base to get a taste of Air Force life. The coordinator at Hill, 1st Lt. Charles Monette, calls it "a day off" from illness.

USAF photo by Larry Tighe

Now in remission, Adam had spent months in the hospital during the past year, enduring surgery and chemotherapy after being diagnosed with acute myelocytic leukemia. His father, Blair Asay, said Adam nevertheless has held on to a dream of becoming a pilot.

During his visit to Hill, Adam received a flight suit, customized with his name patch, a scarf, and patches of the 421st Fighter Squadron. He sat in the cockpit of his favorite airplane, an F-16, and later "flew" a sortie in a Fighting Falcon simulator. The base's "Viper West" F-16 demonstration team performed for him as Adam watched from the control tower's catwalk. At the end of the day, Col. Stephen Hoog, 388th Fighter Wing commander, pinned pilot wings on Adam's flight suit.

"Ever since that day," Blair Asay wrote afterward to Monette, "[Adam] is more determined to do whatever it takes to someday fly an F-16."

Pilot for a Day programs take place at several USAF bases. At Hill, it began in February 2001. According to Monette, 12 children became "pilots" that year.

Insight into Bravery

Aircrew members from two F-15Es that participated in an Operation Anaconda rescue mission in Afghanistan delivered what **Richmond (Va.) Chapter** President Carl F. Bess Jr. called a "riveting" presentation to the Virginia state AFA executive council meeting in June. The chapter was host for the gathering, held at the Virginia Aviation Museum in Richmond.

Maj. Chris Short, the F-15E pilot, was flying a mission near Gardez, south of Kabul, Afghanistan, on March 4 when he heard a call for help from a US Navy SEAL rescue team. The team had been searching for Petty Officer 1st Class Neil Roberts, a SEAL member who had fallen off an MH-47



Matthew Schmunk, an AFROTC cadet from Marquette University, Milwaukee, Wis., receives the Billy Mitchell Chapter's leadership award from Col. Gary Copsy, detachment commander, and Scott Dumbauld, chapter vice president.

helicopter when it was hit by ground fire.

Another Army Chinook sent to recover Roberts and the SEAL team was downed by rocket-propelled grenade fire. The F-15Es ended up providing close support—at one point shooting at specific trees—for these US forces trapped in a firefight that lasted all day. By the time the action ended, seven Americans died, including TSgt. John A. Chapman, a combat controller with the 24th Special Tactics Squadron, Pope AFB, N.C., and SrA. Jason D. Cunningham, a pararescue jumper with the 38th Rescue Squadron, Moody AFB, Ga.

Short and Maj. Rich Coe, a weapons system officer, drove up from Seymour Johnson AFB, N.C., for their presentation to the AFA meeting. They showed unclassified portions of what they saw in the head-up display during the rescue and described combat patrols in Afghanistan. It was, said

Bess, "a little glimpse of the inside" of Enduring Freedom.

Fund-Raising Prowess

For the first time, the **Paul Revere (Mass.) Chapter** tried its hand at raising operating funds for an air show—and brought in more than \$100,000.

The money was used to support the Hanscom Air Show 2002 which took place at Hanscom AFB, Mass., in June. The USAF Thunderbirds aerial demonstration team and the US Army's Golden Knights parachute team were the star attractions. Funds raised by the chapter helped cover contracts with civilian air show acts, hospitality, civilian police coverage, and other expenses.

Joseph P. Bisognano, chapter president, served as chairman of the Friends of Hanscom Air Show. Kevin F. Gilmartin, chapter VP, and Angela Dupont, co-chaired the chapter's air show committee.

They sought contributions from Community Partners and other companies in the Hanscom area. To pique interest, they distributed sponsorship packets listing the demographics of typical visitors to air shows in North America. The statistics included age (most between 30 and 50 years old), income (43 percent between \$35,000 and \$75,000), and education (39 percent with a college degree).

In exchange for monetary support, the companies received several kinds of advertising and VIP treatment at Hanscom's air show. Bisognano said companies wanted to contribute because the air show—which brought

AFA Conventions

Aug. 2-3	California State Convention, Vandenberg AFB, Calif.
Aug. 2-3	Illinois State Convention, Galesburg, Ill.
Aug. 3	Massachusetts State Convention, Northborough, Mass.
Aug. 9-10	Michigan State Convention, Clare, Mich.
Aug. 16-17	Utah State Convention, Ogden, Utah
Aug. 17	Georgia State Convention, Savannah, Ga.
Aug. 23-24	Colorado State Convention, Denver
Aug. 30-31	Iowa State Convention, Waterloo, Iowa
Sept. 7	Delaware State Convention, Dover, Del.
Sept. 15-18	AFA National Convention, Washington, D.C.
Sept. 21	New Hampshire State Convention, Manchester, N.H.

