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MAGAZINE

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# AIR FORCE MAGAZINE

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**About the cover:** A B-1B and two F-15Es from the 366th Wing, Mountain Home AFB, Idaho, are part of USAF's on-call force. See "The Long Reach of On-Call Airpower," p. 20. USAF photo by SrA. Greg L. Davis.

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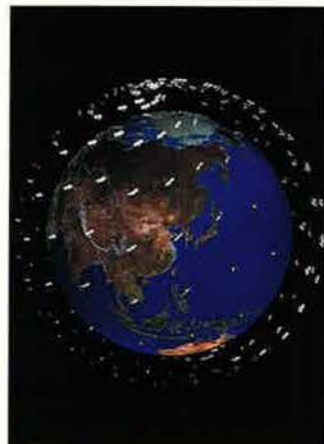
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By John T. Correll, Editor in Chief

## Boren-Rudman Takes Its Turn

**I**N recent years, Pentagon planning has been dominated by a rolling series of special defense reviews. The regular planning, programming, and budgeting system has had to operate in whatever leeway was left.

First, there was the Bottom-Up Review in 1993, then the Commission on Roles and Missions of the Armed Forces in 1994-95, followed by the Quadrennial Defense Review in 1996-97, and the National Defense Panel in 1997.

One reason for this string of special reviews is that the nation's political leaders, particularly in Congress, believe that the armed forces are still stuck in a Cold War mentality and will not make any real change—which Congress regards as imperative—unless they are pushed to do so.

Now comes the Boren-Rudman Commission, officially, the National Security Study Group, headed by former Sens. David Boren and Warren Rudman. Between 1998 and 2001, it is charged with performing "the most comprehensive review of the national security environment, processes, and organizations since the National Security Act of 1947."

Although previous defense reviews led to force cuts, they did not induce any fundamental change. The armed services look about the same as they did before, except smaller. The Boren-Rudman Commission differs from its predecessors in several respects, though.

It has longer tenure and a more expansive charter than the other review groups did. Its final report, due in February 2001, will "delineate a national security strategy" and recommend "concomitant changes to the national security apparatus."

Previous study groups consisted mostly of defense insiders. The 18 members of the Boren-Rudman Commission are drawn from more diverse backgrounds. They range from former Secretary of Defense James Schlesinger and former Secretary of the Air Force Donald Rice to former Ambassadors Anne Armstrong and Andrew Young to former NATO commander John Galvin to historian Ste-

phen Ambrose and former NBC correspondent Bud Dancy.

The first meeting on Oct. 6 was attended by Speaker of the House Newt Gingrich, who sponsored the legislation that created the group, and by Secretary of Defense William S. Cohen, who appointed the commissioners.

Compared to earlier reviews, the

**This commission could lead to major change for the armed forces. Whether that's good or bad remains to be seen.**

Boren-Rudman Commission is less likely to approach its task with preconceived conclusions. It will also be less vulnerable to capture by the rival service factions. It is entirely possible that this group could produce real change. Whether that's good or bad remains to be seen.

It is not the job of the commission to write war plans. Its focus will be the National Security Strategy, a White House document that describes in broad terms the nation's interests and how they will be defended. The National Military Strategy derives from that, and so on down the line.

However, the commission could have a direct effect on the organization of the Defense Department, the roles and missions of the services, and the shape of the defense program, depending on what it decides on five critical points.

**The Revolution in Military Affairs.** Both the QDR and the NDP recognized that a combination of information technology and long-range precision strike has taken us beyond the inevitability of force-on-force attrition warfare. This "Revolution in Military Affairs" cuts great reliance on aerospace forces. That is very threatening to those who insist that wars are won or lost by ground

forces. They argue, therefore, that technology is overrated and undependable.

Their position has gotten a boost from planning models that rate airpower as less effective than it has proved to be in actual combat and by the manipulation of joint exercises to artificially constrain airpower and give the ground forces a bigger role in the fight. The commission might ask why we undervalue the best thing we've got going for us.

**Level of effort.** Should US armed forces be prepared to win quickly, decisively, and with as few casualties as possible, or just strong enough to hold parity? If the choice is parity, that means that about half the time, we are going to lose. We are drifting toward parity because the defense budget has been cut too much.

**Purpose of the force.** It is essential to make distinctions and priorities between missions that occur often but which may not be critical—such as military operations other than war—and vital missions at which the force must not fail, such as fighting and winning the nation's wars.

**Space.** The growing importance of space must be obvious to all. Yet our commitment to use space for more than support and peripheral roles—much less dominate space in wartime—is hedged and underfunded. Some nation will be the leader in space in the 21st century. Let us hope that it is us.

**New regimes of conflict.** We can barely imagine warfare in which computers fight each other and when information is used directly as a weapon. We have, at best, a very weak grasp of how to employ such capabilities or defend ourselves against them.

The QDR and the NDP pulled close to some of the answers but then veered away, in part because of internal pressures. The Boren-Rudman Commission will not have that particular set of organizational problems. This could be the defense review that breaks the inflexible grip of tradition and gets it right. ■

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## Degraded Benefit

Your editorial ["*Degraded Benefit*," *October*, p. 3] certainly spelled out the problem of degraded retirement benefits for our armed services. It is hard to believe that Les Aspin allowed this to happen when everyone knows that nearly all city workers, state workers, cops, firemen, etc., receive 50 percent after 20 years.

Why would a serviceman or -woman stay in to work 12–16 hours a day during deployments when he or she could take a relatively easy city or state job with great retirement benefits? It is time for Congress to undo all the damage our former Secretary of Defense has done before our military is destroyed.

David Chigos  
San Diego

Should, miracle of miracles, both the retirement pay question and the extent of deployments be resolved, would the retention crisis disappear? Not likely. Why? One of the basic reasons people volunteer to serve in the armed services is a belief they are helping to maintain the security of their country. Currently, there is no potential enemy perceived to put the nation's security at risk. Another reason for joining is that it provides a job which, in hard times, encourages people to endure often less than desirable circumstances. This is not so when the economy is humming along and job opportunities abound on "civvy street." And then there is another explanation not often addressed because of the difficulty of assessing why many people make careers in the military services. You can call it a sense of camaraderie, esprit, or what you will, but without it there is no feeling of belonging and people, if they have a choice, will not stay.

The departure of the intangible "belonging" has not just occurred. The current members of the armed services probably wonder what I am talking about, but those who recall military base clubs that were well-attended, and are now empty, and unit off-duty gatherings that are now no longer evident, you know what

I'm saying. Unfortunately, it is unlikely that this special sense of belonging will ever be recovered. Having said that, it is all the more imperative the senior leaders of the armed services, in concert, constantly confront Congress until the problems of retirement pay and deployments are eliminated. Current personnel planning, such as deploying reserve units, can only help in the short term. They create other problems.

Col. Peter E. Boyes,  
USAF (Ret.)  
Rancho Murieta, Calif.

## The Access Question

As you correctly pointed out in "The Access Issue" [*October*, p. 42], the access issue centers on two interrelated components: political "lockout" and military "keep out." The first results from reluctant "allies" unwilling to furnish advance basing, and the second is a result of enemy action to prevent our operations.

I agree with your assessment that we have thus far not been prevented from accomplishing a "military operation to which the United States was seriously committed." However I am not as sanguine about prospects for the future and I am concerned that your discussion eventually devolved to a carrier-based air bashing exercise.

In an era where permanent American overseas presence is at a post-World War II low but operational commitments are at an all-time high, the value of rapid response cannot be

overstated. If an adversary can prevent the US from committing substantial forces long enough to achieve their objectives in their own backyard, they may see the risk as worthwhile since eviction comes with a high price—a price they may hope the US public will be unwilling to pay. If regional allied leaders can be mollified with promises of limited objectives or intimidated with threats of retaliation they may very well refuse basing, especially if, as you pointed out in your report, they see US commitment as halfhearted.

To make matters worse, US national military strategy describes weapons of mass destruction (chemical, biological, nuclear) as this nation's greatest threat. Combined with rapidly proliferating delivery means, such as missiles and expanding terrorist organizations, very real threats to deployed forces are on the rise. But active and passive defense capabilities are poor at best. It is not too far-fetched to imagine the threat of a rain of chemically armed missiles or biological contamination of food and water as causing enough concern to at least constrict deployed force levels—or worse, use of such weapons forcing operations out of their range or to cease altogether. There is precedent; we built an entire military "city" in the remote regions of the Saudi desert to avoid the terrorist threat, and we withdrew from Beirut after taking substantial casualties in a terrorist bombing. These lessons aren't lost on our adversaries.

A very necessary answer to this dilemma is national aerospace power. America's greatest single advantage over every other nation on Earth is its aerospace forces—the amalgamated capabilities of carrier-based, theater land-based, and long-range air as well as their supporting space, mobility, and information systems. It's time we understood this and planned to maximize its value—its speed, range, and versatility—to our national military strategy.

To denigrate one vital part of that combined capability is counterproductive because we clearly need it

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all. This is because of just the kinds of situations the *Air Force Magazine* article describes—situations where for one reason or the other a particular leg of our aerospace power is unavailable. These include denied theater bases, carrier-based forces out of position or in need of replenishment, or long-range air at too great a distance to provide true tactical responsiveness. Is it so difficult to imagine carrier-based air, long range air, and space systems working in concert to alleviate problems of theater access?

If need be, we should maintain a robust national aerospace force at the expense of forces that, because of their inability for rapid global response, contribute little to our most important global combat requirements. But we do not need to play a trade-off game among the elements of our true national asymmetrical advantage over every other nation on Earth—air, space, and information systems—regardless of the uniforms their operators wear.

Gene Myers  
Science Applications International Corp.  
Hampton, Va.

Congratulations on a provocative and well-researched essay. The lock-out problems described are real and are likely to become more serious as we enter the next century.

They are not fighter and strike problems alone—the phenomenon is equally applicable to tankers and en route service for strategic airlift. Neither is lockout a service specific problem—it is a national problem which can strike at our very ability to respond to threats to our national interests. Lockout can affect all the services and the entire spectrum of military capability. For example, as your essay pointed out, we cannot support carrier battle groups from CONUS—[the] Navy must have littoral port access to operate in the littorals. As you imply, this issue is too important to be addressed on a partisan basis.

It is illogical, however, to conclude that if the US interest at risk is truly *vital*, our friends will grant us the access we need. Rather, if the interest is *vital*, then, by definition, we must guarantee access. And there is a way to do just that.

Under development for the past six years has been the Mobile Offshore Base. The MOB is a very large floating structure as much as a mile long by 500 feet wide and containing over 3.5 million square feet (80 acres) of climate-controlled storage and

working space. [It is] capable of operating up to C-17 type aircraft. This concept was introduced by Adm. [William A.] Owens when he served as vice chairman, Joint Chiefs of Staff. Since then, DoD has invested nearly \$50 million in a science and technology program to study and assess the feasibility of building such a structure. This effort is not scheduled to [be] complete[d] until next year, but the emerging conclusion is that there is no technological reason why a MOB cannot be built.

Clearly, deploying and operating Mobile Offshore Bases will produce fundamental change in the way we employ our military. Equally clear, however, is the conclusion that the nature of the threat and the geopolitical realities we will encounter in the 21st century require such change. MOB makes too much sense not to pursue.

J.B. LaPlante  
McDermott International  
Alexandria, Va.

#### Missile Threats

"Missile Threats and Defenses" [October, p. 18] needs to tell the whole story. On ballistic missile threats, revised intelligence credits North Korea's Taepo Dong 1 with an estimated range of 3,000 to over 4,000 miles. North Korea can strike Alaska and Hawaii.

The Brilliant Pebbles program for deploying space-based interceptors was ready to move into acquisition in 1992. Had we fully funded Brilliant Pebbles we would have had ballistic missile defenses in place today. But President Clinton canceled the program shortly after taking office in 1993.

On the deployment of a ballistic missile defense, Lt. Gen. Lester Lyles says, "We don't think we can go any quicker." But the Navy acknowledges accelerated funding of its Navy Upper Tier (Navy Theater Wide) program could result in deployment as soon as 2001, not 2003. With upgrades to its interceptor and cueing system, Navy Upper Tier could also provide National Missile Defense coverage at a reasonable cost, perhaps \$2 billion—\$3 billion.

We can quickly build ballistic missile defenses, meeting both theater and ballistic missile threats to the US. Accelerated funding of Navy Upper Tier and a restart of Brilliant Pebbles would let us build that defense. In addition, the Space Based Laser program, now at the point of testing in space, will give us a boost phase defense capability with global coverage.

Brilliant Pebbles could have inter-

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## Letters

cepted Iraqi Scuds in the 1991 Persian Gulf War. Space-based lasers will be effective against ICBMs and ballistic missiles with ranges as short as 75 miles.

But if we subscribe to the deployment of a limited NMD using ground-based interceptors we will forfeit the advantages of continuous, global coverage and a boost phase defense capability that space-based BMD will have. If we quickly move to meet the threat of ballistic missile attacks by building ballistic missile defenses in space, we will be able to defend ourselves against theater and long range ballistic missile threats. We are in a race for space.

James H. Hughes  
Englewood, Colo.

### The Berlin Airlift

After reading the article on the Berlin Airlift [*"Inside the Berlin Airlift," October, p. 48*] I talked with my father, a retired USAF colonel, about his memories of those times.

He had been in charge of warehousing replacement parts and supplies for the radios and electronics used in the planes and on the ground during the lift. The Russians did jam our radio signals during the lift. This required frequently regrinding our radio crystals to different frequencies, which my father had contracted to a German shop in Munich. Since the Russians were short on crystals, it would take them a week or so to catch on and catch up to us. We had lots of surplus equipment left over from the war that was being sold on the open market, so all the radios were first stripped of crystals so that they would not fall into the hands of the Russians.

David Bruce Grant  
Austin, Texas

You omitted English bases. I went to Burtonwood AB, just outside Liverpool, UK, in September 1948, to serve the [Berlin] Airlift. We washed coal dust and flour out of the C-54s before maintenance and then performed whatever maintenance was needed.

After the airlift was over, Congress authorized an "airlift device," which was a miniature golden C-54, for those who had served in the airlift. [It was worn] on the German Occupation Ribbon. I was one of those who received the German Occupation Ribbon without ever setting foot on any part of continental Europe.

TSgt. William B. Pinkerton,  
USAF (Ret.)  
Pico Rivera, Calif.

[The] mention of a P-39 Russian fighter making a pass between the C-54s is correct, since that did happen to the flight I was on. This was [in] the northern corridor, and about midway, crossing into eastern territory. [The author's] opinion that this was an only incident is sadly underestimated.

Other types of interference by unknown sources, and reported by my crew, [included] a broadcast of barking dogs on our communications channel while approaching the turn into the approach to Gatow. This was a point of critical timing, since if you missed the turning point, you would overshoot and enter into eastern territory.

Another type of interference was a duplicate transmission on the same low frequency radio beacon being used for the turning point into Gatow. This signal was of a poorer quality of aural tone and a poorer quality of code identification. When this signal was operating, you could retune the receiver so as to hear each signal separately. Then the compass needle would waver just a little to the left of where the good [signal] should be. A sharp navigator would observe that a fake transmission was being made to lead you out of the corridor and set you up for a navigation error and possible incident.

The interference the aircrews experienced was not just a piece of cake.

Lt. Col. James E. Lee,  
USAF (Ret.)  
Camp Hill, Pa.

[I] must in all fairness take exception to [Milton's] assumption that the B-29s stationed in England were considered the only deterrent force preventing Russian interference with the Berlin Airlift. The 36th Fighter Group, Fuerstenfeldbruck AB, and the 86th Fighter-Bomber Group, Neubiberg AB, both in southern Germany, could also be included in this deterrence. Although the 36th did not arrive in Germany from the Canal Zone until the fall of 1948, the 86th had been stationed on German soil since the end of hostilities. Together we could be called a formidable adversary, with the 36th's 75 F-80s and the 86th's 75 P-47s.

There have been many published articles about the many sacrifices and hardships by the men connected to the airlift. However, it must also be known that we as fighter personnel were well-prepared and ready and were yet another deterrent.

SMSgt. Willard R. Baker,  
USAF (Ret.)  
Sequim, Wash.



## Retention Woes—You Bet

When I first joined the Air Force in 1975, it sure wasn't for the pay. [See "The Retention Problem Spreads," October, p. 60.] I was earning a whopping \$360 a month base pay. I joined for two reasons. (1) I had absolutely no direction or education in my life and the Air Force offered me both. (2) My dad retired from the Army and I saw what his retirement check allowed him to do each month. [I]n 1968, when my dad retired, his retirement was almost enough to live on.

During my 21 years [in the service], I learned that the military was a way of life that one learned to love and hate at the same time. As a senior NCO, I counseled many young people on the advantages and disadvantages of being in the Air Force. But, later [in] my career it [became] more and more difficult to point out the good things to entice young people to stay.

We [work] long hours, nights and weekends. We [send] people all over the world on a moment's notice. The 179-day TDY maximum [is] a joke. We [give] them substandard housing. We [pay] them one-third what their civilian counterparts make. We [make] it more and more difficult to get quality medical care. We charge them a surcharge at the commissary because Congress won't fund new facilities. We cut out all dental care for dependents. We completely change their uniforms every couple of years. We make promotions the most difficult of all the services. We keep their pay below industry standards by telling them they have other greater benefits than people on the outside.

I guess I could go on and on, but I think you get the picture. My point is, this has been happening for over 20 years. The more Congress and the President have tried to fix it, the worse for all of us it has become. And to the credit of those on the front lines—the NCOs and SNCOs—we identified these issues years ago, but to our dismay, our cries have [always] landed on deaf ears. Now the powers [that] be want to bring back the selective re-enlistment bonus and the old retirement plan. And that's going to solve the problem?

I've been retired for two years, now, and I make three times the money I did on active duty. My benefits are better, I see a real doctor (no offense to physician assistants), I leave my job at work when I go home at 5 p.m. each day. My weekends are mine. My retirement plan is better. I get raises, not because I test but because I'm good and my management shows their appreciation for [my] working hard for the company. I've

gotten two raises this year alone. All the airmen who worked for me [whom] I've talked to since I've retired, well, what do you think I tell them?

MSgt. David Palmer,  
USAF (Ret.)  
Cary, N.C.

Your article on retention is certainly disturbing. Of course, retention is a complex matter with no magic bullet. Pay, retirement benefits, unreasonable deployment, the potential for advancement, [and] quality of life—these are but a few of the vital factors. Anyone interested in the problem should review Gen. Curtis LeMay's actions on quality of life in his book. The old boy may have breathed fire and brimstone, but he went to a lot of trouble to improve the quality of life for the people in his command. [For] example, his effort to procure more and better family housing was the forerunner of Wherry Housing. So, consider this question: If LeMay recognized the importance of quality of life so early, why is it still a deficient area today?

The problem persists because [officials] are not allowed to get at the base root of the problem and solve it! They can only use Band-Aid fixes on the symptoms! Our elected representatives have systematically created and aggravated the problem by withholding the money required to solve it, among other things.

I sincerely believe that the Air Force could and would do a much better job, by adjusting its overall personnel management to modern concepts and to the demands of the high-tech aerospace world we live in, if Congress and other branches of the service would allow us to do so. It is great that the Air Force has the vision for taking advantage of the rapid technological advances, but if we are forced to continue with some of the concepts of the 50s we just find that the people we need the most are not around when we need them the most.

Lt. Col. Joe C. Lyons,  
USAF (Ret.)  
San Antonio

A big thank you for the [retention] article. I appreciate the fact that our nation's military and congressional leaders are finally taking note of the retention problem our Air Force faces, but the way they are handling it could use some work.

Let's take a look at the things Congress is throwing money at (as mentioned in the article): a 3.6 percent compensation boost to base pay, updating housing, building education centers, child care centers, and a

fitness center. These things affect members in different (trivial?) ways. The new buildings affect people at some bases but not nearly all. Many service members do not even use these facilities. A very large number of military families own or rent houses off base. Even a 3.6 percent pay raise, which affects everyone, is still only that—3.6 percent, well behind our civilian counterparts.

As the article points out, the culprit is [operations] tempo. In order to drive changes that affect one and all, [operations] tempo must be slowed for individuals. Fewer deployments are not usually an option. Less time spent on exercises, or fewer exercises altogether, hurts readiness. Our politicians and military leaders cannot expect to continually call on one person to do the work of four, without things falling apart.

The only sensible way to keep our forces happy (and re-enlisting) is to hire some help. Quit cutting our benefits and maybe people will stay around. Make the military look more lucrative to the new recruits, and maybe more will join. Allocate some more people to fill those heavy rotations, and maybe people might start to smile. Don't tell today's military member, "Hey, we're going to cut your retirement, give you marginal raises, and while we're at it, you're going to miss half of the holidays with your loved ones."

Here's something I'd like to see—the expression on Congressman So-and-so's face when the President throws him or her a Kevlar helmet and flak vest and says, "Here you go; you're going to Saudi for four months. Sorry you're going to miss your anniversary and your daughter's birthday. Look on the bright side, though; we're building your base a new fitness center."

SSgt. Jesse Bunck,  
Hill AFB, Utah

In response to the pilot retention problem, I believe one thing is being forgotten. Pilots are relatively intelligent individuals, although perhaps not as smart as us navigators. They are thinking long term. A lump sum payment over the course of a couple of years might seem good to some, but there is no long-term security in it. One thing that might keep a pilot who is in that 10–12 year group is to offer him retirement at 16 years' time served. Instead of him saying, "I've got 10 more years of this," he might just say, "Only six more years till retirement; I would be crazy to get out." Although they might only retire with 40 percent of their base pay,

there is security there. This would retain the pilots through those critical years, and I'm sure many would elect to stay on past 16 years. This is an option that I have not heard discussed before.

Maj. Stephen Shahabian,  
AFRES  
Foxboro, Mass.