AFA/AEF National Report

out nearly 400,000 visitors this year—is a “big deal” in the Boston area.

Charles H. Church Jr., 1926–2002

Charles H. Church Jr., who served as AFA National Treasurer in the period 1995–2000, died June 23 in Lenexa, Kan. He was 75.

An AFA national director emeritus, Church was named AFA’s Member of the Year in 2001. It was just one of many AFA honors he received for superior service during 38 years as an association member.

Church held AFA offices at all levels and served on several national committees, including 19 years on the Finance Committee.

Born in Kansas City, Mo., Church graduated from the University of Kansas with a bachelor’s degree in political science. He was a Navy veteran of World War II and after the war went on to a career in banking. He retired as chairman of the United Missouri Bank of Hickman Mills.

An AEF Scholar

In May, the **Dale O. Smith (Nev.) Chapter** made the first presentation of the AEF–Dale O. Smith Chapter Miriam Diskin Levy Scholarship.

Monica Macaluso, daughter of ANG TSgt. Sam Macaluso, received the \$2,000 award at a joint Armed Forces Day dinner in Reno, Nev., held by AFA and the Association of the United States Army.

DeVonde Clemence, chapter president, and Irwin Levy, chapter member and scholarship benefactor, made the presentation.

The award is named for Levy’s late wife, who was born in London. During World War II, she helped make life vests, life rafts, and barrage balloons—tethered blimps intended to foul the propellers and wings of low-level enemy airplanes.

AEF and the Smith Chapter established the scholarship in her name in January. The award is to defray costs of higher education. Applicants must be a junior enlisted member of the state’s Air National Guard or a dependent child of a current or retired ANG member of any rank; a cadet from the state’s CAP wing; or an AFJROTC cadet at North Valleys High School in Reno.

Into the Crown Circle

Christy L. Garvin, AEF’s Teacher of the Year in 2001, was named a

member of the Crown Circle at the National Congress on Aviation and Space Education conference in Arlington, Va., in April. The NCASE award recognizes her leadership in aerospace education.

Jack C. Price, AEF Board Chairman, and Richard B. Goetze Jr., AEF President, were on hand for the ceremony.

Garvin was teaching gifted students at Vaughan Elementary School in Powder Springs, Ga., when the **Dobbins (Ga.) Chapter** nominated her for the AEF Christa McAuliffe Memorial Award for Teachers. Her younger students had studied principles of flight by building kites and airplane models, while her older ones concentrated on aerospace topics.

The NCASE conference is sponsored by the Civil Air Patrol and USAF and brings together educators to exchange ideas on aerospace education. Previous inductees into NCASE’s Crown Circle include Mary Anne Thompson, former AFA National Secretary, who was honored in 1997.

More AFA/AEF News

■ As outstanding AFROTC senior cadet in the Southeast Region, Matthew R. Brooks of Virginia Military Institute in Lexington, Va., received the W. Randolph Lovelace Memorial Award from Karen S. Williams, Roanoke (Va.) Chapter president. The award is named for AEF’s first Board Chairman. Lovelace served from 1963 to 1964.

■ Gary A. Hoff, president of the **Edward J. Monaghan (Alaska) Chapter**, presented the chapter’s Mike Jenne Scholarship for \$1,000 and an AFA Medal and plaque to cadet Philip West at the Alaska JROTC Dining-Out and Awards Banquet, held in Anchorage in April. The 34th annual banquet honored cadets from Air Force, Navy, and Army JROTC units statewide. West is a cadet at West Anchorage High School. The chapter’s award is named for a longtime chapter leader and former state president, now deceased.

■ Two U-2 pilots from a training detachment of the 9th Reconnaissance Wing at Beale AFB, Calif., spoke on Enduring Freedom operations at a meeting of the **San Diego Chapter**. Lt. Col. Dominic Eanniello and Maj. Dean Neely described the aircraft’s capabilities and the physical challenges of their long missions, illustrating this with an actual space-suit used by pilots of the high-altitude reconnaissance airplane. Members of a local chapter of the Daedalians

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were among those at this luncheon presentation at Miramar MCAS, Calif.

■ Gary A. Strack, president of the **Ute-Rocky Mountain (Utah) Chapter**, presented AEF Pitsenbarger Awards at a recent graduation ceremony of the Community College of the Air Force at Hill AFB, Utah. The recipients were TSgt. Edward Delker, SSgt. Terri Watkins, and SrA. Marla Naylor.