### Air-Breathing Rebutals

Retired Lt. Col. Duane Cossalter stated in his letter [*Not So, Black-bird," October, p. 7*] that the SR-71 was not competitive with satellites and the U-2 and would have been a waste of taxpayer money during the Gulf War. He is mistaken on several points.

I served in the Strategic Reconnaissance Center before, during, and after the war and was involved in taskings of satellites and U-2s, along with [the] SR-71 before it was retired. The retasking times for the U-2 and SR-71 were unique but not that different in terms of timeliness. Retasking of satellites was nigh unto impossible in most instances. More often than not there was no satellite overhead when you needed one, and when one was, the red tape involved was so cumbersome, I would liken it to mating elephants.

Many of the satellites carried sensors of very specific design that often did not fit the desired taskings. The retasking of satellites also invited many more heated arguments due to the number and variety of customers that they served. We were asked numerous times by theater intel officers if it [were] possible to reactivate the SR-71. They repeatedly described satellite responsiveness as almost totally nonexistent.

However, Cossalter is correct on several other points. The SR-71 was very expensive to operate, and an argument over its cost-effectiveness could easily be waged. The exploitation of its product could not match the timeliness of a data link, either. However, the U-2 also flew many "off-tether" missions in the Gulf without the benefit of a data link. The same delays in processing that would have been seen in the SR-71 were also present on these sorties, and the theater never complained.

Expensive? Yes. A waste of money compared to satellites? Absolutely not! In fact, based on experience, I'd say the opposite was true.

MSgt. Bob Simmons,  
USAF (Ret.)  
Omaha, Neb.

I was assigned to the 9th Strategic Reconnaissance Wing from 1975-81. My duties included SR-71 sensor

tasking, SR-71/U-2 data reduction, and mission planning. I have also worked for Lockheed Martin's Skunk Works.

First, the SR-71 was designed and built in the early 1960s [to] gather Photint as well as Elint over vast areas of possible denied airspace. (This was effectively demonstrated during the Vietnam War.) During the same period, the U-2 was (and still is) limited in range due to the lack of a refueling capability. The U-2 data-link capability was also limited and would not "come into its own" until the late 1980s and 1990s. Satellite coverage and capabilities were also limited during this period. I don't think that one can objectively compare these three different systems.

Second, the slow response time is not, and never was, an issue. The "station time" for crew members varies, depending on the mission but is usually 2.5-3 hours prior to takeoff. I have flown on RB-47s, RC-135s, and C-130 gunships and we all reported about the same time prior to launch. U-2 pilots must also prebreathe and suit up. Film processing and exploitation are required regardless of the collection platform.

Third, the data and intelligence information provided to the battlefield commander by the U-2, RC-135, and Joint STARS platforms provided invaluable real-time targeting and battle damage assessment on a continuing daily basis during the Gulf War.

Finally, satellite coverage is efficient, timely, and useful only if you have coverage of the area of interest (or maintain control of the satellite) or only want photos and the satellite can image the target, or if the target is not obscured.

The SR-71 may have been expensive, but [it is] not as costly as designing, building, launching, maintaining, and protecting a satellite.

Maj. George V. Back,  
USAF (Ret.)  
Cleveland

Cossalter mentions that the SR-71 would not be competitive with satellite assets or "even the data-linked U-2s." I'm sure he means after the sats had been maneuvered into the correct orbit and then were able to start surveying the area, weather [permitting]! If satellites were so effective how come [Army] Gen. [Norman] Schwarzkopf asked repeatedly for the SR-71, but these requests were denied by the Air Force? Additionally, after the Gulf War, Schwarzkopf declared that satellites were of little use in Desert Storm. In studies done after the Gulf War, one of the main prob-

lems [noted] was the lack of timely intelligence for commanders!

[Cossalter] also states, "Responding to a crisis took too much time (crews had to dress and prebreathe oxygen)." U-2 pilots have to undergo a similar routine (actually an SR-71 pilot goes a half-hour shorter prebreathing routine than a U-2 pilot).

He goes on to state, "Retrieving information was slow (film had to be unloaded, processed, and exploited)." This is also the case with the U-2, when not using an electronic reconnaissance system. In the Gulf War, Army field commanders wanted hard copies of intelligence, so U-2s, in conjunction with electronic missions, flew "wet-film" missions for the Army. They did this using processing equipment developed for the SR-71 before it was retired.

He additionally writes that, "activities happened at such a fast pace that an airplane such as the SR-71 could not react and change flight plans to meet the requirements." Actually the flight plan for the SR-71 can be changed in flight, by the reconnaissance systems officer. How long does it take to retask a satellite and at what cost? Also the SR-71 is able to carry out wet film, digital imaging, [and] electronic intelligence in one flight.

I think Cossalter needs to look again at the SR-71 (and the U-2). He mentions that "many air-breathing reconnaissance assets were of limited value in that conflict" (meaning the Gulf War) "and the SR-71 would have been a great waste of taxpayers' money." He seems to prefer satellites over the air-breathing assets. If the U-2 supplied 50 percent of all imagery intel, and 90 percent of all Army targeting intel, what did the satellites provide? Sounds to me like the air-breathing intel gatherers did a lot better job than the satellites!

Of course, the U-2 had to fly with a fighter CAP, SAM suppressor support, and AWACS, and tanker support for the support aircraft, during the first part of war and not over "high threat" (SAM sites) areas. With the SR-71 none of this would have been a problem, as the SR-71 could overfly Iraq with impunity, imaging in two hours what the U-2 takes eight to image and with just tanker support. Sounds like a cost savings to me.

There is no replacement with the capabilities of the SR-71 then or now in the Air Force inventory. That leaves us with no high-threat overflight capability, made glaringly apparent in the Gulf. Saddam stated that he would shoot down any further U-2 flights over Iraq (luckily he didn't follow through on his threat). The SR-71

could have easily been deployed to a forward operating location, overflowed Iraq, and with its newly installed "real-time data link" could have provided imaging before it landed, similar to the U-2 and four times faster.

In addition, with its ability to overfly an area, unannounced, and not on a schedule like satellites, the SR-71 has an ability to gather totally different intelligence than a satellite.

Unlike Cossalter, I think that this is not an "either-or" situation; it is a question of what assets work best in which situation. The SR-71, U-2, and satellites all have their strengths and weakness. They are complementary systems which, when used together, give the decision-makers and military personnel of the US the information needed to make intelligent decisions.

John Stone Jr.  
Louisville, Ky.

### Thinking Aerospace Part 2

I cannot ignore the challenge thrown down by Frank Jennings in his letter [*September, p. 6*]. [His] defense of the term aerospace is learned, clear, and antiquated. Aerospace is a medium that doesn't exist. Air Force forces don't fight in it. Trying to force the emerging space force into an "aerospace" straitjacket has the same semantic value that "amphibious warfare" has—a term for a niche product that is always bounded and of limited value. In contrast, looking at "air and space forces" allows us to visualize and invent new and highly effective forces that maximize the operational and warfighting potential of both mediums while understanding the special advantages and limitations of each. Let's look at the operational arenas in question and see where they differ and how they might complement one another.

Air is a clearly understood operational medium. There is a corpus of knowledge, technical and operational, that stretches back 85 years. We know, for instance, that use of air makes war a four-dimensional affair—all three physical dimensions and the overwhelming advantage air gives you in time. We know that air missions are fundamentally short and require a significant infrastructure—something that has driven our foreign policy over the years (remember Wheelus AB in Libya?). And, over the years, we have found out that a number of our dearest assumptions don't hold water. For example, strategic bombing as envisioned by Douhet, Mitchell, et al simply doesn't work. But tactical airpower—the kind so deplored in World War II but so very effective in

every war [in which] we've used airpower—does work and, in fact, works wonders.

Viewed in this light, space is clearly another operational medium. The corpus of knowledge is admittedly smaller and the forces that operate in space are today woefully inadequate to the tasks we wish to thrust upon them. Very reminiscent of the 1920s and 1930s, isn't it? But there are clear differences. Space missions today are long—years, in many cases. The infrastructure is huge but can be concentrated in protected areas and therefore doesn't necessarily drive foreign policy. We don't know yet about the assumptions that we think govern space operations, except the one that says whatever you thought you needed, you'll never get enough. Or did we not lease over 60 percent of our satellite communications transponders for Desert Shield/Desert Storm?

Space operations today are in their infancy and await the technological breakthroughs that we made in air operations since 1903. What will harm the utility of space is limiting it to some artificial definition of aerospace that has no basis in reality. The Secretary of the Air Force and the Chief of Staff recognized this three years ago. When will we?

Lt. Col. Timothy K. Roberts,  
USAF  
Colorado Springs, Colo.

I enjoyed reading [Jennings' letter]; however, I was disappointed that there was no mention about how the word "aerospace" was actually used by a major command over 30 years ago and is still in use today.

For those who don't know, the Air Defense Command changed its name to the Aerospace Defense Command in 1968 and added two orbiting satellites to [the] command shield to reflect the space mission it already had been doing for several years. On July 1, 1968, the 9th Aerospace Defense Division at Ent AFB in Colorado Springs became the 14th Aerospace Force under ADCOM. Units under the 14th AEROF also used the word aerospace. The 10th Aerospace Defense Squadron at Vandenberg AFB, Calif., was the only all blue-suit unit launching Thor missiles in support of the Defense Meteorological Support Program and in Project 437, the first and only operational anti-satellite program in USAF.

Years later after the deactivation of ADCOM, the North American Air Defense Command changed its name to the North American Aerospace Defense Command. So for those who

think aerospace power is a new thing and that the word aerospace is the new buzzword around town, it is not. It is an old word being brought back into light to help bring air and space forces together—something that has been going on for many years.

TSgt. Rollan B. Yocum  
Andersen AFB, Guam

### Down to Earth Space

It's always great to see the Space Almanac issue [*August*], but you really missed the mark with your cover photo. What does the birth of a star "seven thousand light-years away" have to do with the vital role space plays in military operations? You could have pictured space operators providing accuracy prediction models to GPS guided munitions strike planners or illustrated the contributions space systems and operators make to theater missile defense.

Unfortunately, your cover reinforced the image of space operations as a matter for scientists and academicians. I believe we should focus on what space brings to the fight here, not [on] what's going on in some far corner of the galaxy.

Capt. Peter J. Flores  
Nellis AFB, Nev.

### The Robin Olds Record

[Retired] Lt. Col. Edward T. Barnard claimed the 479th Group credited Robin Olds with 24-0-2 victories. [*See "Letters," August, p. 8.*] Your article [*"Guide to Aces," May, p. 73*] credited him with 12 victories in World War II. You are both apparently correct. For a time USAAF, at least in Europe, credited ground victories the same as air victories. When ground victories are counted Olds scored at least 24 kills in World War II.

Robert S. Sacchi  
Sterling, Va.

### Slow Rolling Retirees

[When you consider] the Federal Employees Health Benefits Program—65 test, paid-up Survivor Benefit Plan, and other bills in the legislature that address promised benefits for military retirees, it's obvious that flock of non-veteran legislators are trying to outlast those of us who enlisted in the service at the outbreak of World War II. [*See "House OKs FEHBP Pilot Program," August, p. 13.*]

I'm in my early 80s and others like myself aren't going to be around much longer. Those indifferent legislators will win in the end if they continue their present policy of "I don't care."

Col. Harry L. Zanders,  
USAF (Ret.)  
Castle Rock, Colo.

By Peter Grier

## F-22 Makes First Supersonic Flight

The F-22 went supersonic for the first time Oct. 10, 51 years to the week after the sound barrier was broken for the first time in the skies over Edwards AFB, Calif.

Lockheed Martin test pilot Jon Beesley flew Raptor 4001, one of two F-22s now at Edwards, to Mach 1.1 at 29,000 feet, while using the afterburner. From takeoff to landing, the flight took about three hours.

"From all indications, the Raptor flew past the sound barrier with ease," said Lt. Col. C.D. Moore, commander of the F-22 Combined Test Force. "This is just one step of many for the program."

The next step for the F-22 program is supercruise flight: breaking the sound barrier without use of the fuel-gulping afterburner.

The Air Force wants to start F-22 production late this year with release of money for two representative production test vehicles. Congress has decreed that the Raptor has to complete at least 4 percent of its test program hours before this purchase, however.

That would require an acceleration of the current flying schedule.

## On Retired Pay, Wait'll Next Year

Congressional leaders deferred a last-minute effort to include a boost in military retired pay in the Fiscal 1999 budget deal that was struck in mid-October.

However, the Joint Chiefs of Staff said that such an increase is one of its top priorities, and it will likely receive serious consideration on Capitol Hill next year.

The desire for change stems from the fact that the current system has three levels of generosity.

Service members who joined the military prior to a 1980 congressionally mandated cut, and who serve 20 years, receive 50 percent of their last year's base pay as their retired pay.

Twenty-year veterans who joined between that point in 1980 and another in 1986, when a second reduc-

tion went into effect, will receive 50 percent of the average of their three highest years of salary.

Those who joined after July 31, 1986, get only 40 percent of their highest-three-years average.

In a surprise move that occurred during final budget negotiations, the White House supported a proposal by Rep. John P. Murtha (D-Pa.) to raise pensions back to the 50 percent level.

Republican leaders demurred, however, saying they wanted to study the issue at length via hearings next year. They also cited expense: The move could cost up to \$3 billion over the next five years, depending on how cost-of-living increases are handled.

The disparities in retired pay are a

## On Gulf Duty

When he declared, on Nov. 11, that the United States "must be prepared to act" against defiant Iraq, President Clinton authorized a new Persian Gulf buildup that was conspicuously top-heavy with airpower.

Defense Secretary William S. Cohen signed a deployment order sending 98 land-based warplanes—70 of them USAF aircraft—to the Gulf. There, the Air Force aircraft would join an already large USAF force bedded down in a number of Gulf states.

Sent as a unit was an entire USAF Air Expeditionary Force. It comprised six B-1B heavy long-range bombers; 12 F-16CJ defense suppression aircraft; 12 F-15C/D air superiority fighters; and 12 F-16C multirole fighters.

Also sent to bulk up the USAF presence were:

- 12 F-117 stealth fighters.
- 12 B-52H long-range, heavy bombers.
- Four F-16CJ defense suppression craft.

Included in this wave of deploying aircraft were two Navy EA-6B jammers and 12 Marine F/A-18 multirole fighters. Additionally, 41 support aircraft—37 fixed-wing and four rotary-wing—deployed.

Some 3,000 additional Army soldiers went to the region, as did an additional Navy aircraft carrier and Marine amphibious group. New Patriot air-defense units and personnel and a light infantry battalion also went.

Addressing a Veterans Day ceremony at Arlington National Cemetery, Clinton explained the deployments in this way:

"A failure to respond could embolden [Saddam] Hussein to act recklessly, signaling to him that he can, with impunity, develop these weapons of mass destruction or threaten his neighbors. ... [And it] would permanently damage the credibility of the UN Security Council to act as a force for promoting international peace and security."

major contributor to unrest in the ranks and poor retention levels, according to the Joint Chiefs of Staff.

The JCS Chairman, Army Gen. Hugh Shelton, recently told Congress about surveys showing that perceived inequity in retirement is one of the top three reasons people are leaving the service.

## USAF Has New Operational Doctrine

The Air Force on Oct. 6 released a new operational doctrine for the Expeditionary Aerospace Force of the 21st century.

"Just as technology, world threats, and opportunities change, so must our doctrine," wrote Chief of Staff Gen. Michael E. Ryan in the forward to Air Force Doctrine Document 2,

"Organization and Employment of Aerospace Power."

AFDD 2 follows release of AFDD 1, "Basic Air Force Doctrine," in September 1997. It takes the aerospace power discussion to the next level of detail, said officials, describing how the service organizes and employs its forces at the operational level of war.

"This publication also outlines how to set up, plan, and execute Air Expeditionary Forces," said Lt. Col. Bob Poyner, chief of the Aerospace Power Division at the Air Force Doctrine Center at Maxwell AFB, Ala.

AFDD 2 can be understood on its own, said officials, though reading AFDD 1 gives an understanding of terms used and a larger conceptual framework.

The effort to develop a new doctrine began at the behest of former Air Force Chief of Staff Gen. Ronald R. Fogleman after his long-range planning summit in 1996.

### AEF Bombers Complete Mission

Three B-2s and three B-52s from the 2d Air Expeditionary Group completed a month-long training deployment to Andersen AFB, Guam, on Oct. 6. The Spirits returned to their home base of Whiteman AFB, Mo., while the Stratofortresses flew back to Barksdale AFB, La.

During their weeks on Guam, the 2d AEG aircraft flew 34 training missions and logged more than 350 flying hours. The bombers flew as far north as South Korea and as far east as Wake Island.



Photo by Rich Lipski / Washington Post

*USAF Maj. Kimberly Markland broke the tape as top female finisher of the Marine Corps Marathon in Washington Oct. 25. Markland, 34, a clinical laboratory technician at Lackland AFB, Texas, finished in 2 hours, 49 minutes, seven seconds. The first female Marine came in at 3:11:46. Markland had already qualified for the 2000 US Olympic marathon trials before this, her 10th marathon finish.*

Repairs made to the B-2s during the AEF operation showed that stealth bombers can indeed be properly maintained away from home, said officials.

One B-2 suffered damage to some of its low observable tiles, while the other sustained relatively minor damage to its wing leading edge because of a static discharge.

### Georges Hits Keesler

On Sept. 28, Hurricane Georges slammed squarely into Keesler AFB, Miss., after a destructive 10-day ram-

page across the Caribbean islands and the tip of Florida.

The base weather station recorded winds of 112 knots, with gusts over 149 knots. The slow pace of the storm—about five miles per hour—caused it to stall over Keesler, flooding the base and blocking area roadways.

No deaths or serious injuries were reported at the installation or nearby along the Gulf Coast.

Approximately 250 base housing units were rendered uninhabitable by wind and water damage, said Keesler officials. Base and community marina docks were destroyed, and electrical power was knocked out. Eight on-base shelters, including the Keesler Medical Center, protected evacuated personnel as the powerful storm passed by.

The unpredictable path of Georges caused the Air Force to move its military aircraft to safe havens across the southeastern United States.

At Keesler, Hurricane Hunters of Air Force Reserve Command's 403d Wing were forced to fly nine of their 10 WC-130 storm tracking aircraft to Ellington Field, Texas. They also sent seven of the wing's C-130Es to Little Rock AFB, Ark.

At Duke Field, near Eglin AFB, Fla., the 919th Special Operations Wing (AFRC) flew six MC-130s to Ft. Knox, Ky.

At NAS JRB New Orleans, La., the 926th Fighter Wing (AFRC) sent eight O/A-10s to Barksdale AFB.

At Homestead ARB, Fla., the 482d Fighter Wing (AFRC) sent its F-16s



USAF photo by Joan Prichard

*Two V-22 Ospreys at Eglin AFB, Fla., were on display for visitors during a week of preoperational testing in October. As the CV-22, the tilt-rotor aircraft that can take off and land like a helicopter and fly like an airplane, will join Air Force Special Operations Command starting in 2003.*

## Ritter vs. Albright

The years-long effort by the international community to strip Iraq of its capability to make weapons of mass destruction foundered and was no longer effective, according to Scott Ritter, the former UN official entrusted with the job.

A desire by US officials to placate allies who did not wish to confront Iraq was just one major reason why UN weapons inspection teams lost their edge, said Ritter, former weapons inspector for the UN Special Commission, at a meeting with reporters Sept. 16. Ritter resigned his position in August rather than continue to take part in activities he deemed a charade.

US and allied officials said they "want to achieve disarmament of Iraq," said Ritter. "What [they] are doing is not achieving this."

Ritter's resignation sparked a debate which, among other things, highlighted the Clinton Administration's unannounced change in policy toward Saddam Hussein.

Earlier this year, the White House threatened Iraq with attack when it blocked UN Special Commission (UNSCOM) inspectors from full and free access to suspected weapon sites. Dozens of US aircraft and thousands of troops were diverted to the Gulf region to back up that threat.

Saddam backed down and agreed to access demands—or at least said he would. But the crisis showed both him and the US that France, Germany, Russia, and other key nations were weary of confrontation and had no desire to see cruise missiles fly over the Iraqi desert again.

Rather than convince its friends of the need to back up threats with force, the US adopted an unannounced policy of avoiding brinkmanship. On a number of occasions, intervention from Secretary of State Madeleine K. Albright or other top US aides scuttled UNSCOM surprise inspections, charged Ritter.

In response, Iraq started blocking inspector work. On Sept. 1, Iraqi officials barred inspectors from a location where they have previously tagged missile parts and stored them for observation. Baghdad then halted all cooperation with UNSCOM on Oct. 30.

UNSCOM was "hobbled by unfettered Iraqi obstruction and nonexistent Security Council enforcement of its own resolutions," said Ritter.

Albright and defenders of the Administration, clearly stung by the charges, attempted to respond. Ritter, they said, was a low-level worker who did not understand all the dynamics policy-makers had to face. In the words of Albright, Ritter didn't "have a clue about what our overall policy has been."

Top officials had more to consider than whether "old Scotty-boy didn't get in" to a suspected weapon site, said Sen. Joseph R. Biden Jr. (D-Del.) in one memorable comment.

The White House, however, acknowledged the shift in Iraqi policy—what one high official called a "tactical" alteration in approach. They admitted attempts to influence the pace of UNSCOM inspections.

"We did it in order to have the greatest chance of overcoming Iraqi efforts at deception," said Martin S. Indyk, Albright's top Mideast deputy.

Ritter said his resignation from UNSCOM and subsequent public appearances were meant to spark discussion about the implications of the UN's new approach to Iraq.

New details emerged from his efforts, including intelligence information indicating that Iraq built three or four nuclear implosion devices which lacked only a core of fissile material to become atomic weapons—and that Iraq used vehicles painted as Baghdad ice cream trucks to move weapon contraband during the day.

Ritter also said that Saddam Hussein had some success in rebuilding his air force.

They flew more sorties in late 1998 than they did prior to the Gulf War, the former inspector told reporters.

All the fixed-wing aircraft in the Iraqi inventory—such as MiG-29s, Mirage F-1s, SU-27s—were flying, he said. Sorties were limited to takeoffs and landings, with a few maneuvers in the middle, and did not venture beyond central Iraq.

"They have spare parts and maintenance and they've got these planes at the point where they can take off and land. Does that say the sanctions are working? I say it's a failure of sanctions," said Ritter.

to Dobbins ARB, Ga. Also at Home-  
stead, Det. 1 of the Air National  
Guard's 125th Fighter Wing evacu-  
ated three F-16s to Jacksonville,  
Fla.

At MacDill AFB, Fla., four KC-  
135Rs were flown to McConnell  
AFB, Kan., and another one to Shaw  
AFB, S.C.

In the storm's wake Air Force air-  
lifters flew at least 150 missions  
delivering ice, generators, plastic  
sheeting, and other relief supplies  
throughout the affected area. Ac-  
tive, Guard, and Reserve airlifters  
also ferried medical personnel and  
supplies. Two North Carolina ANG  
C-130s transported nearly 100 pa-

tients from facilities in Key West  
and Marathon, Fla.

### Phoenix Aviator 20 Takes Off

Oct. 1 marked the launch of a test  
program intended to keep pilots in  
the Air Force by making them more  
attractive to airlines at the end of  
their military careers.

The new Phoenix Aviator 20 effort  
will guarantee enrollees eligible to  
retire in 2001 a flying spot in the last  
two years of their career. In addition,  
it will provide up to \$1,900 to pay for  
commercial pilot licenses, written  
tests, physicals, and other require-  
ments for the transition from the mili-  
tary to the civilian world.

Behind PA20 lay the idea that the  
US pilot force is a national resource,  
not a focus of competition between  
airlines and the military, and should  
be managed as such.

"Revolutionary ideas are required  
to ensure the high standards of safety  
and security are preserved in our  
nation's skies as America struggles  
to meet this pilot demand," said  
USAF's Chief of Staff, Gen. Michael  
E. Ryan.

A new PA20 office at the Air Force  
Personnel Center at Randolph AFB,  
Texas, will serve as an information  
bridge between major airlines and  
retiring Air Force pilots.

Some pilots eligible to retire in 1999



*During a combat employment readiness exercise held in conjunction with the Foal Eagle '98 exercise at Osan AB, South Korea, in October, Capt. Kris Kraiger of the 33d Rescue Squadron role-plays amidst the fire and smoke of a simulated emergency landing of a Black Hawk helicopter.*

or 2000 will also receive some transition assistance.

### Modernization a Must, Chief Warns

The Air Force Chief of Staff, Gen. Michael E. Ryan, said that the Air Force has a balanced, time-phased modernization plan but that any further delays will boost costs and hurt readiness.

In written responses to readiness questions posed by Sen. John McCain (R-Ariz.), the Chief said that, in the near term of 1999, modernization priorities will be the C-17 and space launch ranges. From 2000 to 2002, bomber upgrades and precision guided missiles will be the emphasis. In 2004 and 2005, the F-22 and the Evolved Expendable Launch Vehicle will be among the priorities. Beyond that, the Airborne Laser and Joint Strike Fighter are scheduled to take up modernization money.

"Further delays in these modernization programs will continue to drive up the cost of supporting our current, aging weapons systems—jeopardizing readiness as costs rise within the constraints of topline funding," wrote Ryan.

### EELV Contracts Unveiled

On Oct. 16 the Air Force announced that it has picked two contractors to develop and build a new series of large rockets, the Evolved Expendable Launch Vehicle.

Boeing and Lockheed Martin were the EELV winners. Each will receive a \$500 million contract for engi-



*Foal Eagle's air mission was to attack enemy artillery pieces, reinforcements going to the front lines, and key facilities. Such exercises give USAF service members on the Korean Peninsula a chance to improve their ability to function in a chemical environment. Here, 36th Fighter Squadron members search for unexploded ordnance after a simulated chemical attack.*

neering and manufacturing development. Boeing will then conduct 19 launches, and Lockheed will have nine, said acting Secretary of the Air Force F. Whitten Peters.

"Having two domestic sources will reduce risk and provide assured access to space for both government and commercial payloads," said an Air Force spokesman.

Launch sites will be both Cape Canaveral AS, Fla., and Vandenberg AFB, Calif. Launch activity is scheduled to begin in 2002.

The objective of the EELV program is to produce cutting-edge expendable launch systems cheaply after the turn of the century. It is meant to replace the current Delta, Atlas, and Titan fleet of medium and heavy launch rockets.

Standardization will be the EELV watchword, with a standard payload interface, standardized launchpads, and standard off-pad processing all helping shave an estimated \$5 billion to \$10 billion in costs over the life of the program, according to a senior DoD official.

### DoD Opens Threat Reduction Agency

Secretary of Defense William S. Cohen announced Oct. 1 the establishment of a new arm of the federal government dedicated to protecting the US and its allies from weapons of mass destruction.

The new organization will be

called the Defense Threat Reduction Agency.

The new organization is composed of various old ones rolled together. The On-Site Inspection Agency, Defense Technology Security Administration, Defense Special Weapons Agency, and elements of the Secretary of Defense's staff were all combined to produce DTRA.

DTRA will have about 2,100 employees and a budget of around \$2 billion.

Though the idea for the agency

## New Defense Review Panel Gets Started

The Pentagon announced Oct. 13 the formation of the new National Security Study Group. Headed by former US Sens. David Boren (D-Okla.) and Warren Rudman (R-N.H.), and known informally as the Boren-Rudman Commission, the panel will aim to develop an appropriate US national security strategy for the first quarter of the 21st century.

The effort is expected to take two and a half years. Secretary of Defense William S. Cohen announced the formation and first meeting of the panel.

Plans call for the Boren-Rudman panel to submit three reports. They are to:

- Determine the global security environment of the first quarter of the 21st century.
- Analyze the character of the nation during that period and develop an appropriate national security strategy.
- Recommend alternatives to the current national security apparatus and processes to implement the new strategy.

Invited to participate as members of the Boren-Rudman Commission are:

**Stephen Ambrose**, historian.

**Anne Armstrong**, former US ambassador to Britain and head of the President's Foreign Intelligence Advisory Board.

**Norman Augustine**, former chairman and chief executive officer of Lockheed Martin.

**Lynne Cheney**, senior fellow at the American Enterprise Institute.

**Bud Dancy**, former NBC White House and diplomatic correspondent.

**John Galvin**, retired US Army general and former Supreme Allied Commander Europe.

**Leslie Gelb**, president of the Council on Foreign Relations.

**Gary Hart**, former senator from Colorado.

**Lee Hamilton**, retiring congressman from Indiana.

**Lionel Olmer**, former undersecretary of commerce and member of the President's Foreign Intelligence Advisory Board.

**Donald Rice**, former Secretary of the Air Force.

**Henry Schacht**, director and senior advisor to Lucent Technologies.

**James Schlesinger**, former Secretary of Defense and former CIA director.

**Harry Train**, retired US Navy admiral and former commander of NATO Atlantic forces.

**Pete Wilson**, retiring governor of California.

**Andrew Young**, former US ambassador to the United Nations.

Executive director is **Gen. Chuck Boyd, USAF (Ret.)**.

came from a defense reform initiative that looked for ways to eliminate duplication and save money, funds for the agency are likely to increase in coming years, said officials.

"This is likely to be, and I'm sorry to say it, a growth industry in the Department of Defense—finding ways to mitigate the spread of dangerous technologies, finding ways to contain the proliferation of weapons to other countries, finding ways to lower the threat to the United States and to our allies" said Deputy Secretary of Defense John J. Hamre.

### USAF Wants Weapon to Hit Chem, Bio Plants

The Air Force plans to spend

\$16 million over nearly four years to develop a conventional warhead tailored to destroy chemical and biological warfare production facilities.

The program could eventually lead to the production of 10 weapons for operational use, said a notice in the Sept. 9 *Commerce Business Daily*.

Air Force officials said that they want the new warhead to be compatible with a wide range of existing munitions, from the AGM-130 stand-off weapon to the GBU-24 bomb. It is intended to create widespread physical damage to factories, said the CBD notice, while limiting collateral damage from released agents.

Neutralizing chemicals or high heat from incendiary blasts might be ways of reaching this goal, according to the Air Force, although several techniques may have to be combined before a satisfactory result is achieved.

### USAF Announces Promotion Policy Change

The Air Force leadership has approved two changes in the Below-the-Promotion-Zone program for officers.

For majors, below-the-zone promotions will be eliminated. For lieutenant colonels, BPZ opportunities will be increased, beginning with 1999 boards.

The reason for the change is that too many young officers were spending too much time focusing on and worrying about BPZ chances.

Said Lt. Gen. Donald L. Peterson, USAF deputy chief of staff for personnel: "The problem is that even though the number of officers who get promoted BPZ to major each year is less than 2 percent of the eligibles, many officers have concluded, quite erroneously, that success as an Air Force officer can only be measured by BPZ promotion—and the earlier the better. ... We need to refocus on what's really important: development as officers in a career field."

Before the change, up to 5 percent of the total positions available on the majors' boards could go to Below-the-Promotion-Zone fast burners. Now the whole promotion quota will go to those in and above the promotion zone.

Up to 7.5 percent of the slots open to lieutenant colonel boards previously went to BPZ. That will now increase to 10 percent. The Below-the-Promotion-Zone allocation for colonel will remain at 15 percent.

### THAAD Safe—For Now

Despite its string of test failures the Theater High Altitude Area Defense missile is not going to be killed—at least, not yet.

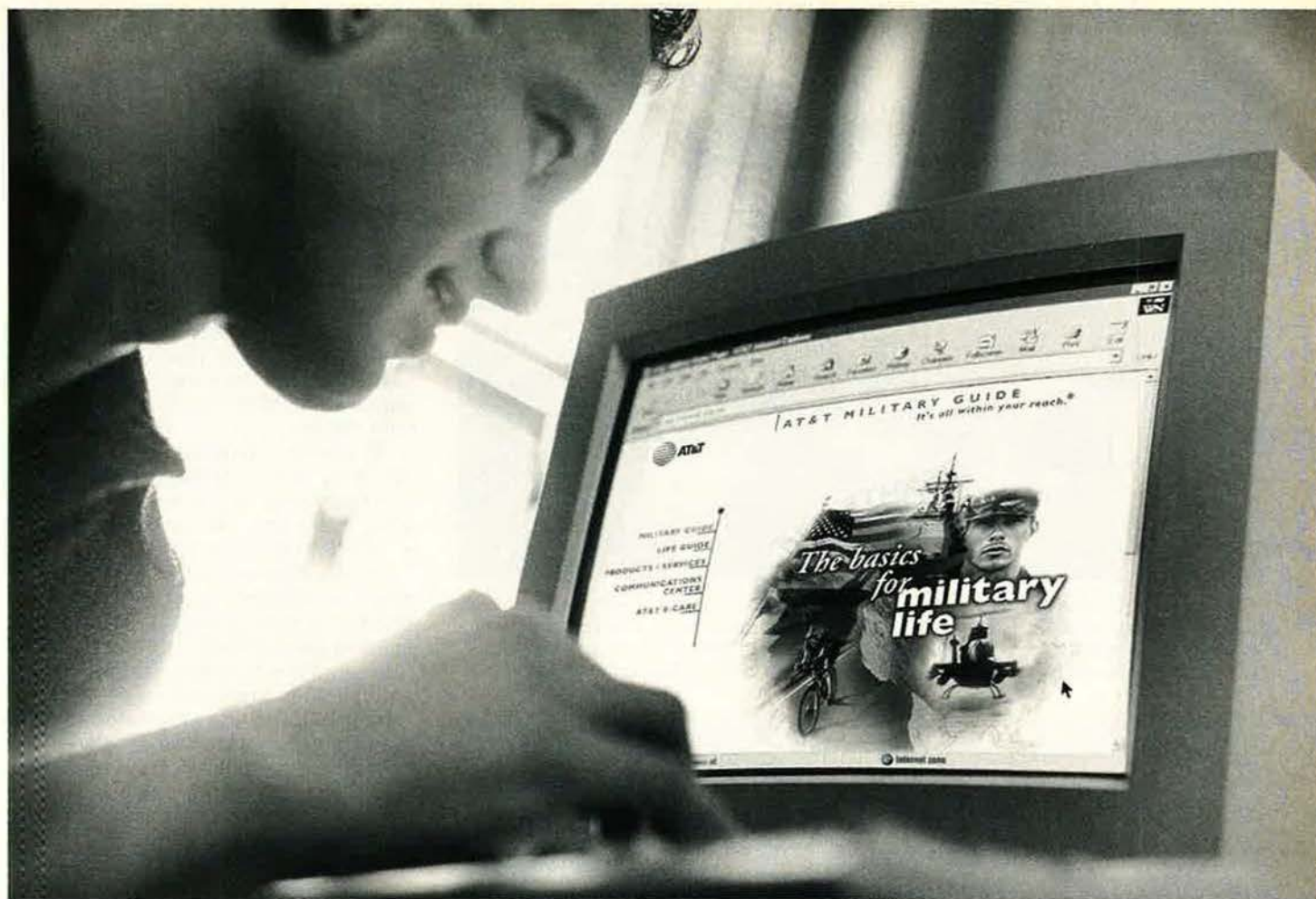
That is what Deputy Defense Secretary John J. Hamre told lawmakers who support the program in a meeting on THAAD's future this fall.

The US indisputably has to have something with THAAD's capability, said Hamre. The question is, what is the best way to obtain it?

Defense officials are now studying three options for THAAD, Hamre said.

The first is to go ahead with the test program as planned and hope that more stringent ground examinations will prevent the glitches that





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The Joint Strike Fighter X-32A concept demonstrator moved closer to completion as Boeing employees prepared the first composite wing skin for shipment to its final assembly plant in Palmdale, Calif., in November. Boeing is competing to build the JSF under a joint-service concept demonstration contract.

## Slow Down to Speed Up

The following comes from Air Force Doctrine Document 2-2, "Space Operations," released Aug. 23, 1998.

"It sounds odd, but it is true for a satellite in orbit. How quickly a satellite circles the Earth is determined only by its altitude—high altitude circuits take longer to complete than low ones. Any attempt to 'speed up' a satellite by applying more thrust will only push the spacecraft out to a higher orbit, thus increasing the orbital period (the time it takes to circumnavigate the globe).

"To shorten the orbital period, the satellite must be allowed to fall into a lower orbit, which requires braking (usually by firing a propulsion motor in the direction of flight). Satellites in Low Earth Orbit will complete more frequent revolutions around the Earth but cannot 'linger' over any particular point. To cause a satellite to appear to stand still when seen from the Earth requires pushing the craft out to Geostationary Earth Orbit—a geosynchronous orbit 22,300 miles directly above the equator (a difficult proposition in terms of fuel costs).

"Satellites that orbit at that altitude but are not directly above the equator will appear to make figure eights from center lines over the equator. The 24-hour orbital period of any geosynchronous orbit corresponds precisely with the time it takes the Earth to rotate once on its axis."

## Senior Staff Changes

**CHANGES:** Brig. Gen. Craig R. Cooning, from Dir., Contracting, AFMC, Wright-Patterson AFB, Ohio, to Prgm. Dir., MILSATCOM Jt. Prgm. Office, AF Prgm. Executive Office, Asst. SECAF for Acq., Los Angeles AFB, Calif. ... Brig. Gen. Paul W. Essex, from Cmdr., 92d ARW, AMC, Fairchild AFB, Wash., to Dep. Dir., Reaction Force, Allied Central Europe, NATO, Kalkar, Germany ... Brig. Gen. Joseph B. Sovey, from Prgm. Dir., MILSATCOM Jt. Prgm. Office, Asst. SECAF for Acq., Los Angeles AFB, Calif., to Dir., Special Projects, SECAF, Pentagon ... Brig. Gen. Bruce A. Wright, from Cmdr., 35th FW, PACAF, Misawa AB, Japan, to Dep. Dir., Info. Ops., Pentagon.

**SENIOR EXECUTIVE SERVICE CHANGES:** Lawrence B. Henry Jr., to Dep. Administrative Asst., Office of the Administrative Asst., Pentagon ... Patricia Kirk-McAlpine, to Dir., Contracting, SMC, Los Angeles AFB, Calif.

have dogged past launches. The second is to build a new batch of test missiles, under more exacting quality control conditions. The third option is to meld THAAD with a Navy Theater Wide program, a seaborne high altitude missile defense effort, by developing a common interceptor.

### Iran and Nuclear Weapons

Iran could be able to deliver nuclear weapons within five years, according to Marine Gen. Anthony C. Zinni, the senior US commander in the Persian Gulf region.

"If I were a betting man, I would say they are on track, [and] within five years they would have the capability," said Zinni, who is commander in chief of US Central Command.

Zinni called worrisome Iran's program to develop nuclear weapons and the means to deliver them, particularly given India's and Pakistan's move into the nuclear club this year.

In addition, Iranians have learned from the Gulf War and developed an "asymmetrical" naval force that might be difficult for the US fleet to deal with, said Zinni. The revamped Iranian navy depends on fast-attack patrol boats, accurate anti-ship missiles, and mine-laying submarines.

In the long run Iran "will be a more significant problem than Iraq," said Zinni.

While there are moderate elements in Iran, such as President Mohammad Khatami, hard-line elements in government continue to resist reforms, said Zinni in an Oct. 21 session with reporters.

"If hard-liners stay in charge, we're going to see ... a country that has weapon-of-mass-destruction capability, a country that still supports terrorism, a country with hard-liners and extremists in charge. That would be difficult," said the USCENTCOM chief at a meeting with reporters.

On reported congressional plans to spend almost \$100 million on military efforts by Iraqi exile groups, Zinni was less than enthusiastic. "I don't see a lot of viability in the [Iraqi] opposition groups," he said.

### Two Die in F-15E Crash

Two officers from the 366th Wing, Mountain Home AFB, Idaho, were killed Oct. 21 when the F-15E they were flying crashed near McDermitt, Nev., 80 miles southwest of the base.

They were Lt. Col. William E. Morel III and Capt. Jeffrey K. Fahlander.

The aircraft was assigned to the 391st Fighter Squadron at Mountain

Home. The officers were on a night flying training mission at the time.

A safety board is investigating the accident.

### Lax Accounting Costs DoD

Loose accounting controls are costing the Pentagon millions in fraud and theft, Sen. Charles E. Grassley (R-Iowa) said Sept. 27.

"It's a story about the complete and utter breakdown of financial controls within the Department of Defense," said Grassley.

Releasing a series of General Accounting Office studies on the subject, Grassley highlighted a case in which a low-level accountant at an Air Force base in Texas set up a dummy company, forged vouchers and certifications, and stole \$2 million. Neighbors noticed his lavish lifestyle and turned him in.

Solutions, said Grassley, might include revising vendor payment system access levels and reducing the number of employees with access to the vendor payment system.

### News Notes

■ On Oct. 1 the Confederate Air Force inducted the second set of honorees for the new American Combat Airman Hall of Fame. Inductees were Maj. Gen. John R. Alison, USAF (Ret.); Col. Rex T. Barber, USAF (Ret.); Brig. Gen. Robert E. Galer, USMC (Ret.); Maj. Jack Ilfrey, USAAF; Col. Walker "Bud" Mahurin, USAF (Ret.); Col. Robert K. Morgan, AFRES (Ret.); and Torpedo Squadron Eight Crew of TBF Avenger BuNo 00380. Unit recognition went to the American Volunteer Group.

■ NASA turned 40 this year. Congress and President Dwight D. Eisenhower established the National Aero-

### Pay Up, He Explained

*Defense Secretary William S. Cohen delivered the following statement to reporters on Oct. 30, 1998, shortly before he embarked on a week-long tour of Asian nations.*

"We believe nonetheless that, in spite of these [economic and financial] problems, Japan and South Korea are still committed to providing the kind of support that is necessary to make sure that their forces are fully capable of defending themselves. ... We also have to remind these countries, South Korea and Japan, that we still fully expect host-nation support, even given the tough times that they have."

### Trouble Time in the Tank

The fall of 1998 was not an easy time for the Joint Chiefs of Staff. Powerful members of Congress all but accused the top uniformed officials of the US military of lying to them about the state of armed forces readiness earlier this year. Meanwhile, reports that the service chiefs were not in the loop when it came to picking potential strike targets in Afghanistan and Sudan raised painful memories of the White House-directed bombing campaigns of the Vietnam War.

The furor over US readiness centered on the relatively upbeat reports the chiefs gave to Congress in testimony earlier this year. At that time, JCS Chairman Army Gen. Hugh Shelton said, "We are fundamentally healthy." Gen. Michael E. Ryan, head of the Air Force, told a Senate panel that "we think we have the right balance" between readiness, modernization, and operations spending. The other chiefs gave similar assessments.

This fall, only a few months later, the chiefs were telling a different story. After a summit with Administration officials to lay out readiness concerns, Shelton spoke for all of them when he testified that "our forces are showing increasing signs of serious wear."

Several senators complained that the chiefs must have known that readiness was a problem in the spring, and that by waiting to announce that fact they had made it impossible to fix it within the normal budget process.

"This is an almost Orwellian experience for me," said Sen. John McCain (R-Ariz.), a member of the Senate Armed Services Committee and a leader of the critical lawmaker group. "Last February ... you came before this committee and gave a dramatically different view of readiness and the requirements that the military needs to maintain our capabilities."

The nation's military leaders, for their part, denied that they had kept quiet about developing problems. Readiness trend lines worsened considerably during 1998, said JCS chief Shelton. He said that the fundamental conclusion presented earlier in the year—that the military remains fully capable of executing the national military strategy—still stands.

"With an acceptable risk," added Shelton, "the risk having gone up."

With respect to Afghanistan and Sudan, the service chiefs appeared to have been deprived of any substantial role, informal or otherwise, in the choice of possible bombing targets or the weapons and tactics to be used in the attacks, according to news reports.