■ The **Richard I. Bong (Minn.) Chapter** presented its first Teacher of the Year award to David Johnson, a sixth-grade teacher at Marshall School, a college-preparatory day school in Duluth, Minn. At the same awards dinner, AFROTC cadets Matthew Kuperus and Zoe Treuer, from the University of Minnesota, Duluth, received chapter certificates of merit. Gary Doty, Duluth mayor, served as guest speaker. He spoke about the aviation industry in the area and the city's pride in the 148th Fighter Wing

(ANG), located at Duluth Airport. Special guest was Marjorie Bong Drucker, widow of the World War II ace for whom the chapter is named.

■ Capt. Timothy W. Trimmell, president of the **Brig. Gen. Harrison R. Thyng (N.H.) Chapter**, presented the chapter's Teacher of the Year award to Louise Stevens, a fifth-grade teacher at Main Dunstable Elementary School in Nashua, N.H. Stevens had earlier received the chapter's first AEF Educator Grant, which allowed the school's entire fifth grade to visit the Christa McAuliffe Planetarium in Concord, N.H. Trimmell accompanied the class on this field trip in early May and made the award presentation there. On that same day, he also presented the chapter's first Community Partner—Alida Connections—with a CP plaque.

■ Several **Ark-La-Tex (La.) Chapter** members stepped forward when Larry C. Deen, sheriff of Bossier Par-

ish, La., asked for volunteers for the "sheriff's posse." Ivan L. McKinney, George C. Finck, Anthony E. Wolf, Alex J. Napier Jr., Franklin P. Moritz, and Stanley C. Johnson are now among the 200 residents volunteering about once a week in the sheriff's office. Their tasks include house checks for absentee owners, traffic control, fingerprinting children, and distributing food to the needy. McKinney says their volunteerism shows that chapter members have taken seriously the call for 4,000 hours of public service made by the President in his State of the Union address.

Have AFA/AEF News?

Contributions to "AFA/AEF National Report" should be sent to *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 22209-1198. Phone: (703) 247-5828. Fax: (703) 247-5855. E-mail: afa-aef@afa.org. ■

Unit Reunions

reunions@afa.org

3rd Combat Cargo Sq (WWII) and 328th TCS, TAS, or Airlift Sq. Oct. 4-6 at the Niagara Falls ARS in NY. **Contact:** SMSgt. Dave Tarnowski (716-236-2553) (david.tarnowski@niagarafalls.af.mil).

12th Troop Carrier Sq, North Africa and Italy, Twelfth AAF (WWII). Sept. 20-23 in Branson, MO. **Contacts:** Bob White (918-449-1305) or Blaine Peterson (308-537-3506).

35th FG/Wg, including 39th, 40th, 41st, and 339th FSs. Oct. 31-Nov. 3 at the Hilton St. Louis Airport in St. Louis. **Contacts:** Buck Buckhout (520-854-3760) (bucko26@citlink.net) or Dan Dannacher (703-406-0422) (cedanna@bellatlantic.net).

68th TFS, Korat AB, Thailand (1965). Oct. 3-6 at the Menger Hotel in San Antonio. **Contact:** Bud Taylor, 12543 Enfield Park, San Antonio, TX 78232 (210-490-6378).

90th Aero Sq Assn (90th BS Assn, Korea). Oct. 9-13 at the Woodfield Suites Hotel in San Antonio. **Contact:** Lou Segaloff, 944 S. Camino Seco, Tucson, AZ 85710 (520-722-8746) (slouis2@qwest.net).

103rd and 932nd AC&W. Oct. 5 at the Groton Elks in Groton, CT. **Contact:** Jack Hamilton (207-625-7130) (emily@psouth.net).

374th APS, Clark AB, Philippines (1970-90). Aug. 30-Sept. 2 in Gulfport, MS. **Contact:** J.J. Johnson, 1267 Circlewood Dr., Melbourne, FL 32935-5536 (321-255-7396 or 321-698-3465).

380th BG. Sept. 18-22 at the Sheraton City Centre Hotel in Salt Lake City. **Contact:** Pat Carnevale, PO Box 1230, Sonoita, AZ 85637-1230 (phone: 800-659-8808 or fax: 520-455-5866) (carne@dakotacom.net).

381st BG. Oct. 2-5 in Dayton, OH. **Contact:** J. Waddell, PO Box 6064, Madison, WI 53716-0064 (608-222-4591) (jkwadd@aol.com).