Traditionally, top defense officials would present a range of target options for the White House to choose from, but this procedure has been circumvented. Pentagon officials complain that this has led to some poor decisions, such as mismatches between the type of warheads assigned to some targets and the type of blast necessary to destroy them.

On this issue, former naval aviator McCain weighed in on the side of the uniformed military. "If it's true, it's very disturbing," he said.

nautics and Space Administration on Oct. 1, 1958, largely as a Cold War response to Soviet spaceflight progress.

■ Vance AFB, Okla., recently played host to an Air Force first when the 71st Flying Training Wing became the service's first wing to lease computers. The leased equipment, which includes laptops, servers, printers, and software, will provide greater standardization and more power than equipment purchased piecemeal, said officials.

■ Nominee Richard Danzig was scheduled to take over as Secretary of the Navy from John H. Dalton at a Nov. 16 ceremony.

■ A congressional cut of \$25 million from the Airborne Laser's requested budget of \$292 million will result in delays of six months to a year in some parts of the weapon's development, Col. Michael W. Booen, program director, said Oct. 1.

■ On Oct. 5, Whiteman AFB personnel and the US Department of Agriculture Wildlife Services began efforts to move a roost of more than 100,000 blackbirds which threaten flying operations safety at the Missouri installation. The effort uses various nonlethal harassment efforts, such as propane cannons, pyrotechnics, sirens, horns, and distress-call tapes.

■ The Defense Courier Service, which delivers highly classified material under physical escort, was re-assigned to Air Mobility Command on Sept. 30. DCS had been under the wing of US Transportation Command since 1994.

■ The Congressional Budget Office recommended canceling the DarkStar stealthy Unmanned Aerial Vehicles and investing more money in Global Hawk long-range UAVs in a report released during the first week of October.

USAF photo by SSgt. Jason Tudor



**SSgt. Ronald Martinez and MSGt. Errol Stewart drag TSgt. Marie Mohammad on a litter through an obstacle course during Top Dollar '98. An Air Force Space Command team from Malmstrom AFB, Mont., won first place in the four-day competition to determine USAF's best comptroller and contracting team.**

■ Firebee drones, outfitted with sensors and other equipment already in the Air Force inventory, could be an effective in-theater defense against attacks by cruise missiles, according to a study done for the Pentagon's Defense Advanced Research Projects Agency.

■ The May 13 crash of an F-16C from the 185th Fighter Wing (ANG), Sioux City MAP, Iowa, was caused when five American White Pelicans struck the aircraft, according to a newly released accident report. The plane's pilot, Lt. Col. David E. Lundquist, ejected safely but sustained major injuries from the impact of the birds.

■ Two F-4Fs from Holloman AFB, N.M., collided in midair while on a training mission Oct. 14. Aircrew from one aircraft ejected safely. The other aircraft landed safely at Holloman.

■ On Oct. 19, the Supreme Court declined to hear arguments against the military's "don't ask, don't tell" ban on homosexuals. It was the fourth time the nation's highest court has rejected such a request.

■ The Air Force has determined that several 55th Wing support functions at Offutt AFB, Neb., qualify for conversion to all-civilian workforces. The wing is studying 1,609 positions in civil engineering, transportation, and supply, among other work centers, with a conversion goal of early 2001.

■ On Sept. 29, 30 House members sent President Clinton a letter urging

him to remove the "acting" from acting Air Force Secretary F. Whitten Peters' job title. "Mr. President, our Air Force needs a leader. In acting Secretary Peters they already have a good one. We respectfully request you nominate him quickly to serve as Secretary of the Air Force," said the letter.

■ Due to declining costs, the cash clothing replacement allowance used by enlisted personnel to defray uniform expenses has been lowered. The basic allowance (for members with three years of service or less) is now \$187.20 annually for men and \$212.40 for women.

■ The US military does not need all the C-130s that Congress forces it to

buy, said Secretary of Defense William S. Cohen in a letter to Congress this fall. Seven such planes were added to the budget this year, over DoD objections, at a cost of some \$400 million.

**Obituaries**

**Clark M. Clifford**, Secretary of Defense at height of the Vietnam War in the late 1960s, died Oct. 10 at his Bethesda, Md., home. He was 91.

Born in Kansas and educated in St. Louis, the smooth power lawyer virtually defined the role of Washington insider for more than four decades. He began his long association with power as a young White House naval aide in 1944. He became a speechwriter and later special counsel for President Harry S. Truman and helped articulate the Truman Doctrine of resistance to communist expansion in Greece and Turkey. He later served as personal lawyer to President John F. Kennedy, defense chief to President Lyndon B. Johnson, and trusted advisor to President Jimmy Carter.

He said he was proudest of his efforts to extricate the US from Vietnam when he ran DoD after Robert S. McNamara's departure in late 1968 and until Johnson left office in early 1969.

Retired **Col. Glenn E. Duncan**, a World War II Army Air Forces ace, died in Niceville, Fla., July 14.

During World War II, Duncan served as commander of 353d Fighter Group, based in Britain. He is credited with 19.5 kills of airborne German aircraft and destruction of nine planes on the ground. Shot down over Germany during a low-level attack, he made it to Holland and safety without being captured.

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## Overseas Presence

"In past years, USAF has tended to pay less attention to overseas presence than did the Navy. The emerging situation [in regional theaters] suggests that USAF should broaden its thinking in this arena. USAF forces may at least be required to perform a host of new missions in outlying areas. Beyond this, USAF forces may come to play a larger role in overseas presence than is the case today, and its overseas deployments may increase.

"Alternatively, other services may experience declining overseas commitments in ways that shift the spotlight toward the Air Force. If the future emphasis of overseas presence is to be quick power projection, USAF forces are clearly well-suited to playing a major role. Thus, the future agenda for US overseas presence offers the Air Force important opportunities if it is willing to rise to the challenge.

"How could the future agenda affect specific USAF plans and programs? ... [F]uture requirements for stationing US forces overseas could necessitate more than the 20 fighter wings now in the USAF posture. ... [N]ew or expanded overseas air bases and infrastructure may become critically important in the coming years. ... [F]uture overseas missions may place a greater premium on long-range operations."

**From a November 1998 RAND study, "Changes Ahead: Future Directions for the US Overseas Military Presence," by Richard L. Kugler.**

## Powder Keg

"For many Russians, angst about their future is compounded by suspicion about the US' strategic intentions. The Russian press has carried numerous articles suggesting that, under the guise of "partnership," the US is pursuing a hidden agenda not only to keep Russia weak but to bring about its fragmentation. ...

"Nothing could be further from the truth. The US supports a unitary Russian state, within its current borders. The violent breakup of Russia would

be immensely dangerous and destabilizing. When Czechoslovakia split in two in 1992, it was called the velvet divorce. But multiple divorces among, and perhaps within, the 89 regional entities of Russia would almost certainly not be velvet. The horror that has unfolded over the past several years in the Balkans might be replayed across 11 time zones, with 30,000 nuclear weapons in the mix."

**Strobe Talbott, deputy secretary of state, in a Nov. 6, 1998, speech at Stanford University, Palo Alto, Calif.**

## What He Was After

"At various times from at least as early as 1993, Osama bin Laden and others, known and unknown, made efforts to obtain the components of nuclear weapons. ... At various times from at least as early as 1993 Osama bin Laden and others, known and unknown, made efforts to produce chemical weapons."

**From text of a Nov. 5, 1998, federal indictment returned in New York against Saudi terrorist leader Osama bin Laden.**

## We Know the Feeling

"It is astonishing, as well as dismaying, that some of our national custodians feel morally impelled to impugn American science in the public's eye. ... Professor Gerald Holton, physicist and historian of science at Harvard University, [has] described how the Smithsonian Institution blindsided the American Chemical Society. This affair had received far less publicity than the notorious *Enola Gay* exhibit at the National Air and Space Museum. ... But, in many ways, it is a more telling example of the kind of politics that seems to predominate at the Smithsonian.

"In 1989 ... the ACS commissioned the Smithsonian's National Museum of American History to design a permanent exhibit on 'Science in American Life.' The ACS scientists naturally expected an exhibit celebrating the triumphs of American science and did not imagine that this needed to be spelled out in the contract. Five

years and \$5 million later, what the scientists got was an exhibition that presented American science as a series of moral debacles and environmental catastrophes: Hiroshima and Nagasaki, *Silent Spring*, Love Canal, Three Mile Island, and the explosion of the space shuttle."

**"Fleeing Science and Reason," by Christina Hoff Summers, in the September/October The American Enterprise.**

## Frequent Resort

"Our credibility in dissuading ... rogues from attacking our interests, from developing and then using nuclear, chemical, and biological weapons, is diminishing before our eyes and the eyes of the world. ... Ironically, the lack of a strong military leads only to its more frequent use. The Reagan Administration sent forces abroad 18 times to tamp down crises; the Bush Administration, 14 times. So far in the Clinton Administration, ... forces have been deployed some 50 times. These are costly deployments. Haiti alone cost \$2 billion. Bosnia is well over \$9 billion per year by the most conservative accounting and still climbing."

**John F. Lehman Jr., navy secretary 1981-87, writing in the October 1998 American Spectator.**

## Cruising With Clinton

"When US leaders who are ill at ease with US power hear the word 'duty,' they reach for their cruise missiles. Those weapons provide telegenic, antiseptic action-at-a-distance. They make possible illusory decisiveness, without follow-through. The Clinton Administration has used them as a substitute for serious policy regarding Iraq and terrorism. Now cruise missiles may be fired to express ersatz seriousness about Serbia's actions in the province of Kosovo. Someone the *New York Times* identifies as 'a senior Administration official who requested anonymity'—one can see why—said, 'We are at last serious.'"  
**Political commentator George F. Will, writing in the Oct. 10, 1998, Chicago Sun-Times.**

**Air Expeditionary Forces are extending the concept of long range airpower.**

# The Long Reach

*Armed for bear, two F-15Es and a B-1B from the 366th Wing at Mountain Home AFB, Idaho, head out on a quick-reaction mission. The AEF concept is recasting traditional notions of long range airpower.*

# ch of On-Call Airpower



By John A. Tirpak, Senior Editor



**Bombers once defined strategic airpower—nuclear or conventional—but they are becoming more integrated into the “deploying” force. Here, a B-52H tanks up from a KC-10 en route to Diego Garcia.**

**S**WIFTLY delivering fire and iron on distant targets constitutes a signature capability of the Air Force. Not long ago that capability—requiring speed, mass, and long reach—was seen as residing primarily in the fleet of heavy bombers and fighter-bombers. These long-legged aircraft continue to play a vital role, but Air Expeditionary Forces have broadened and deepened the concept of long range airpower.

Through AEFs, USAF is working to revolutionize the way it responds to crises. The national military strategy requires the US to be able to fight and win two Major Theater Wars that might occur at more or less the same time. Much of the responsibility for carrying out this task—especially in the early going—would fall on the Air Force.

The Pentagon’s Quadrennial Defense Review in 1997 said that the power to rapidly halt an enemy’s advances short of objectives in two theaters in close succession is “absolutely critical” and that “failure to halt an enemy invasion rapidly can make the subsequent campaign to evict enemy forces from captured territory much more difficult, lengthy, and costly.”

The “halt phase” is the focus of much AEF planning.

Speed is of the essence in this strategy, and Air Force officials have spent the last few years refining the way that the service will meet the test. The challenge is twofold: Be able to

arrive quickly, ready to fight. Then, be able to follow up the initial blows with attacks that can be sustained for as long as it takes to do the job.

#### **Global Power Missions**

In a part of the world in which no air units already have been put in place, heavy bombers would still provide the fastest response to aggression. USAF’s B-1B, B-2A, and B-52H bombers, from a cold start at their home bases in the continental United States, could attack virtually anywhere on Earth in 18 hours.

The heavy bombers, armed with new types of munitions that could destroy hundreds of armored targets on a single pass, would be able to stop an enemy column on the march and, armed with new precision weapons, destroy time-critical enemy command-and-communications nodes, infrastructure, and other targets.

Lt. Gen. Ronald C. Marcotte is the commander of 8th Air Force, headquartered at Barksdale AFB, La., which is responsible for all USAF bombers. He said that the crews of all three types of heavy bombers practice such Global Power missions on a regular basis. The 30-to-40-hour-long missions entail a launch from the continental US, flight to a spot halfway around the world, and a return to home base.

According to Marcotte, the Air Force’s bomber force could sustain these kinds of missions, at a high sortie rate, for weeks, if need be.

The bomber fleet practices “all options” with regard to how they may be used in combat, added Marcotte, who noted that bomber employment is very “scenario-dependent.” Missions are affected by “availability of the forward operating location, type of bomber available, ... and other factors,” he said. “Obviously, if you forward locate, it improves the sortie rate [and] you can react much more quickly.”

Increasingly, that’s just what is happening.

The force of heavy bombers, which during the Cold War focused heavily on nuclear operations and had limited involvement in planning for conventional operations, more and more is being integrated with other kinds of theater forces, particularly in AEFs. This has been done to help coordinate attacks and to make the most effective use of the bombers’ greatest assets—huge payload, high speed, long range, and, in the case of the B-2, stealth.

According to Marcotte, bomber officials still pay “very close attention” to the nuclear war commitment. Beyond that, he said, learning to operate within AEFs is “the No. 1 priority for the foreseeable future.” This is, he added, “the focus of what we do.”

#### **“In Your Face” Airpower**

This step is favored by Gen. John P. Jumper, currently the commander of US Air Forces in Europe but also viewed by many as the father of the AEF concept. According to Jumper, heavy bombers at home station, ready to attack anywhere in the world, are an impressive strike instrument sure to provide some degree of conventional deterrence, but the forward deployed AEF, possibly including bombers, provides a more immediate, “in your face” deterrent.

As a package of airpower tailored to the situation at hand, the AEF can be deployed quickly to show that the US is “willing to put aircraft forward ... on the ground, to share risk with a nation under duress,” Jumper explained.

With some mixture of fighters, attack airplanes, heavy bombers, tankers, airlifters, air defense suppression airplanes, and other types, an AEF can deploy to a forward base, arm airplanes, and strike enemy targets in force within a few



days. The AEF's first bombers could hit targets within 24 hours, but fighters could deploy and do the same within 48 hours, according to the Air Force. Such quickness begins to put a fighter-heavy AEF on a par with bombers alone for speed of response.

Success can be attributed in part to successful change in the fleet of heavy bombers. The bomber force, once thought too dependent on extensive home support facilities, has demonstrated that it, too, can be a deployable force, Marcotte asserted.

"We've proved, of course, that we can forward deploy," he said, citing recent B-52 short-notice excursions to Diego Garcia, B-1B deployments to Bahrain, and the B-2 exercises in Guam. The B-2 deployments were particularly important, having disproved claims of critics that the B-2's exotic stealth materials couldn't be maintained in an austere, forward location.

Marcotte said that the deployments have been learning experiences, which have helped identify which support items must go forward with the airplanes and what can safely be left behind. In addition, "we've done site surveys at our most likely deployment locations" to determine what items will need to be pre-positioned for future deployments.

Their range also gives the bombers the option of either staying home, going forward, or heading to some intermediate location, depending on

## Next Up, a Bomber Roadmap

The Panel to Review Long Range Airpower, headed by former Air Force Chief of Staff Gen. Larry D. Welch, struck a nerve last spring with its observation that the Air Force has no plan for long range airpower beyond upgrades and modifications to the existing fleet.

As a result of the Welch panel's report, Congress ordered the Air Force to prepare a bomber roadmap and hand it over to lawmakers next spring.

Air Force Chief of Staff Gen. Michael E. Ryan said the lack of a bomber roadmap was not an oversight by the service. It was premature, he said, to look to the next aircraft while introducing a brand-new bomber with unprecedented capabilities, especially given the uncertainties over whether the B-2 line would be reopened. Several intervening studies about bomber and munitions requirements further delayed the process of "looking at the next generation, 20 to 30 years away."

The bomber roadmap will include "munitions, capabilities, bombs on the airplanes, and future requirements for long-range aircraft," Ryan said. The roadmap will tell whether "there's a B-3 out there someplace."

"Sometimes time is of the essence," Ryan said, "either from a reconnaissance standpoint or a force application standpoint. And if you have something that positively has to be there overnight, I think we need to look at faster ways to do it."

Ryan said his "gut" feeling is that the requirement will be stated as "rapid response at intercontinental ranges," suggesting the next craft to do the mission might be a hypersonic craft, a spaceplane or transatmospheric vehicle.

Whether that means a spaceplane or a B-3 or smaller aircraft with long range "doesn't make any difference," Lt. Gen. Ronald C. Marcotte, 8th Air Force commander, said. "It's the concept of Global Reach, Global Power."

the sensitivity of the situation, Marcotte said.

### Making a Statement

The typical AEF is made up chiefly of fighter airplanes, which can be portrayed as a defensive instrument. Bombers make a "more overt, aggressive political statement," he observed. Besides political considerations, bombers might need a different operating location because of their need for more ramp space.

Current Air Force plans call for organizing and keeping ready two

AEFs at all times. Most of the time, one would be deployed forward to some austere site and one would be on-call in the United States for any contingency that might occur. If it were necessary to deploy both AEFs, a third would be formed up and made ready.

Because of the critical requirement for deployment speed, the Air Force has looked at any and all means to whittle down the size of its deploying units. Only a bare minimum of spare parts, maintenance personnel, force protection assets, and crews go on a deployment. This practice not only reduces the number of cargo transports necessary to move an AEF—inherently reducing the scope of the deployment and the time needed to do it—but it also reduces the turbulence in the force by reducing TDY.

Jumper does not think the Air Force has reached the limits of compression. He envisions the typical future AEF as being a minimalist force, "living under the wing" at a bare-bones runway, able to get in and—when the mission is over—out within hours. It's a job the Air Force actually did very well in the 1950s, he remarked, and he's anxious to restore USAF's proficiency.

The Air Force believes that the whole force needs to be lighter, leaner, and more lethal, if it is to do its job properly in the years ahead. Jumper maintains that, in an ideal world, an AEF commander—or a Joint Forces

DoD photo by PH2 Leland B. Comer



*Leave it home: AEFs are trying to deploy with fewer and fewer people, to save airlift, save time, and reduce the strain on the force. "Reachback" to Rear Air Operations Centers offers real-time answers from the real experts.*

## Deterrence and Contingency Operations

**Information, Surveillance, and Reconnaissance.** Increase situation awareness, tailor operations tempo, gain information superiority, and improve responsiveness. ISR assets can help deter an aggressor by letting him know the US is interested and watching closely.

**Show of Force.** Highly visible deployment of aerospace power on short notice can deter crisis. Example: Dispatch of an AEF to Kuwait in 1997, which deterred hostile Iraqi actions.

**Forced Entry.** Establish local air superiority to permit injection of ground or naval power or aerospace power directly to restore stability. Example: Operation Just Cause in Panama in 1989 featured forced entry airpower delivering surface forces.

**Aerial Occupation.** Employ air and space forces to prevent hostile forces from operating effectively in specific areas. Example: No-fly zones established over Iraq following the Gulf War.

**Raids.** Rapid projection of aerospace combat power into hostile space to secure information, confuse the enemy, or attack key targets. Example: 1981 Israeli airstrike against Iraq's Osirak nuclear reactor.

**Coercion.** Deterring an enemy from performing hostile action or compelling an enemy performing such an action to cease. Example: Operation Deliberate Force in 1995 to force Bosnian Serbs to remove heavy weapons from designated exclusion zones.

—From Air Force Doctrine Document 2, "Organization and Employment of Aerospace Power," September 1998.

Air Component Commander, in a Smaller-scale Contingency or Major Theater War—would deploy to the war zone carrying little more than a small man-portable satellite dish, a laptop computer, and a printer.

With this goal in mind, the Air Force recently conducted Expeditionary Force Experiment 98, the first of what is planned to be many annual lab sessions for creating the force of the future. The goal is to sharpen the emphasis on moving forward only what is absolutely necessary—and getting even greater effectiveness out of what does move forward.

### The Power of Reachback

Numerous experiments were carried out in EFX 98, run in September at Eglin AFB, Fla. Eglin stood in for an airfield in an allied country under attack. A major goal was to see how small and light the Air Force could make the forward Air Operations Center—which manages air tasking orders, passes intelligence, and coordinates US and allied forces. To run the AOC, only 115 command-and-control personnel deployed forward with the AEF commander, Lt. Gen. Lansford E. Trapp Jr.

However, they had some assistance, acquired courtesy of a concept called "reachback." Supporting them were about 300 people at a Rear AOC established at Langley

AFB, Va. Using video teleconferencing, the Internet, radios, telephones, and other means of data transfer, the forward-based people could see and hear their counterparts at Langley and from there, could "lay hands on" and "reach back" to get the best subject matter experts all over CONUS, according to Lt. Col. Rocky Kimpel, deputy director of EFX 98.

Kimpel noted that the 1991 Persian Gulf War required the manage-

ment effort of nearly 2,000 people based in Riyadh, Saudi Arabia. It would be "a nightmare" if, in a similar conflict, a large forward-based AOC took a hit from a missile or car bomb, which would effectively decapitate the allied war effort, Kimpel noted. The Gulf War AOC was underground and well-protected, but in other theaters, such facilities might not be available. A smaller AOC, backed up by the Rear AOC at Langley, is easier to hide, protect, move, and reconstitute, if necessary, he said.

The Rear AOC at Langley can accommodate hundreds of terminals in a building reminiscent of NASA's mission control in Houston, and the parking lot outside has been wired with cables and electrical lines so that the facility can be expanded with tents and trailers in a real war.

Not only does employing reachback sharply reduce the amount of cargo and people that must be airlifted forward, but many people who otherwise would have to deploy can stay at their home base. This reduces the stress of deployment on individuals, allowing them to work from a place where everything they might need to give the full answer is at their fingertips.

In remarks to reporters as EFX 98 was wrapping up, Gen. Michael E. Ryan, USAF Chief of Staff, said that the "distributed" command-and-control effort worked "in some cases ... very, very well."



*The mix in any given AEF will depend on the mission, but the No. 1 rule is to get out of town fast. The Air Force is becoming proficient at deploying a fighting force forward and being ready to put iron on target within 48 hours.*

USAF photo by SSGT. Debbie Hernandez

The impetus for reachback comes from several sources. First, the world is witnessing a boom in telecommunications high technology, making the systems of Gulf War vintage seem almost primitive by comparison.

More important, however, is the changed operational outlook. Gen. Richard E. Hawley, commander of Air Combat Command, pointed out that the Persian Gulf buildup was a huge logistic effort that took a long time to get forces in place and operational. "In the world we're looking at," said Hawley, "we think we'll have to be more agile than that and must be able to set up a command-and-control capability to employ aerospace power on very short notice."

That's why the reachback concept is so important, said Hawley. Instead of deploying thousands of people and tons of equipment, small bits and bytes of information will move between command centers.

The concept of reachback gets major attention in the Air Force's new operational doctrine manual, "Organization and Employment of



USAF photo by SrA, Greg L. Davis

**Regional CINCs are warming up to the AEF, coming to count on USAF to provide almost overnight, sustainable airpower. Here, an F-117 on a recent deployment to Kuwait is towed past its Gulf War handiwork.**

Aerospace Power," published this fall. It stated, "Reachback, for both additional forces and materiel, will become increasingly important for reducing the deployment footprint, thus preserving critical lift."

### En Route Planning

EFX 98 also spotlighted another "get-fast" initiative—en route planning. The experiment, in fact, began on the run. The AEF commander, Trapp, deployed immediately following the "go" order, using USAF's Speckled Trout electronics experiment airplane as a kind of flying AOC.

Trapp was able to stay in constant contact with all his forces during his transit time, which he used for evaluating targeting information, issuing orders, and crafting the air tasking order. Previously, JFACCs have had largely "dead" time in transit, able to communicate but not do much substantive planning or decision making based on real-time data.

This en route Expeditionary Operations Center was an EFX initiative developed by the operational units and the AEF Battlelab at Mountain Home AFB, Idaho. It provides intelligence and weather analysis, mission planning capability, air defense integration, aircraft status monitoring, and command post functions.

The en route EOC has a "roll-on, roll-off" capability. Built on a standard aircraft pallet, it was loaded onto a specially equipped KC-135R Stratotanker at Mountain Home at the beginning of EFX 98. The aircraft was outfitted with a phased array communication antenna to receive large amounts of data at global distances. Once unloaded, it formed the core of the forward AOC.

## War-Winning Operations

**Destruction.** Maximum long-term damage to targets such that the enemy cannot recover in immediate future or for the duration of the conflict. Example: Operation Desert Storm.

**Disruption.** Temporary incapacitation of enemy strength, preventing deployment of assets. Example: 1944 Allied air attacks on Panzer division trying to contain Allied landings in France.

**Diversion.** Attacks against targets that compel an enemy to shift forces from offensive to defensive duties. Example: World War II strategic bombing campaign against Germany.

**Delay.** Direct or indirect attack on advancing or retreating enemy forces to slow or stop their movement. Example: Fall 1950 USAF air interdiction campaign that lengthened amount of time for North Korean troops to reach the Pusan perimeter.

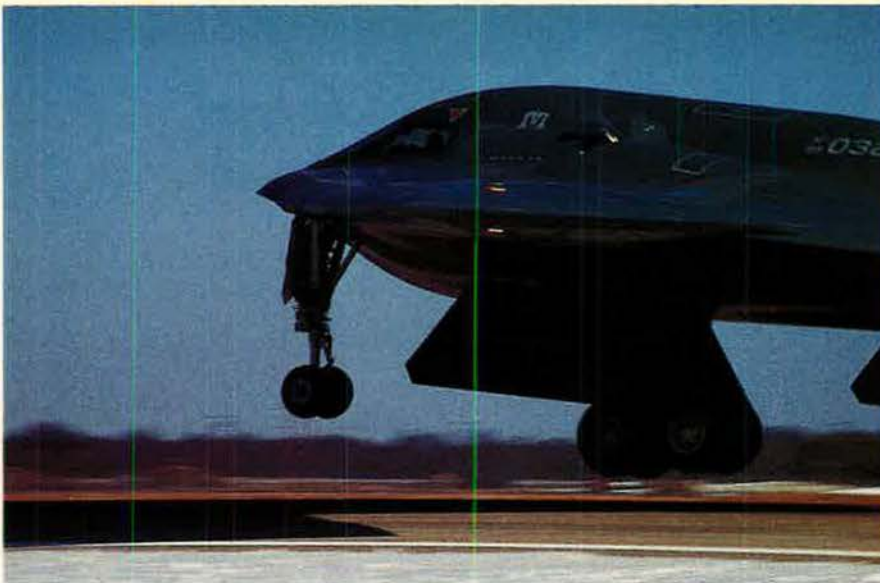
**Deception.** Actions to mislead an enemy about operations. Example: Operation Bolo in 1967, when USAF F-4s, masquerading as F-105s, lured North Vietnamese MiG-21s into battle and defeat.

**Halt.** Combination of destruction, disruption, diversion, delay, and deception that denies an enemy the ability to employ his forces in an offensive. Example: Israeli air attacks that stopped Syrian offensive on Golan Heights in 1973 Mideast War.

**Deployment/Sustainment.** Interruption of a commander's ability to conduct operations over time. Example: World War II Allied air interdiction that prevented German Field Marshal Erwin Rommel from obtaining reinforcements and resupply.

**Information Operations.** Both air and space reconnaissance and surveillance to provide accurate information to US planners or information warfare. Example: Operation Desert Storm, in which Iraqi air defenses were blinded and communications destroyed.

—From Air Force Doctrine Document 2, "Organization and Employment of Aerospace Power," September 1998.



**A bomber roadmap is to be completed in the spring; it will detail how the fleet will be upgraded with new weapons and capabilities and, ultimately, replaced. The B-2 is not likely to be the last word in intercontinental warplanes.**

Similarly, two B-1B bombers took off from Mountain Home for the notional allied nation, armed for a strike, but without any targeting information. The targeting data were passed to the bombers in transit, and the bomber crews programmed their weapons en route.

However, just minutes before the B-1s were to “release” weapons at previously planned aimpoints, officials ordered changes in the targets and pumped new data into the system. Both airplanes recast their targeting and scored “shacks,” or direct hits, on the objectives at Eglin.

In-flight targeting changes were also tested with fighters. Such a capability is vital for rapid response to a fast-changing battlefield or in missions such as Scud hunting.

### Hacked

Other experiments included information warfare defensive operations. The latter was particularly important—though its conclusions are classified—because an enemy able to cut off the flow of information or corrupting the information being passed back and forth from CONUS could achieve significant disruption of the AEF’s operations. Simulated hacking of the system was conducted and studied.

“A lot of these things ... pushed the envelope,” Ryan said. However, EFX “gives us a jump start on the next iteration of capabilities” necessary for AOCs and AEFs.

Trapp said the exercise was useful in “changing the mind-set” of the Air Force. “Where you’re located ... shouldn’t matter if you’re hooked together through this global grid ... of information,” he said.

Nevertheless, he asserted that no one believes the time of running a war by remote-control is at hand. The JFACC needs to see and feel the situation firsthand in order to make good decisions, he said.

How small can a deployed AOC get? The size of the forward AOC, Jumper said, should be dictated

“more by the representational requirements—the hand-holding, the presence of the other services, the coalition partners—than by command-and-control requirements.”

Ryan said that regional commanders in chief are becoming more accepting of AEFs.

While they would prefer having dedicated forces on hand under their command, USAF is successfully demonstrating that an AEF on call in CONUS is “almost as good” as having one already deployed, Ryan said. “They understand we have worldwide tasking, and ... they go to the head of the list if they have a problem.”

Hawley, the ACC chief, said he saw a turning point in the concept of AEFs last summer, when US forces, having quickly deployed to the Persian Gulf region to deal with Iraq’s recalcitrance on UN weapons inspections, were ordered home again. A Defense Department spokesman, Hawley recalled, told the national media that the Air Force could return to the Gulf with substantial striking power within 48 hours.

“That tells me that we have gained acceptance, at the senior levels of our government, of our concept of having forces on alert in the States, ready to deploy and respond with meaningful combat power in a short period of time,” Hawley asserted. “We think it’s the right way to use airpower.” ■

## What Is Attrition Reserve?

Today, USAF has 196 bombers, 126 of which are available for combat. Others are in test, training, depot maintenance, or the status called attrition reserve.

The attrition reserve was created in the early 1990s as a way to pay for needed upgrades to the bomber fleet. By not flying some airplanes, not buying spares for them, or not assigning flight or ground crews, the Air Force saved money for upgrading the bombers with new munitions and avionics.

In practice, however, Air Combat Command continues to try to maintain attrition reserve aircraft at the same rates as the combat-coded ones, cycling them in and out of flight status from time to time in order to age the fleet at a uniform rate and to prevent maintenance problems.

As a result of the attrition reserve, as well as shortfalls in funds for operations and maintenance, spares, and ground crews, bomber mission capable rates have fallen.

In Fiscal 1996, 1997, and 1998, bomber mission capable rates averaged 58.2 percent, 58.5 percent, and 56.4 percent, respectively. Worst off is the B-1B fleet, for which the standard is 67 percent; in Fiscal 1998, it averaged 50.9 percent, and the cannibalization rate hit 97 percent. The B-52H averaged 78 percent against an 80 percent standard. No mission capable standards have been set yet for the B-2 fleet, only half of which has been delivered.

ACC plans to “buy back” some airplanes in the attrition reserve, increasing the number available for combat. About 20 B-1Bs are to be returned to full combat status by the end of 2001. The B-2 fleet will gain 12 airplanes for a total of 21—of which about 15 will be ready at all times. Twenty-three B-52Hs are to be retired in the same period.

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The USAFE commander talks about air expeditionary operations from foreign bases.

# Operating

*Gen. John P. Jumper is commander of US Air Forces in Europe. Before this assignment, he was deputy chief of staff for air and space operations (1996–97) and commander of 9th Air Force and US Central Command Air Forces (1994–96). He is the principal figure in development of Air Expeditionary Forces. On Sept. 15, he met with the Defense Writers Group in Washington. Here is some of what he said.*

## **Access to Overseas Bases**

“Any country that is worried about its survival is not going to stall on [granting USAF forces] access [to its bases]. But our job, in the meantime, is to posture ourselves so that our presence is valuable to those who are going to need our help. I’m not sure we have always taken that sort of a look at it before, but this is the way in the new expeditionary air force that we have to think about it.

“We have to think about [the] cultural and diplomatic end of this ahead of the game—that, along with exercises and a helpful presence, [like] some of the sort of things we’ve done in Bahrain, where we’ve gone in and helped the F-16 maintenance people and the Bahrain air force achieve new efficiencies that they hadn’t been able to do before in the maintaining of the airplane.

“This is very valuable to them. Little things like that make you valuable to a country.”

## **Missile Threat to Access?**

“In the short term, ... I don’t see the numbers of missiles out there that would be able to take out ... an airfield [being used by USAF units]. We struggled for years in the Cold War [to develop means for] taking out Warsaw Pact airfields and finally decided [that], with all the might of the United States—[using] conventional weapons—you really can’t do it.

“With a few Scuds, can you take out an airfield? No, you cannot. You can contaminate with chemical weapons, but that is what we practice for.”

## **Dealing With Chemical Attack**

“We were vulnerable to it during the years of the Cold War. We practiced the art of doing our business in

# Abroad

chemical protection suits the whole time, for 30 years, that I [have been] in the Air Force. When I was a wing commander at Eglin AFB [Fla.] in 1988, we practiced generating airplanes in chemical gear. I'd prefer to forget those summer days in chemical gear, but the fact of the matter is that all services have practiced doing these sorts of things through the Cold War."

## Defending US Access

"None of the [US armed] services are sitting still and quietly watching other nations build missiles and not [doing] anything about it. Just like any other threat that emerges, yes, we are dealing with this. ...

"Now the question is, how do you defend yourselves against this sort of missile problem? ... Is it an easy problem? No.

"The policy of this nation is that we are going at it from many different directions, through the technologies being built [for] theater missile defense and offense, to include the airborne laser. ...

"It is interesting to note that there are technologies that can do things like delimit terrain, even in the desert. If you digitize the terrain and you put the right limits and filters in there, and look at [areas] where [you] could really launch a Scud missile—... places that have access to roads, that have access to good hiding spots, where the terrain meets certain requirements, et cetera—... you'd be surprised at how few places there are.

"It is things like that [which] tell us where to search, where to focus [our] capabilities, where to put [our] Joint STARS search pattern, where to take the picture from the U-2 from many, many miles away, [how] to identify that and take care of it."

## Levels of Access

"The best example [of gaining local access] is Desert Shield. Secretary of Defense Dick Cheney personally went into the area, took irrefutable evidence of a vital threat to the nation [Saudi Arabia], which perhaps at that point was not fully accepted, and received the response, 'We need to go deal with that threat.'

"In NATO, it tends to be different because ... access [and] interoperability [are] the code word[s] of the Alliance. So, when we talk about going into the Czech Republic or Poland or even the Partnership for Peace missions—Bulgaria, et cetera—you are welcome. ... We practice servicing each other's airplanes. Their technicians can work on our airplanes. Our technicians work on theirs. There is a different spirit in the Alliance that gets you around these sorts of problems."

## Getting Lighter

"[The Air Force wants to become] lighter and leaner in the command-and-control world. Those of you who recall the Gulf War [know] we had this compact little package of about 2,000 people that we put down in the basement of the Royal Saudi Air Force headquarters in Riyadh. That is what it took, in those days, to run a 2,000-to-3,000-sortie-a-day air campaign, which is what Desert Storm was.

"What we want to get to is the ability to get that number down [by] orders of magnitude. ... I want the joint force air component commander to be able to deploy forward with an 18-inch [satellite] dish, a laptop computer, and a printer and, if he had to, be able to do his job with not much more than that."

## Forward to the Past

"The Air Expeditionary Force idea was born of a need to be able to react quickly. It was to get us back to the rapid part of deployment. It is something we actually did very well, back in the mid-1950s. ... In the mid-1950s, [the job of 19th Air Force] ... was to pick up and rapidly deploy anywhere in the world. They did so to Turkey, Lebanon, and other crises around the world. We were very much into the business of light, lean, lethal, rapid deployment.

"The [development of the] AEF was about getting back to that sort of discipline. It put a force on the ground that was a deterrent force that could transition to a fighting force that was small enough to be lethal but not so large that it took away a CINC's ... ability to make a further decision."

## Reaching Back

"Where will this take us in the future? I think it takes us to a place where a lot of the work that we saw done in Desert Storm in the basement of the Royal Saudi Air Force building might be done in some central location like Langley AFB [Va.], where you are doing the data base manipulation, you are doing the computation, and running out the air tasking order—[doing it back here] so you don't have to have all that equipment forward.

"Those people who are living at Langley, helping you fight your war somewhere in the Middle East, are wearing fatigues, and their body clocks are on that other theater's schedule to do that job. They even belong, perhaps, to the person who is deployed forward as the joint force air component commander, but they are doing their job in a place that practices that sort of stuff day in and day out." ■

**The land forces believe the decisive defeat of the enemy must occur on the ground. The Air Force believes otherwise.**

# Duel of Doctrines

**By Elaine M. Grossman**

**I**N early 1996, a band of action officers at Air Force headquarters decided that it was time to make a few waves. Their objective was not trivial. These officers—members of the Plans and Operations directorate—elected to protest a blueprint prepared by Army Gen. J.H. Binford Peay III, head of US Central Command, for fighting a major war in Southwest Asia.

At issue was the general's "strategic concept" for his theater, put forth in a paper used as the basis for more-detailed war plans. USCENTCOM circulated a draft, and when the USAF officers read it, they were incensed.

They saw that CENTCOM had propounded a war scenario that closely resembled Iraq's 1990 invasion of Kuwait and threat of an attack on Saudi Arabia. Amazingly, however, Peay postulated that airpower would be *less effective* than it was in the 1991 Persian Gulf War. Rather than assuming that technological advances over five years had strengthened airpower, he assumed the opposite—that airpower's contribution would fall below the Desert Storm standard.

This was a shock to the officers. In the wake of USAF's Gulf War successes, the Air Force had, if anything, become even more confident that airpower could be used in a dramatically expanded way—to slow, halt, and perhaps even defeat an enemy before allied ground troops could arrive on scene. In many instances, argued the officers, an air campaign could bring aggression to a decisive halt, where the enemy no longer has the capability to advance and his strategic options are exhausted.

The paper made it clear that Peay disagreed with this notion, to put it mildly.

In his concept of how the next war would unfold, aircraft battered invading forces for a couple of days. But then, for reasons unstated, the Air Force stopped the attack, husbanded resources, and largely held its fire for weeks. In the interval, Army troops deployed to the region, prepared for battle, moved into position, and then launched a counteroffensive—all with massive air support.

## **"Boots on the Ground"**

Peay's message was none too subtle: The principal business of war—inflicting decisive defeat on the enemy—could be carried out only by land forces—"boots on the ground"—not air forces.

The Air Staff officers delivered a message of their own, filing a formal notice of "nonconcurrency" with CENTCOM's paper. With this action, the Air Force gave its first clear signal that it would no longer accept the traditional view that it should act, at all times, as a support arm of US surface forces. The officers argued that, in many cases, airpower would be the best instrument for carrying out the main thrust of a war, especially in light of the US public's sensitivity to the loss of soldiers under ambiguous circumstances in far-off places.

Though bureaucratic politics forced the Air Force to withdraw the protest, Peay was compelled to write an air campaign into his strategic concept. It was presented as an alternative to—or "excursion" from—his basic plan, which continued to use a



major land engagement as its basic organizing principle. The Air Staff officers maintained that CENTCOM plans needlessly put US soldiers and Marines at risk and continued to chip away in what has become a long-running contest of service visions.

Such actions once were considered audacious, but they have multiplied and diversified in recent years, fueling a revival of sorts within the Air Force itself. Joint war plans in the two principal theaters—Southwest Asia and the Korean Peninsula—haven't changed much; in the view of Air Force partisans, they continue to devote too much scarce airlift to hauling ground troops to the fight and not enough to supporting the application of airpower. However, the Air Force has made some strides in the world of strategy and doctrine.

One instance of this came recently from the highest Pentagon levels. The Defense Department's 1997 Quadrennial Defense Review for the first time put the Pentagon on record as supporting a vigorous "halt phase" of war, which the Air Force believes will require the application of significant airpower.

The final QDR report declared the US must be "able to rapidly defeat initial enemy advances short of their objectives in two theaters in close succession, one followed almost immediately by the other. Maintaining this capability is absolutely critical to the United States' ability to

seize the initiative in both theaters and to minimize the amount of territory we and our allies must regain from the enemies."

In this initial stage, immense force from the air would be brought to bear against an enemy's invading troops and centers of power. The goal would be to stop an attack even before Army or Marine forces could reach the war zone in great number.

The earliest and still main proponent of this concept, retired Air Force Maj. Gen. Charles D. Link, was the USAF Chief of Staff's point man on the QDR. In Link's view, the employment of airpower early and decisively shapes up as the most effective way to prosecute a war in modern times.

### Horse and Horseman

"Too much of our military is still focused on the enemy's will and trying to find ways to break his will," Link explained, "when, in fact, what we have the capacity to do, if we just understand it, is to take away his means of exercising his will. If I can kill his horse, I don't care if he likes to ride."

In Link's view, airpower provides not only the most effective military instrument but also the most ethical, in that it holds out the most promise of saving lives—on both sides.

Not long after the QDR delivered its approving verdict on exploiting the halt phase, Link summed up the situation with these words: "If one

has the capacity to find, fix, and attrit enemy military capabilities from the air, then one owes it to the nation to develop and exploit that capability."

A decisive halt, airpower proponents believe, could provide a "culminating point" at which the theater commander has a number of options to further disable the enemy regime, ranging from a ground offensive to continuation of the air campaign.

Not even airpower's strongest advocates see the matter in absolute terms. They freely acknowledge the strengths of airpower do not make ground or naval forces irrelevant or necessarily make airpower the preferred solution in all cases. "When airmen talk about the use of airpower being 'low risk,' they're not saying 'no risk,'" Link said in a recent interview. "It's a relative thing, and so you have to look at airpower options as just those—options."

Airpower options might also save money, proponents say. During the QDR deliberations, Gen. Ronald R. Fogleman, then Air Force Chief of Staff, raised the politically contentious prospect that the defense budget may not be able to provide enough forces to prosecute two nearly simultaneous Major Regional Conflicts, as called for in national strategy, unless the US made heavy early use of airpower and took many of its ground forces from the Army National Guard and Army Reserve.

Fogleman said, "Clearly, the possibility exists that, while you're engaged somewhere in the world, some other adversary can decide to take advantage of that. So the issue in my mind is, do you try to sustain an entire second MRC's worth of forces and capabilities, and do you do that, say, only in the active force? Do you do it with active and Guard types of forces?"

Trying not to rock the boat too much, Fogleman avoided saying it was the Army to whom he was referring. If the combat troops in the active Army were not needed for weeks or even months after the Air Force and Navy launch an extended halt phase, perhaps more ground forces could be put in the Guard and Reserves, his thinking went. The Army was not taken with the idea, given that combat missions are regarded as the lifeblood of the active component.



*F-16s refuel as they head toward a target during the Persian Gulf War. Despite the many successes of airpower in the Gulf, CENTCOM's leader contends airpower in future battles will be less effective—technological advances notwithstanding.*



**These Marines prepare for urban warfare in an exercise at Fleet Activities Yokosuka, Japan. Army and Marine Corps leaders maintain that Smaller-Scale Contingencies will become a prominent feature in the future.**

Despite Fogleman's reticence, the message came through clearly at the Pentagon: Not only did Defense Secretary William S. Cohen include an endorsement for a decisive halt phase in the QDR's newly reworked defense strategy but he also, through his senior deputies, launched a serious effort to change the way the Army leadership uses its Guard and Reserve forces.