440th Signal Battalion (SCARWAF), all eras. Oct. 8-10 in Hot Springs, AR. **Contact:** Richard Fluke, 160-440th Blvd., Saxton, PA 16678 (814-928-5041).

454th BG, Italy (WWII). Oct. 15-20 in Harrisburg, PA. **Contact:** Ralph Branstetter, PO Box 678, Wheat Ridge, CO 80034-0678 (303-422-6740).

455th BS, 323rd BG, Ninth AF (WWII). Oct. 12-16 at the Ramada Valley Ho Resort Center in Scottsdale, AZ. **Contact:** Bonnie Goldsmith-Guilbault, 4977 E. Aire Libre, Scottsdale, AZ 85254 (bonnie.goldsmith@gibby.net).

466th BG, Eighth AF (WWII). Oct. 23-26 at the Holiday Inn Airport in Richmond, VA. **Contact:** Bob Bee (614-272-5289) (gocart92@earthlink.net).

507th Air Refueling Wg, including 507th FG and TFG (WWII-present). Sept. 20-21 at Tinker AFB, OK. **Contacts:** Donald Klinko (405-734-6379) or Cynthia Bischoff (405-734-7494) (www.shokies.com).

2471st AFRTC, O'Hare AFB, IL (1950-60). Sept. 13-15 in Minneapolis. **Contact:** James Roy, 6015 James Ave. S., Minneapolis, MN 55419 (612-798-5958).

Distinguished Flying Cross Society. Oct. 16-20 at the Doubletree Hotel in Arlington, VA. **Contact:** Paul Butler, 6917 Rawhide Ridge, Columbia, MD 21046 (410-997-3277) (pabmab264@aol.com).

Iwa Jima Veterans & Family Assn. Feb. 19-23, 2003, in Wichita Falls, TX. **Contact:** Howard Phillips, 978 Orangewood Dr., Brea, CA 92821-2514 (714-990-2560) (howardphil@aol.com).

Pilot Class 53-A, Malden AFB, MO. Sept. 7-8 at Malden Community Center in Malden, MO. **Contact:** James Culligan, 3 Stripper Way, Warwick,

NY 10990 (845-986-0720) (cullyman@warwick.net).

Pilot Tng Class 65-E, Laredo, TX. Jan. 24-26, 2003, in Honolulu. **Contact:** Jack Schneider (808-596-2727) (jschn@lava.net).

RED HORSE Assn. Aug. 10-13, 2003, at the Doubletree Hotel in New Orleans. **Contact:** Don Averett Sr., 6700-C Hunters Horn St., Eight Mile, AL 36613 (251-649-7165) (d3s2k5@msn.com).

SAC personnel. Oct. 7-12, 2003, at the Castle Air Museum in Atwater, CA. **Contact:** Meyers Jacobsen (www.jacobsensb-36hangar.bigstep.com).

Society of Wild Weasels. Nov. 4-9, 2003, at Disneyworld in Orlando, FL. **Contacts:** Allen Lamb, PO Box 638, Lumberton, NC 28359 (910-739-1381) (alamb@lambgroupinc.com) or George Acree, 12 Evergreen Trl., Severna Park, MD 21146 (410-647-9511) (acree5@comcast.net).

Webb AFB, TX, all personnel, including civil service. Oct. 11-12. **Contact:** Hangar 25 Museum, PO Box 2925, Big Spring, TX 79721 (phone: 915-264-1999 or fax: 915-466-0316) (hangar25@crcom.net) (www.webbafbunion.com).

Seeking former members of the **913th Troop Carrier Gp** and **327th TCS** (AFRC) for a reunion. **Contact:** TSgt. David Stroebel, 1051 Fairchild St., Willow Grove ARS, PA 19090-5203. ■

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

Jimmy's Raiders



These artifacts at the USAF Museum come from the Doolittle Raiders, the famed B-25 crew members of World War II. Led by then-Lt. Col. Jimmy Doolittle, the Raiders on April 18, 1942, took off from the aircraft carrier USS Hornet and flew more than 600 miles to bomb Tokyo and other Japanese cities. Afterward, most of the B-25s headed for China. Japanese forces in China

captured eight of the Raiders. Lt. Chase J. Nielsen, one of four who survived the brutal imprisonment, used a nail to write on the wood flooring of his cell a record of what happened on the raid. That section of flooring is shown here. The Doolittle raid boosted American morale and caused Japan to keep more forces at home to defend the home islands.

Memorabilia courtesy USAF Museum, Wright-Patterson AFB, Ohio



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