### Thumbs Up for JV 2010

The Air Force sees Joint Vision 2010, the "conceptual template" for future combat laid out by Army Gen. John M. Shalikashvili, former Chairman of the Joint Chiefs of Staff, as a warfighting construct in which it can make the most of its strengths.

"Full spectrum dominance," the sine qua non of future warfighting in JV 2010, "depends on the inherent strengths of modern air- and spacepower—speed, global range, stealth, flexibility, precision, lethality, global/theater situational awareness and strategic perspective," stated the Air Force in its 1997 publication, "Global Engagement: A Vision for the 21st Century Air Force."

The service vision goes on to lay out the key capabilities and characteristics of the future Air Force: air and space superiority, global attack, rapid global mobility, precision engagement, information superiority, and agile combat support.

The bureaucratic battle goes on, with periodic clashes of service vi-

sions. In September, the Air Force scored a victory in the struggle to get policy-makers to recognize airpower's potential. The director of the Joint Staff, Vice Adm. Dennis C. Blair, supported the Air Force's position on the creation of a joint doctrine for countering air and missile threats. All three other services were expected to protest Blair's decision—which supports the notion of an air defense commander with the ability to go after targets theater-wide—at the level of the Joint Chiefs of Staff in a formal tank session.

Many defense experts think the airpower medium has the ability to give adversaries great pause even when used in a more limited context. The Navy, for its part, tends to embrace this view enthusiastically and puts it in the context of providing presence in world hot spots.

Retired Adm. Leighton W. Smith Jr., a former NATO commander, spoke about this matter last summer at a Washington, D.C., conference titled, "Dueling Doctrines and the New American Way of War." Smith served as commander of NATO south forces and headed the initial Implementation Force assembled to enforce the peace in Bosnia after the 1995 Dayton peace accords. Smith recalled, "The fact of the matter is that we put together one hell of an effective air operation." To Smith, the payoff of airpower's effectiveness was that when he issued threats, they were believed. "Airpower has a

great persuasive force," he told the audience.

### The Counterattack

The Air Force's new vision of warfare and of the role that it should play in future conflict has provoked frequent attacks. The main challenge comes from the Army, supported by the Marine Corps. These services argue with mounting intensity that what will matter most in future conflicts is boots on the ground, not advanced aircraft and precision guided weapons.

The Army conceives of itself as "the force of decision." In its "Army Vision 2010" paper, the service argues that land power makes permanent "the otherwise transitory advantages achieved by air and naval forces."

Within the Army, officers feel they have a special mission to bring America's wars to a successful termination—a role that, in their view, is not shared by the other services. Thus, ground-force partisans believe that everything else, including airpower, should be made subordinate to the requirements of success in the land battle and that airpower's role is to support them.

Furthermore, the Army and Marine Corps, with considerable support from some officials within the Pentagon, emphasize a need to prepare less for Major Theater War and more for Smaller-Scale Contingencies and for Military Operations Other Than War.

Army leaders contend that increased demand for these operations on the lower end of the spectrum of crisis suggests that missions should be rethought with more emphasis given to the troops carrying rifles. Air Force proponents, for their part, maintain that these missions, though important, are lesser in nature and should be subordinated to the demands of theater war. The objective of US military forces is full spectrum dominance, not marginal advantage, they say.

Among the more prominent proponents of the ground force vision are Army Maj. Gen. Robert H. Scales Jr. and recently retired Marine Corps Lt. Gen. Paul K. Van Riper. Both have appeared in many venues around Washington, offering up intriguing counterpoints to the Air Force perspective.

In Van Riper's vision of the fu-

ture, the greatest US security problems will arise not chiefly from some heavily armed regional aggressor but rather from nontraditional and irregular forces such as terrorists, drug traffickers, and organized crime forces. In judging the best way to cope with these problems, he says, the US should emphasize the likelihood of Smaller-Scale Contingencies, forcible entry operations, urban warfare, peacekeeping missions, and the like. As a result, he concludes, the emphasis should be on training and equipping Marines and soldiers for ground operations.

"Airpower can do a lot, but it can't do it all," Van Riper said in a paper presented at the Dueling Doctrines conference. "Those who wear the 'muddy boots' cannot be forgotten in your deliberations. They will still be necessary in the 21st Century."

### Friction Forever

Scales' view, though it differs from Van Riper's in some important respects, echoes the Marine's skepticism of the utility of airpower and high technology as a sufficient answer to the wars of the not-too-distant future. He—and Van Riper—argues that there has been no fundamental change in the nature of war, that "friction" will still bedevil actual operations, that high-technology solutions have potentially great weaknesses, and that imposing the will of the US on an adversary requires, ultimately, troops on the

ground to close with the enemy and destroy him in decisive battle.

These commentators and others dispute Link's tendency to downplay the importance of breaking the enemy's will to fight—that is, the Air Force general's belief that one should try to "kill the horse" rather than go after the rider.

Critics argue that a variety of factors might make it difficult or even impossible to find, much less to destroy, "the horse." Stationing mobile missile launchers in residential areas or employing low-technology modes of communication immune to electronic jamming or interception, continue to pose serious targeting challenges, they contend.

In addition, they say, an enterprising adversary can continue to cause problems for US forces even after his strategic targets apparently have been decimated. The critics note that Iraqi leader Saddam Hussein was able to suppress rebellions to his north and south even after taking a fearful pounding in the Gulf War. "It's not the horse that's going to kill me," said one US military officer. "It's the enemy."

### The OODA Loop

The late Col. John R. Boyd, a leading Air Force intellectual who retired in the 1970s, frequently stated that he saw enormous potential in airpower but saw no need to limit war to a single medium. Boyd, a

leader of the military reform movement in the 1970s and 1980s, was renowned for his elaboration of the "OODA Loop"—Observe, Orient, Decide, and Act—a concept for anticipating and crippling an enemy in a fast-paced battle. For Boyd, destroying an adversary's will to fight was essential to ending the war, and understanding and undermining an enemy's "critical nodes" with rapid-fire attacks was one important facet of that effort.

While last year's QDR bolstered the Air Force view of warfighting doctrine, it also trimmed some of the forces that service leaders believe are key to its ability to dominate the skies in future conflicts.

The review cut procurement of the F-22 air superiority fighter from 438 to 339 aircraft, chopped the buy of the Joint Strike Fighter from 2,978 to 2,852 aircraft, and reinforced an earlier decision to cap B-2 stealth bombers at 21.

The National Defense Panel, formed to conduct a review of the Pentagon's QDR, seemed, in its December 1997 findings, uninspired by the potential of airpower and questioned the cost, quantities, and future warfighting effectiveness not only of the Air Force's F-22 fighter but also of the multiservice Joint Strike Fighter and Navy F/A-18E/F without suggesting more attractive alternatives.

Air Force officials felt uneasy about the NDP's failure even to mention the halt phase; the final NDP report contained not a word about the issue. Chairman Philip A. Odeen explained that the panel "didn't feel [it] could endorse that particular approach because we don't think it has been demonstrated yet."

For all the Air Force's popularity with the public and its modest behind-the-scenes successes in the Pentagon's interservice war of words, its leaders acknowledge that the service has a long way to go before it can meet its true potential. To make its vision a reality, USAF will have to deal with a number of major challenges. Airpower experts differ about which are most critical for the Air Force to meet in the near and long term. Here, however, are some of the issues frequently mentioned:

**Control of the USAF budget.** Last year the Office of the Secretary of Defense gave the Air Force an additional \$1 billion for its Fiscal 1999



*An Iraqi hardened shelter destroyed during the Gulf War. Giving airpower a larger role in US war plans has not won overwhelming endorsement. The National Defense Panel report was particularly unenthusiastic.*



*Long-range aircraft, such as this B-2, would play a major role in the early attrition of enemy capabilities. USAF believes an air campaign will render an enemy incapable of advancing and severely limit his strategic options.*

budget, but the money came with strings attached. The Air Force wanted the addition on readiness, but OSD nixed the plan, saying it should go into modernization accounts.

USAF has been trying to catch up on underfunded operations and maintenance accounts ever since, stacking its "wish list" to Congress with readiness priorities like base support, spare parts, depot maintenance, and crew training.

Despite widespread Air Force support for the new F-22 air superiority fighter, some service officials lament the aircraft's high cost and primary role. Budget pressures are now coming down on the new Joint Strike Fighter. It is F-16s the service needs to replace in great number in coming years, they say, and the service in the just-completed Fiscal 2000 budget round felt compelled to put the JSF on the chopping block—before the Defense Secretary demanded JSF stay on the books.

**Human intelligence cutbacks.** In the context of the ever-sharpening accuracy of guided munitions, an important question is whether the Air Force might find itself very precisely hitting the wrong target.

Officials in all services decry the reduction of resources devoted to US human intelligence. They say it has taken a toll on the quality of intelligence and level of understanding the intel community has attained in several potentially hostile nations. While satellite capabilities have grown, they

are not by themselves sufficient, these officials say.

Military officials rue the decades of cutbacks in the US human intelligence systems. Of the services, the most seriously affected may be the Air Force, with its need to understand exactly which enemy facilities serve as the key nodes to attack.

"Good Humint is absolutely critical," says Brig. Gen. David A. Deptula, who as a lieutenant colonel directed air campaign targeting in Desert Storm. "You can't hit what you don't know."

According to Deptula, the Air Force's inability to rapidly destroy Iraq's mobile Scud launchers was not so much a failure of airpower as it was a failure of human intelligence to compensate for the inherent limitations in sensors. "You have to have good intel to have a good air campaign—or any other campaign for that matter," says Deptula, now commander of a joint task force enforcing the no-fly zone in northern Iraq.

**Doctrine-averse attitudes.** Getting Air Force officers to actually read and understand official USAF doctrine poses a major challenge. Retired Air Force Col. Rich Meeboer, the senior planner who challenged the CENTCOM commander's concept paper in 1996, warns that Army

officers, who "live and die on doctrine," dominate the joint world.

The Air Force "can't effectively compete" in the world of joint experimentation and shrinking budgets unless it can point to a piece of paper that clearly lays out how USAF intends to fight wars. The view of Meeboer, now a defense consultant in Virginia, may surprise those who believe dollars or politics are all that stand in the way of Air Force success. However, he says that as Congress and the Pentagon place increasing emphasis on joint solutions it is the doctrine-rich Army that stands to gain most.

**Influence on Capitol Hill.** These days, say defense analysts, it's not enough to have a good story. A service must have influential friends to give voice to and fund its vision of warfare.

The Army, Navy, and Marine Corps have formidable allies in all the right committees of Congress, while the Air Force, the youngest and least traditional of the military services, relies mostly on friends in industry to press lawmakers for selected modernization funding. As many see it, the service needs more advocates in Congress who can articulate its many priorities and the vision that unifies these parts.

**Intra-Air Force Schism.** Over the past 18 months, reports were emanating from the Defense Department that officers in the Air Staff's Air and Space Operations directorate and Plans and Programs directorate were playing tug-of-war over control of planning for major initiatives, like preparations for the next QDR in 2001.

Recently the two directorates took a major step to settle the discord, signing an agreement to split up the work and establish a working group to oversee planning for upcoming DoD reviews. The two directorates are now working "very diligently" to strengthen their ties, said one USAF officer, "because there was such a schism." While only time will tell, there appears to be growing recognition that the Air Force cannot stand for much in the joint environment when it fails to keep an eye on central objectives. ■

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*Elaine M. Grossman is senior Pentagon correspondent for Inside the Pentagon in Washington. This is her first article for Air Force Magazine.*

By John L. Frisbee, Contributing Editor

## Lance Sijan's Incredible Journey

Alone in enemy territory with no food or water and unable to walk, Capt. Lance Sijan refused to give up.

**O**N the night of Nov. 9, 1967, Lt. Col. John Armstrong, commander of the 480th Tactical Fighter Squadron based at Da Nang, South Vietnam, rolled his F-4 into a bomb run. The target was Ban Loboy Ford on the Ho Chi Minh Trail in Laos. In the backseat was 25-year-old Capt. Lance P. Sijan, flying his 53d combat mission.

Armstrong pickled his six bombs at 8:39 p.m. Almost immediately, the aircraft was engulfed in a ball of fire as the bombs detonated a few feet below the F-4. Neither the FAC controlling the mission nor Armstrong's wingman saw chutes. But there was one chute. Sijan ejected and was drifting toward a flat-topped, heavily forested karst formation. For Sijan, recollection stopped as the 195-pound captain crashed into the towering trees.

Sometime the next day, Sijan regained consciousness in a haze of pain. He had suffered a compound fracture of the left leg, a crushed right hand, head injuries, and deep lacerations. Most of his survival gear was gone. He tended the broken leg as best he could, then lapsed again into unconsciousness.

The following morning, a flight of F-4s picked up the sound of Sijan's beeper, and a search-and-rescue operation got under way. Throughout the day, Sijan maintained contact with the rescue force, but several attempted pickups were thwarted by NVA gunners. At 5 p.m., a Jolly Green chopper made it in directly over Sijan. In a desperate attempt to crawl through tangled vines to the chopper's penetrator, Sijan lost contact with the rescue force. As darkness fell, the SAR operation was called off.

Early the next morning, the search resumed, but Sijan's radio batteries were depleted. Failing to make contact, the SAR team was recalled. Sijan

was on his own. If he were to survive, he must make his way down the steep karst to water and an open area where he could warm the radio batteries and call in a chopper. With a crude splint on his shattered leg and only the thumb and forefinger of his right hand functioning, Sijan began the most incredible journey in the history of Air Force survival efforts.

For several days, Sijan, lying on his back, pushed himself over the sharp rocks with his good right leg, a few painful inches at a time. His only source of moisture was dew licked from foliage. There were many falls down the steep slope and periods of unconsciousness and delirium. First his clothing became shredded, then the skin on the back of his body, until he was inching along on raw flesh. At last he found water and pressed on, inch by agonizing inch.

Forty-five days after he parachuted into the forest, Sijan saw ahead the open area he had been looking for. He dragged himself over a bank and fell unconscious in the middle of the Ho Chi Minh Trail, three miles from his starting point.

The young captain regained consciousness in an NVA road camp, his formerly athletic body little more than a skeleton partially covered by transparent skin. He was given some food and water but no medical attention. In spite of his pitiful condition, his mind focused constantly on escape. When some strength returned, Lance Sijan overpowered a guard and dragged himself up a trail, only to be recaptured and punished.

Sijan was moved to a temporary prison near Vinh, where he was beaten severely but refused to give any military information. The guards, who had never seen a human in such ghastly condition, refused to touch him. Sijan was put in the care of Maj. Bob Craner and Capt. Guy Gruters, an F-100 Forward Air Control crew that had been shot down near Vinh. The latter had been in Sijan's squadron at the Air Force Academy. In his lucid moments, Sijan gave them the details of his long, painful journey.

Several days later, the three were



loaded on an open truck for a three-night trip to Hanoi in the chill monsoon rains. At Hoa Lo Prison, they were put in a damp cell. Sijan, who had contracted pneumonia and was near death, asked his cellmates to prop him up on his pallet so that he could exercise his arms in preparation for escape from that grim, impregnable bastion.

On Jan. 22, 1968, Capt. Lance Sijan died. When the POWs were freed in early 1973, Craner and Gruters recorded the details of his long fight for freedom and his resistance to torture. Later, they were major sources for Malcolm McConnell's book, *Into the Mouth of the Cat*. On March 4, 1976, President Gerald Ford presented the Medal of Honor posthumously to Sijan's parents, and on Memorial Day of that year, a new dormitory at the Air Force Academy was dedicated in his memory.

Sijan's will to survive with honor was an inspiration to other POWs during the dark days of the Vietnam War, as it should be to all of us. He demonstrated, as few have, the almost limitless capacity of the human spirit to triumph over the depredations of fate and the malevolence of lesser men. ■

*First appeared in December 1986 issue.*

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**The service chiefs have begun to publicly sound the alarm that the readiness of the armed forces is slipping.**

# Readiness

## *on the line*

By Peter Grier

**T**HE Air Force says that, to save money, it has had to skimp on runway maintenance at a number of installations and that cuts on aircraft tires are increasing as a result. At some fighter bases, aircraft maintenance personnel are pulled away from other critical duties to check the airfields up to four times a day for bits of pavement and other debris that could be sucked up into jet engines. The threat of such foreign object damage has become so severe that it led to the cancellation of six training flights in a single day at Nellis AFB, Nev.

Within Pacific Air Forces alone, the cost to fill the shortage of individual protective equipment for chemical-biological warfare is \$7.2 million. Air Force wide, the rate of cannibalization—taking parts off one airplane to fix another—is up by 58 percent since 1995.

The Marine Corps says it cannot afford new tires for the Humvees and 5-ton trucks of expeditionary forces. It's buying retreads instead. The Navy says that it is concerned about its stocks of modern munitions. Tomahawk cruise missiles are in particularly short supply.

As these examples show, the US military's readiness now appears to be sliding quickly downhill. The situation has reached the point where the chiefs of all the services have started to publicly sound the alarm

in Congress and in encounters with top Clinton Administration officials.

Lawmakers generally agree that more money is needed to keep the armed services in fighting trim, but some complained earlier this fall that they had been taken by surprise at a Sept. 29 hearing when they detected a sharp change in tone from the nation's uniformed leadership about the extent of readiness problems.

The military's can-do attitude, plus the reluctance of lower ranks to tell the brass bad news, made this situation worse than it needed to be, according to Sen. John McCain (R-Ariz.), a leading member of the Senate Armed Services Committee.

### **The Silent Men**

McCain and others on Capitol Hill were disturbed that the chiefs did not emphasize the readiness problem earlier. "All of us know these problems did not arise in the last seven months," he said. "They've been going on for a number of years."

The basic elements of the developing readiness crisis have been well-known since the mid-1990s. They include the demands of a high operations tempo, underfunded operations and maintenance accounts, and the exodus of key personnel drawn by the money and benefits of the civilian economy and, in many cases, disenchantment with Administration policies.

Each of the armed services suffers its own unique mix of readiness problems, but general risks affect them all, according to a readiness report compiled by McCain and his staff. These risks include:

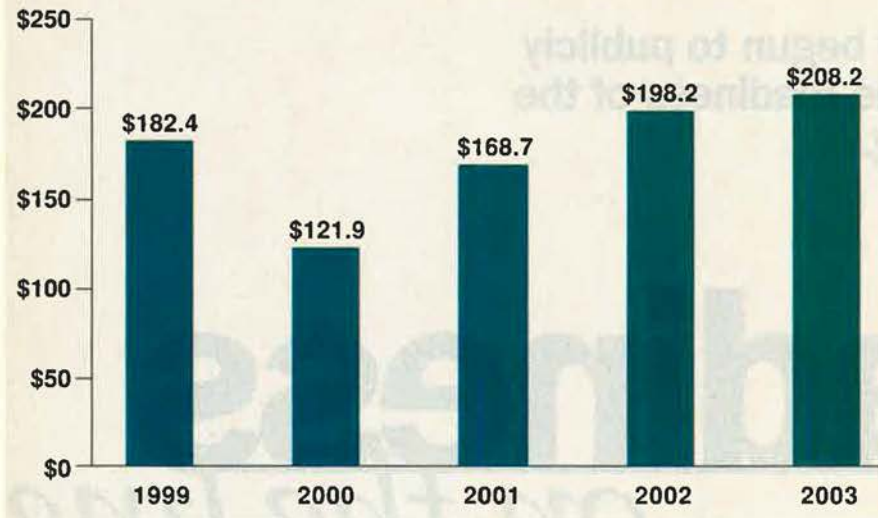
**The optempo illusion.** Laymen might think that deployment on a real-world mission, to peacekeeping duty in Bosnia or no-fly zone enforcement over Iraq, would be the best training that a US military unit could ever receive. In fact, almost the opposite is true. Large amounts of varied training—as opposed to a routine of overflights, or patrols—are needed to keep readiness rates at a high level.

The Air Force, though much smaller, handles an optempo four times greater than it experienced in the Cold War, and much of that activity stems from routine flights enforcing no-fly zones over Iraq and monitoring the airspace around and over Bosnia.

The Navy, for its part, now deploys from home port more than 50 percent of its fleet on any given day, up from about 37 percent in 1992. That fact has contributed to a decline in nondeployed readiness in the sea service, according to the Chief of Naval Operations, Adm. Jay L. Johnson.

At the same time, the life turbulence caused by extended deployments has become the No. 1 reason that personnel of all levels are leaving US

## Unfunded USAF Depot Maintenance (in millions)



military service. "Family separation" was the top choice among reasons for leaving cited by departing Navy sailors in 1997, for instance.

**Increasing depot maintenance backlogs.** All of the services have seen in recent years a steady climb in the backlog of weapons and major parts awaiting depot repair, despite the fact that the size of the force has shrunk during that time.

The Defense Department backlog now has reached \$1.6 billion, compared to \$420 million in 1991, according to McCain's report.

The Air Force slice of this backlog is projected to hit \$323 million in Fiscal 1999. The problem particularly affects ground communications equipment special purpose vehicles, some component repair, and readiness spare packages. Aircraft and engine overhaul and missile repair receive priority, thus the 1999 backlog is projected to include only 25 aircraft and 106 engines.

The extent of the depot jam-up, however, means that any unexpected problem can quickly escalate into a major headache. A technical surprise, for instance, recently affected the engines on F-15Es based at RAF Lakenheath in Britain. Because of the depot backlog, the Air Force told McCain's staff, "The F-15E squadrons at Lakenheath remained at a low state of readiness for over a year."

**Underfunded quality-of-life programs.** Money needed to make life better for the men and women of the US armed services is increasingly tight these days. The estimated 14

percent pay shortfall, when measured against comparable civilian jobs, is only part of the story.

Reductions in military retired pay have made it more difficult to retain qualified personnel, according to the chiefs. So has the institution of the Tricare health care system, which service chiefs described as falling short of their troops' needs and wants.

Said Gen. Dennis J. Reimer, the Army chief of staff, in his reply to McCain's questions: "The loss in medical benefits when a retiree turns 65 is particularly bothersome to our soldiers when making career decisions."

A recent poll of Air Force pilots who have indicated a desire to leave the service found that a perceived decline in quality of life trailed only

high optempo as a reason to separate from the service. A survey by the Air Force Chief of Staff found that only 26 percent of Air Force enlisted personnel judge the retirement system as fair and equitable.

**Underfunded base maintenance and repair.** Weapons may deliver the blow, but buildings, piers, barracks, and runways are important underpinnings of US military power as well. According to McCain's report, maintenance of this infrastructure has been squeezed in recent years as all the services struggled to balance the needs of modernization, operations, and repairs.

At Dyess AFB, Texas, the B-1 avionics shop's air-conditioning and electrical power are not adequate for workers to perform their mission. Hundreds of avionics "black boxes" are having to be shipped off base for repairs.

Leaks in the roof in the communications systems repair facility at Offutt AFB, Neb., have caused delays in repairs for Air Force air traffic control equipment. The only enlisted dining facility at Edwards AFB, Calif., was recently closed due to deteriorating sanitary and health conditions.

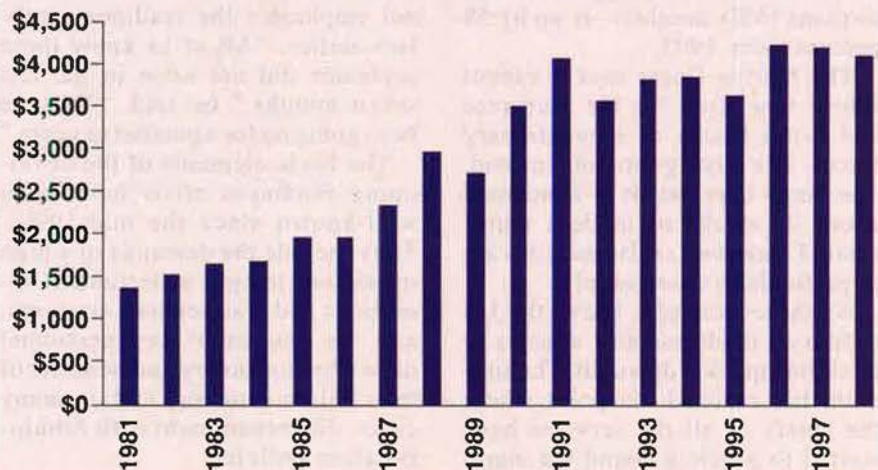
Air Force commanders are having particular trouble with aging water and sewer systems.

"A notable example is a failure in the Minot AFB [N.D.] water system in late spring 1998, which resulted in the base running out of drinking water," officials told McCain's staff. "A 40-year-old line ruptured, result-

## Cost of Recruiting a New Airman

Average cost per recruit in 1997 dollars

(Includes recruiter and staff pay, leases, supplies, vehicles, advertising, and other costs.)





ing in base water tanks draining to less than 20 percent of capacity.”

The Army projects it can pay for only 58 percent of base repair needs in 1999. The Marines say their current budget would pay for the replacement of typical base systems once every 200 years.

**Underfunded weapons modernization.** For years, tight budgets have meant that service weapons procurement accounts have been squeezed. With major new systems purchased during the buildup of the early 1980s still on hand, the Pentagon leadership was content to save what money it could from a “procurement holiday” while planning on a spending ramp-up at some unspecified point in the future.

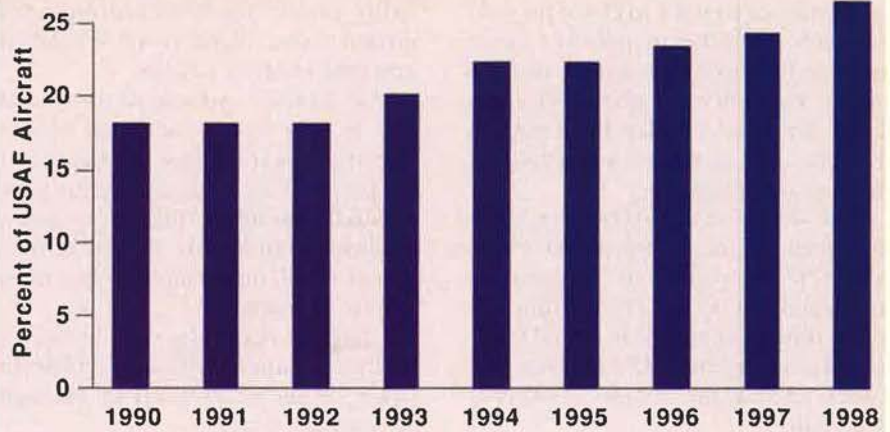
That point is now here. Many major systems have now reached, or surpassed, retirement age.

“We have reached a critical point in the life cycle of our ground and aviation equipment,” said Marine Corps Commandant Gen. Charles C. Krulak. “We are facing virtual block obsolescence of crucial items.”

The average age of a Marine amphibious assault vehicle exceeds its programmed life span by seven years. Marine CH-53D helicopters are 30 years old on average, well past the end of their projected service life.

For the Air Force, the average age for all aircraft in the fleet will be 20 years in 2000. In 2015, it will be 30 years, even taking into account planned purchases of F-22s and Joint Strike Fighters. The age of the Air Force aircraft fleet has

**Not Mission Capable Rate for USAF Aircraft**



never been anywhere near that high, said officials.

Replacing systems may be expensive—but so is not replacing them. As technology-laden weapons such as fighter aircraft age, they become more expensive to maintain, driving up maintenance budgets. Depot maintenance for the oldest F-15s in the Air Force inventory, A/B models averaging 21 years old, costs about 40 percent more than similar upkeep for newer F-15Es.

The McCain report concludes that equipment readiness rates are now being kept up only because of dedicated service personnel who work 12- to 16-hour days, on overlapping shifts, seven days a week, to keep things going.

The study’s list of critical modernization needs is an extensive one, including improved strategic lift, precision guided munitions, bomber force upgrades, fighter aircraft, and

space initiatives for the Air Force; troop and amphibious lift, amphibious vehicles, and fire support for the Marines; improved fighter/strike aircraft, mine warfare, interoperability and battle management, and increased shipbuilding rates for the Navy; and force digitization, increased lethality of ground weapon systems, and improved attack and other combat helicopters for the Army.

**Underfunded munitions stocks.** Purchase of new munitions has suffered the same budget woes as weapons procurement. In general, all the services have simply redefined their stocks on hand as adequate to supply a force structure that has steadily gotten smaller anyway, according to McCain’s readiness report.

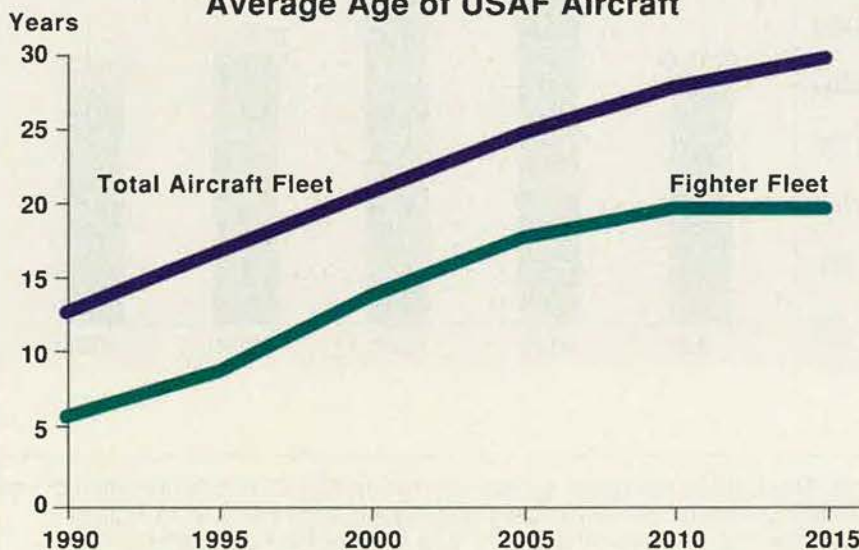
Ryan, the Air Force Chief of Staff, wrote that “we lived off the surplus from the 40 percent drawdown of our forces in the early ‘90s,” although munitions funding is no longer adequate. In two cases—30 mm ammunition and LUU-2 flares—low munitions levels have lowered mission ready crew status, according to the Air Force.

The Navy is worried about low stocks of modern precision guided weaponry, particularly the Tomahawk Block III missile. Its munitions inventories are such that some units receive only one training missile per year of expensive leading edge weapons.

**Budgetary sleight of hand.** The delicate balancing act required to try and keep today’s military ready while preparing for the future leads to budget trade-offs which are not acceptable, according to the McCain study.

Take the funding of real-world operations, such as the deployment

**Average Age of USAF Aircraft**



to Bosnia. While Congress will theoretically pass supplemental appropriations legislation to cover the cost of such add-ons, in practice more money goes out than comes in. The Army will only get about 90 cents back for every dollar it spends in Bosnia, for instance, according to service estimates.

The Air Force suffers the same problem. In Fiscal 1996, the Air Force spent \$779 million on snap operations and got back \$712 million, for a \$67 million shortfall. In Fiscal 1997, the service spent \$852 million and received \$827 million, for a \$25 million gap.

"The shortfalls were sourced from other USAF programs," notes an Air Force response to a question on the subject.

Another budget trick that may hurt readiness is the military's tendency to spend savings before they are achieved. Out-year budget plans are particularly prone to such wishful thinking. The Army, for instance, has already programmed \$10.5 billion worth of savings to be gained from unspecified management efficiencies into its Future Years Defense Program.

"[T]hese are risks associated with this budget," Reimer noted in February, when outlining his spending plans to the Senate Armed Services Committee.

### Still Formidable

All the service chiefs insist that their forces are still able to carry out their missions if the nation calls. Forward deployed units, and those now carrying out missions for the nation in far corners of the globe, get almost all of the money, parts, and weapons they need.

The problem is decay around the edges, as nondeployed units begin to suffer.

"Since 1996, we have experienced an overall 14 percent degradation in our operational readiness of our major operational units," Ryan told the Senate Armed Services Committee on Sept. 29. "This is especially true of state-side units who are prioritized lower than the overseas and engaged units."

"My greatest concern is for our people. ... We are losing too many of our experienced people now," continued Ryan.

Other services see similar problems. The Navy is experiencing its

lowest nondeployed readiness rates for carrier air wings in a decade. The Army said it needs \$3 billion to \$5 billion more added to its FYDP to mitigate readiness risks.

The Clinton Administration said that it now agrees with the chiefs that the situation has now reached the point where budget additions are needed. About \$1 billion in extra readiness funds was tacked onto a Fiscal 1999 supplemental spending bill in September.

Civilian officials now promise readiness funds will go up in future years. Whether they go up enough is another issue.

If the estimates from all the service chiefs are added together, the US military will need upwards of \$27 billion more per year for the next five years to address its readiness and other problems.

All this does not necessarily mean that the US military is on the verge of returning to the bad old days of the 1970s and its hollow force readiness problems. There are some similarities between the situation today and that which was seen in the post-Vietnam era, said McCain. A backlog in depot maintenance formed then, too. Spare parts dried up. The force was not modernized.

### It's People

However, he noted, there is a big difference: people.

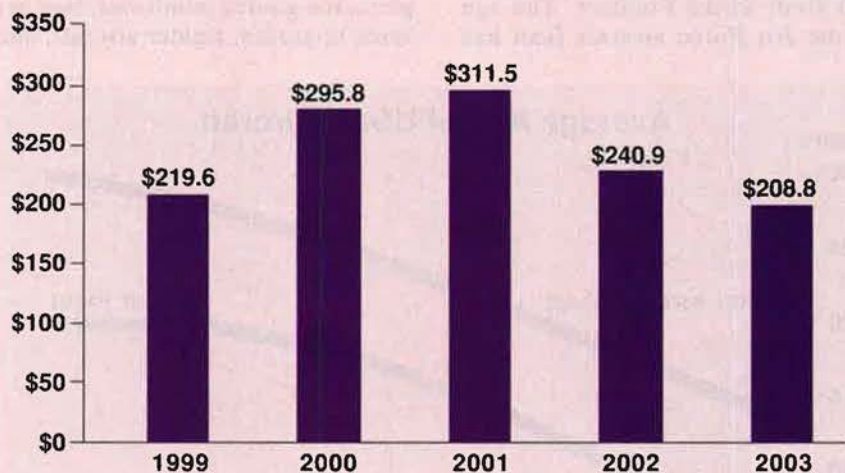
In the late 1970s, said McCain, the military had a huge drug problem, a significant racial problem, and took in many recruits with low educational levels. Decades of effort to repair and bolster the all-volunteer force have helped reverse those trends and given the US military its best human capital in several generations, according to the senator.

"There's a dramatic difference in the quality of the men and women who serve, which I think should serve as a reassuring note to many of us," said McCain.

He is worried that any increase in budgets might be wasted, as lawmakers continue to insist on using defense appropriations to fund pet projects that create jobs and payrolls in their own districts. The military needs to restructure itself to face post-Cold War challenges, said the senator, but that does not mean he believes readiness money should be withheld until Congress and the Pentagon clean up their respective acts.

He concluded, "You can't allow some of these problems to go un-addressed." ■

**Unfunded USAF Spares Requirements**  
(in millions)



*Peter Grier, the Washington bureau chief of the Christian Science Monitor, is a longtime defense correspondent and regular contributor to Air Force Magazine. His most recent articles, "The State of the Force" and "The International Perspective," appeared in the November 1998 issue.*



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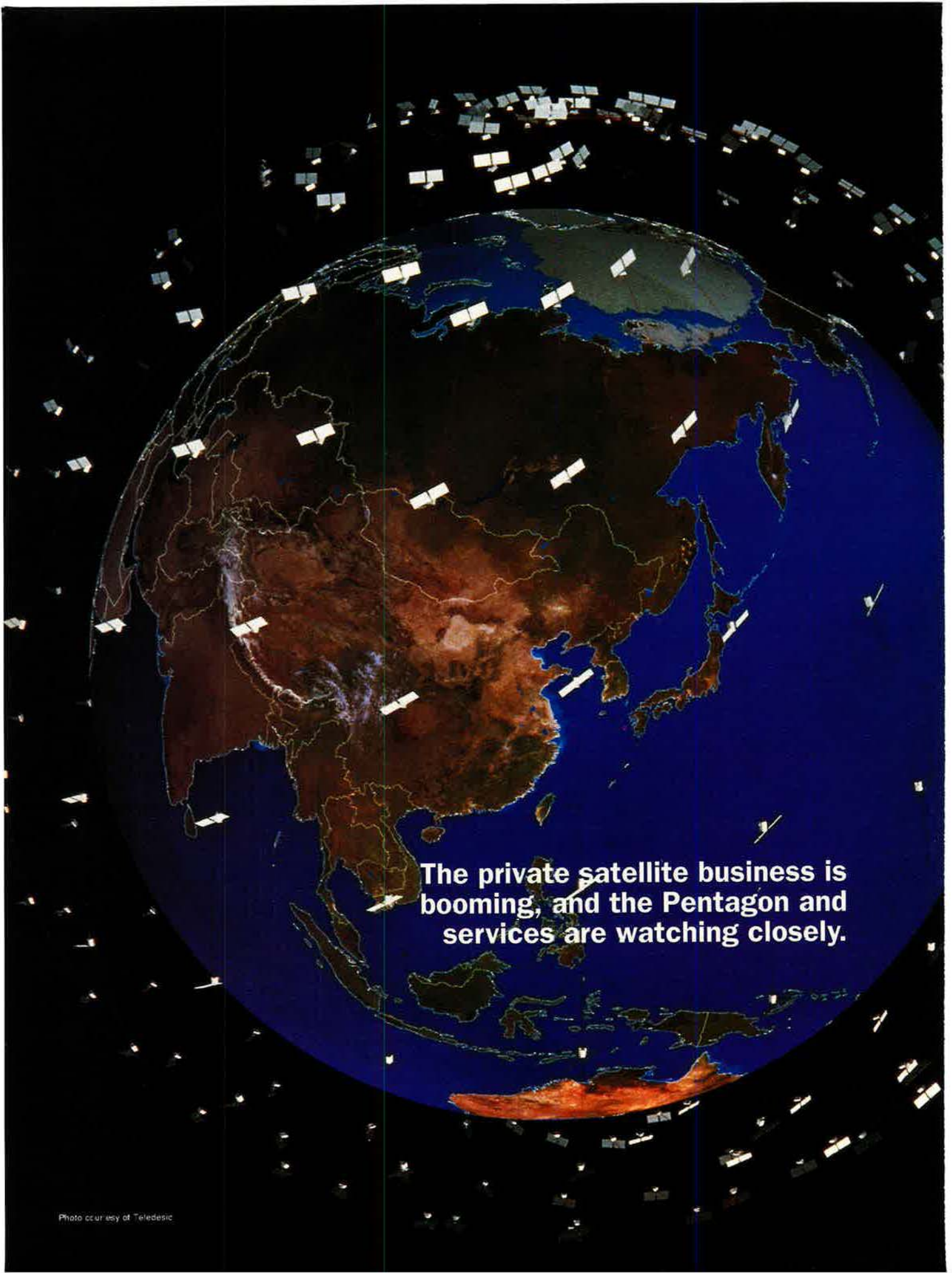
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**MOTOROLA**



**The private satellite business is booming, and the Pentagon and services are watching closely.**

By Theresa Foley



# Commercial Spacefarers

**T**HERE'S no question about it; the satellite industry is in boom times. Twenty percent annual growth rates for the commercial satellite industry have delivered a wide range of new choices to consumers who want mobility and information. First came Global Positioning System for the public, then Direct-To-Home television. Now, consumers will be able to buy a \$3,000 Iridium telephone or a \$1,000 Orbcomm receiver. Beyond that, new satellite-delivered Internet-multimedia products and services will be available before long.

US Space Command, the Defense Information Systems Agency, and virtually all the services are keeping a close eye on the commercial side of the space business. They believe it carries major implications both for military strategy and for actual use, as military forces plan to piggyback on commercial systems when possible.

Statistics indicate that the trend will continue for the next several years as hundreds more communications satellites are deployed in a variety of orbits for many purposes.

The Satellite Industry Association says that, in 1998, commercial satellite manufacturing revenues will surge to \$6.3 billion, nearly double the \$3.6 billion stemming from government satellite business. US Space Command analysts say that, from 2000 onward, space infrastructure could contribute \$121 billion to the US economy each year.

In September, the Teal Group, a consulting firm based in Fairfax, Va., predicted that 1,017 commercial communications satellites, valued at \$50 billion, would be launched in the next 10 years. Teal said that 1998 was a peak period for commercial satellite launches, and another would come in 2002-03 when replacements for first-generation mobile satellites and new broadband multimedia satellites would be launched.

In terms of numbers launched, the largest segment of the industry will be mobile communications satellites—449 in all, or 44 percent of the total, the Teal study found. Broadband multimedia satellites—384 of them, or 38 percent of the total—will be the second largest segment.

Increasingly, multiple satellites will be launched on individual rockets, meaning that the number of launches will not keep pace with the number of satellites.

### The Fuel

Fueling the boom is the seemingly insatiable demand by consumers for mobile communications, Direct-To-Home satellite TV, and Internet access. Teal analyst Marco Cáceres attributes the growth to a "boom in demand for telecommunications services worldwide and the development of new satellite technologies."

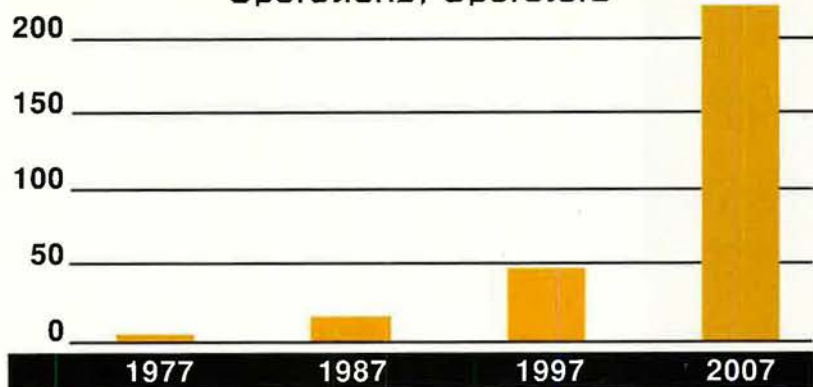
Eric Le Proux, managing director of Euroconsult, a Paris-based group that has studied the satellite industry for many years, cites "the emergence of new geographical markets and the deregulation of the telecom and TV industries" as other factors behind the growth. Euroconsult predicts that, during the period 1998–2007, the number of satellite launches will increase 365 percent over the previous decade. It says the growth can be chalked up to the rise of commercial satellites.

The days when satellites were limited to a narrow role in the \$600 billion-a-year telecom business have ended. For their first four decades, communications satellites were used mainly as 22,300-mile-high repeater stations, beaming television or other signals from one point on Earth to broad geographic regions while using relatively simple "bent pipe" transponders. The situation really began to change in the 1980s, with the emergence of proposals for new satellite systems such as the 66-satellite Iridium global mobile telephony constellation.

Iridium and brother systems, such as Globalstar and ICO Global Communications, fly in more complicated Low or Medium Earth Orbits rather than at Geosynchronous Earth Orbit altitude. They orbit in networked constellations, sometimes employing intersatellite links, to provide global instead of regional coverage.

Today, the entire space business is being altered by a fundamental factor: the discovery by satellite builders that the real money lies not in manufacturing a \$100 million spacecraft but in providing vital services to telecommunications operators and consumers. As a result, all three major US satellite manufacturers—Hughes Electronics, Loral

## The Boom in Satellite Operations, Operators



Space & Communications, and Lockheed Martin—are either in the satellite services business or are working hard to get there. All three plan to be in the global satellite business and no longer limit their market to the US, as was the case only two or three years ago.

As the manufacturers move into operations, they should realize much higher profit margins. On the operating side of the business, the trend is to offer integrated services instead of pure capacity leasing. The result has been a huge expansion in the number of players in the satellite business.

In 1977, five operators earned a total of \$300 million in revenues, according to Euroconsult. By 1997, the operating field had grown to 45 with \$6.5 billion in revenues. Euroconsult expects satellite service revenues to reach \$30 billion–\$40 billion by 2007 and forecasts 25 percent of that huge sum coming from new applications such as mobile, broadband, and satellite-delivered radio.

### Internet in the Sky

Teledesic, one of the new proposed systems, is a 288-satellite constellation that would operate in the Ka-band region of the radio frequency and provide "Internet-in-the-sky" links to schools, factories, homes, and offices. Daniel Kohn, Teledesic marketing director, says, "The killer application for us will be land extension [of terrestrial broadband systems] in the first few years. The customer will be telecom providers."

Teledesic plans to begin operating in 2003. Motorola and Boeing are partnered with Kirkland, Wash.-based Teledesic, which needs at least \$9 billion to build its system. The

venture was founded with money from telecom billionaires Bill Gates and Craig McCaw and thus is viewed by financial analysts as having a good shot at succeeding.

Following in the footsteps of Teledesic and Iridium are dozens of other projects. These would use satellites for:

- Mobile services, not just to telephones but also to laptop computers and other small devices.

- Internet services to consumers and businesses under a new category called broadband or multimedia satellites.

- Rural telephony, where a satellite dish and pay phone are installed in remote villages in places such as Asia and Latin America, allowing several hundred villagers to share a phone, offering many the opportunity for the first time.

Several factors have converged in the last few years to make these projects more viable.

On the international trade front, an agreement on telecommunications struck in 1997 by the members of the World Trade Organization is gradually opening up markets all over the world to competition and new entrants. As the WTO agreement opens these markets, the new satellite companies have an opportunity to do business in countries that formerly had tightly controlled, monopoly telecommunications services.

On the technology side, Defense Department investment in advanced satellite technologies—in particular, projects such as Milstar—has provided companies like Motorola, TRW, Hughes, and Lockheed Martin experience that is being used in the commercial projects.

On the financial front, the public markets and private investors have pumped roughly \$16 billion in the

last four years into satellite projects on the promise of extraordinarily high returns on investment, once the high cost of development has been paid.

### Extraordinary Risk

The market is just learning a fact of life long known to government space managers: Along with their ubiquitous nature and "instant infrastructure" advantage over terrestrial alternatives, satellites and rockets carry extraordinarily high risk.

With three highly visible launch failures during the summer and economic crises in several countries, satellite ventures fell out of favor temporarily with investors. The failures in mid-1998 included a PanAmSat Galaxy IV loss in orbit, a Delta III accident in August that blew up PanAmSat's Galaxy X, failure of several of Iridium's 70-plus satellites to operate correctly after launch, and the devastating loss of 12 Globalstar satellites in mid-September on a single Russian-Ukrainian Zenit rocket.

Stock values in the satellite sector plummeted after years of strong upward growth. Investment has temporarily dried up, but until late summer, satellite investments had delivered phenomenal returns, thereby luring in even more investment. In 1997, satellite stocks brought shareholders, on average, a 64.8 percent return in the Mobile Satellite Sector and 54 percent in the fixed satellite sector, excluding the Asian satellite companies, which had poor returns due to the economic crises there.

Carol Goldstein, Morgan Stanley executive director, said that 1998 has been "much more volatile" than at any time in the recent past. The mobile satellite stocks were down 6.6 percent for the year by early September and fixed satellite stocks had lost 35 percent of their value since the start of the year.

By the end of July 1998, satellite financings for the year had slowed to a cumulative \$6.2 billion, which was far behind the \$14.4 billion raised in the first seven months of 1997, according to Stephane Chenard, an analyst with Euroconsult.

Analysts say the satellite industry is poised for sizable expansion, despite the risks and problems encountered this year.

In the mobile satellite category, market leader Iridium was to enter commercial service Nov. 1, followed

by Globalstar in late 1999 and ICO in August 2000.

Iridium shapes up to be the gold-plated service, with its charges reaching about \$3,000 for the satellite telephone handset and \$4.50 to \$9 a minute for telephone calls. Globalstar is to be considerably less expensive, with telephones priced under \$1,000 and calls at \$1.50 a minute, plus a service provider markup.

The market for global MSS is estimated to be 25 million subscribers by 2005, according to Iridium, a venture that claims to be able to break even at 600,000 users. Merrill Lynch estimates that subscribers will reach 32 million by 2007 with revenues of \$31.6 billion in the sector.

At least two other firms, Mobile Communications Holdings, Inc., and Constellation Communications, Inc., plan to enter the MSS business but are years behind the three market leaders. In 1998, MCHI and Constellation claim to have begun building their first satellites, but both ventures need to raise considerably more money to complete their development and get into business.

The "little LEO" business also was gearing up this fall for first commercial services with the market leader, Orbcomm, completing its 28-satellite constellation with launches in August and September. For \$1,000 or less, Orbcomm offers a communicator device that combines GPS signals with a short data messaging capability, allowing a user to transmit

location and a message from any place on the planet for a few pennies. Orbcomm CEO Scott L. Webster says small Orbcomm cards, about the size of a matchbook, will be available for \$100-\$200 within a year.

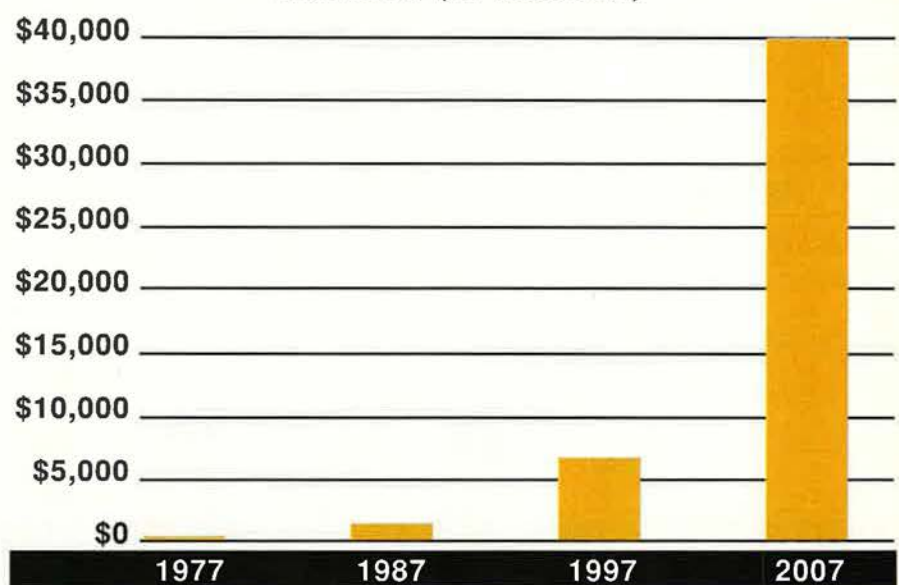
### Military Potential

The miniaturization will enable Orbcomm's communications capability to be embedded in many portable devices for use in industry, by sports enthusiasts, for travelers, and with an obvious appeal to the military. Orbcomm should have the market to itself for about three years before competing systems from Final Analysis, E-Sat, and LEO One can start operations, according to Merrill Lynch. Those three systems are licensed to operate but in the fall were still raising money to build their systems.

The little LEO ventures are relatively inexpensive to deploy, costing several hundred million dollars compared to the billions needed for MSS or broadband.

Direct-To-Home satellite television reaches 9 million US homes currently. Hughes' DirecTV announced its 4 millionth subscriber in September and expects to reach its break-even point in early 1999. Familiar names like DirecTV, EchoStar, and Primestar have demonstrated that satellite television can compete successfully with cable television. Overseas, virtually every large nation has one or more DTH operators, with more introduced each year. Although ana-

The Boom in Satellite Operations,  
Revenue (in millions)



lysts have been disappointed in general with the DTH business because subscriber numbers have consistently fallen short of projections, the application will continue to grow and fuel the demand for geostationary satellites. One recent study reports that subscribers will total 55.4 million by 2002, five times the number in 1997.

Rural telephony is emerging as an area where satellites finally are proving their value. Teledensity, or the number of phone lines per 100 persons in a country, is very low in most developing countries, and an estimated 500 million telephone lines are needed around the world in remote towns and villages. In the past, high costs, which could run \$20,000–\$60,000 for all the equipment needed to install a single telephone connection, kept satellite dishes from use as single or multiple line phone connections. However, in the last two to three years, suppliers such as Hughes Network Systems and Gilat Satellite of Israel, have brought the cost of Very Small Aperture Terminal-based telephone installations down to under \$3,000.

In a dozen countries, satellite rural telephony projects have begun operating in the last year or so, demonstrating that, when they share a phone, even villagers in Latin American or African nations can afford enough minutes per month to make them economically justifiable. The calls are costing from a penny to 15 cents a minute, or higher, and sometimes are subsidized, but early evidence is showing that satellite costs for this application can be low enough to work.

Euroconsult says hundreds of thousands or millions of satellite rural telephones could be needed as more

countries deregulate, the number of competing carriers multiplies, and technology on the satellite side continues to improve and cost less.

### Satellite Radio

Digital Audio Radio Services, yet another new satellite endeavor, uses geostationary satellites. The pioneering venture in this field is WorldSpace, which launched the first of its four satellites Oct. 28 on an Ariane rocket. WorldSpace's AfriStar satellite in early 1999 will introduce satellite radio into Africa, the Middle East, the Mediterranean, and parts of southern Europe. Two other WorldSpace satellites—AsiaStar and AmeriStar—will extend coverage to Asia, Latin America, and the Caribbean later in 1999.

In the US, satellite-delivered radio will become available in 2000 after CD Radio and American Mobile Radio Corp. launch their competing satellite systems. Merrill estimates that nearly 54 million subscribers will use the satellite radio services by 2007, with revenues in the \$8.7 billion range.

Much of the projected growth for satellites is based on proposals for a new breed of satellites—broadband, multimedia systems that would deliver high-speed data. The explosive growth of the Internet and an underlying demand for more data services in general are behind some four dozen proposals for new satellite systems that would augment terrestrial transmission methods like fiber optic cables, telephone lines, cable TV networks, and wireless terrestrial systems.

Intelsat, which with 19 satellites currently in geostationary orbit has become one of the world's largest satellite operators, finds that "Inter-

net via satellite is the fastest growing service ever," says Susan Gordon, an Intelsat official.

She added, "Customers say they prefer satellites over terrestrial for the ease of implementation. We think GEOs are the medium of choice for applications like multicasting and caching," two new Internet-service-related techniques of managing and storing web data.

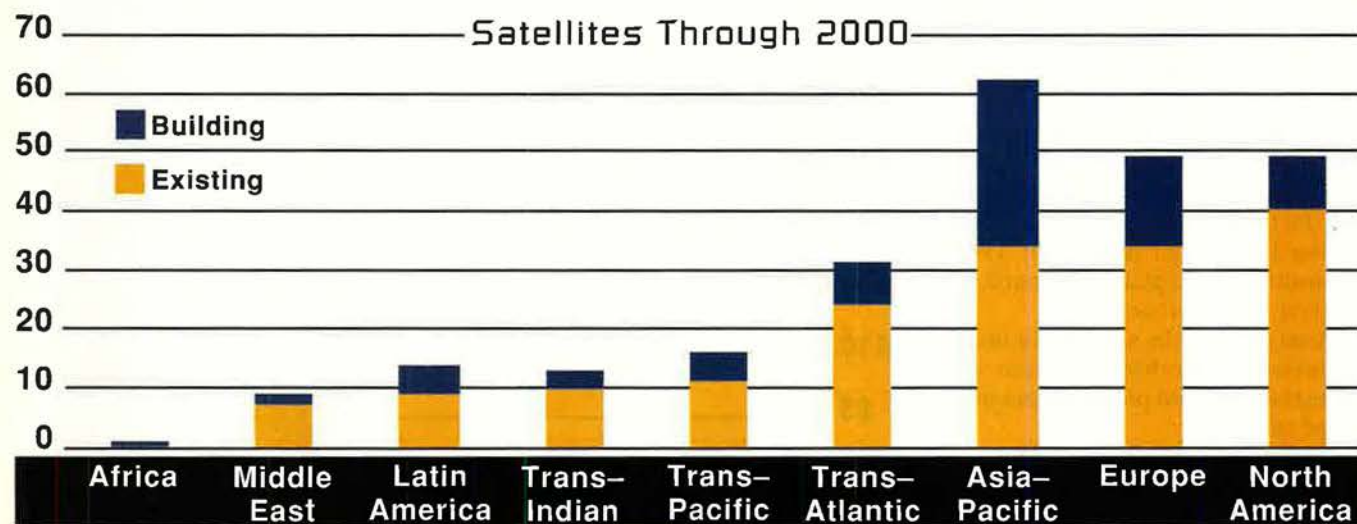
Virtually all the existing satellite operators plan to serve the multimedia market in some fashion, as do new entrants such as Teledesic and SkyBridge, a French-backed project that plans an 80-satellite system to start operating in 2001.

### Techno Darwinism

The demand has drawn out at least 42 satellite proposals, representing 1,100 satellites at a cost of \$114 billion to build, according to Roger J. Rusch, president of TelAstra, a Palos Verdes, Calif.-based consulting company. Rusch and other analysts say the market likely will support only three to five of the systems, so most of these will remain paper satellites.

The proposals are wide-ranging. They include geostationary and non-geostationary constellations and operating in a variety of bandwidths. Some are licensed, others are not. Some of the systems involve numerous satellites and global coverage, while others are more limited in scope, covering only one region and costing much less to deploy.

Teledesic, SkyBridge, and systems proposed by Hughes, General Electric, and Lockheed Martin are leading the broadband satellite pack. Most of the projects aim to be up and





running in the 2001-03 period. Other companies, like Loral, are testing broadband waters early by offering services over existing satellites and deferring decisions on investing in new dedicated broadband satellites. Loral's CyberStar company is offering corporate networking services over Loral's Skynet satellites.

Rusch warns that the broadband satellite sector has many problems to overcome before operations can start. Rain fade will interfere with the higher frequencies such as Ka- and V-bands, forcing the use of larger dishes and resulting in service outages in some places with a lot of rainfall. The technical challenge of developing small, relatively cheap terminals that can track fast-moving, low satellites for consumer applications could drive equipment costs up and set back the companies with low Earth orbiting systems. The billions of dollars required to build the satellites still must be raised, and investors are not likely to sink money into the broadband satellites until the mobile satellite systems like Iridium prove to be profitable.

Even more-visionary satellite applications are emerging for later in the first decade of the new century. A next-generation mobile phone system requiring dozens more satellites in Low Earth Orbit to follow Iridium is being planned by Motorola under the name Iridium Next, or INX. Motorola has been secretive about the project, for competitive reasons, but is believed to be designing a system that would allow the small handheld phones to perform many more functions than the basic voice, paging, and very slow data transfer of the first-generation Iridium.

Horizons, a geostationary satellite system that would allow laptop computers to connect via satellite from anywhere in the world, is another mobile venture sponsored by Inmarsat, the global maritime satellite organization. But Inmarsat will have to privatize, as it plans to do next April, before it can proceed with the new venture.

### High Military Interest

Military interest in the new communications satellite ventures is keen.

Air Force Lt. Col. Edward Alexander, staff assistant for satellite communications systems in the Defense Department's C<sup>3</sup>I Systems Office, says

DoD is taking advantage of the commercial satellite market on two levels.

"We're reaping a tremendous dividend in new systems that we didn't have to pay a lot of development costs for," he noted. "We used to lead the commercial market in development and engineering, but that has flip-flopped. We are now able to buy satellites off the production line that are much more capable and can be flown much sooner. We're looking at three to four years rather than seven to 10" to develop a satellite.

"In addition we do a fair amount of leasing, and as there are more players in the marketplace, it is driving down rates," he said.

So far, the Defense Department has signed on for only limited use of the new satellites. The Pentagon is buying some 2,000 terminals for the Iridium system and building its own "gateway" ground station to access the system. Orbcomm has orders for 600 terminals for vehicle asset tracking from DoD, with the prospect to grow to 50,000.

"With a \$100 million investment for the Iridium gateway, we can use the 66-satellite system" that cost about \$5 billion to develop, he says. "For the next big class of commercial satellite—broadband systems like Teledesic and SkyBridge—we are looking at a similar scenario to leverage a system on orbit and just receive services."

Numerous DoD studies have concluded that, in the long run, it is cheaper for the military to own its own satellites than to rely on commercial services, but in the short term, military communications managers are finding that commercial satellites can fulfill immediate requirements within available budgets. Alexander points out that by law, contractors can only make 12 percent profit on a satellite DoD buys, but for commercial transponders, the markup is not regulated and can be 30-50 percent. DoD users who need communications that are nuclear-hardened or with anti-jamming features will have to be carried on Milstar or the Milstar Follow-On system since alternatives, whether they are military or commercial, will not have the costly protection features. For that reason, Alexander said, he sees commercial systems serving as an adjunct to DoD satellites, not as a replacement.

"Due to the declining congressional budgets for defense spending and the explosive growth in information, DoD has had to look at moving a good percentage of its day-to-day communications traffic from military systems to commercial systems," says Mary Ann Elliott. She is president and CEO of Arrowhead Space and Telecommunications of Falls Church, Va., a company that provides domestic and international satellite communications capacity to US military and other users. DoD information managers want to provide digital information, including detailed digital battlefield maps, to all participants in a conflict.

"This requires expansive amounts of bandwidth. They are looking at utilizing the mobile satellite systems, but increasingly, they are looking at Ka-, V- and Q-bands," Elliott says.

Although Elliott believes the military will find using commercial systems more expensive than owning its own, she said DoD and the services are being forced to go commercial because Congress won't allocate funds for new military satellite systems and because the services have been unable to define, fund, and build communications satellites in a timely fashion. As evidence, Elliott cites the \$18 billion investment in Milstar, with its limited capacity and low data rate.

Already DoD buys some commercial satellite capacity through brokers like Arrowhead and Comsat, which holds a sizable contract from DISA to provide commercial satellite services. The Defense Department also is considering paying up front for a commercial space segment before it is used so that the commercial operators will consider special requirements like hardening of satellites against radiation or attack.

Elliott says DoD will have to deal with internal conflicts as it uses increasing amounts of commercial satellite services. "The government has to realize it is just another user on a commercial system, and not even a major user," Elliott remarked. ■

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*Theresa Foley, a freelance writer living in Florida, is a former editor of Space News. Her most recent article for Air Force Magazine, "Corona Comes In From the Cold," appeared in the September 1995 issue.*

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Flies like an airplane, lands like a helicopter. It offers a whole new approach to Air Force Combat Search And Rescue.

This expeditionary aircraft is fast. Survivable. And sure to get in, get the job done and get out.

Before you can say, "Mission accomplished."



The tilt-rotor Osprey will give the Special Operations Forces the range to reach far into enemy territory.

Book

DEEP

By John A. Tirpak, Senior Editor

**W**hen the CV-22 finally reaches Air Force Special Operations Command, it will do more than simply replace some aging aircraft. It promises to transform the way AFSOC operates and how it thinks about its mission. In fact, the Osprey's impact might be felt beyond the Special Operations Forces.

The CV-22 is the Air Force version of the new Osprey tilt-rotor, an entirely new breed of aircraft that is neither pure airplane nor pure helicopter but has features of both. The Osprey takes off and lands like a helicopter, lifted by two huge rotors on the tips of its wings. Once in flight, the rotors can tilt forward, turning the aircraft into a high-speed turboprop.

Over the years, many have attempted to develop such a hybrid, but the Osprey is the first aircraft offering sufficient reliability and utility to be of practical military value. The aircraft is about half the size of a C-130 transport.

The rotors can again be tilted toward 90 degrees for either a vertical landing or a rolling landing if it is heavily loaded. The Osprey will be able to take off and land within the exact same space as the H-53 Super Jolly series of helicopters it will replace and do it more stealthily and quietly than any previous large rotorcraft.

Assuming that it successfully completes its flight test program—and all signs are that it will—the aircraft will begin operational Air Force service in about five years. Military leaders expect the Osprey to remain in the inventories of at least three US armed services halfway into the next century.

“This aircraft is so revolutionary, ... we have no idea of [its] boundaries,” said Air Force Lt. Col. Jonathan Jay, CV-22 program manager. “This aircraft is going to have capabilities that we’re [now] unaware of.”

The Osprey is being developed by a contractor team of Bell and Boeing, under the overall direction of the Marine Corps. The Corps has a desperate need to replace ancient CH-46 Sea Knight helicopters, many of which are already five years beyond their planned retirement points. The



Photo by Erik Hildebrandt

**A V-22 in helicopter mode for takeoff. The Osprey is the first aircraft ever to combine vertical takeoff and landing with long range, high speed, and a big payload—just the ticket to give SOF units a quick, covert ride to the action.**

Marine Corps version, called the MV-22, will ferry troops, supplies, and small vehicles from amphibious assault ships to landing zones ashore.

The Marine Corps may have the lead, but the Air Force has viewed the Osprey, with its ability to fly fast and far and land vertically, as a natural for SOF activities.

### Resurrection

Unlike helicopters, the CV-22 won't need to be disassembled and loaded into a large cargo jet to get overseas; with a single refueling, it will be able to self-deploy and fly

2,100 nautical miles on its own to get to the action.

It will also be able to fly from a ship or forward staging area over a distance of 500 nautical miles with 18 troops and then return without need of refueling. Indeed, it was largely on the strength of the V-22's promise as an SOF platform that Congress forcibly resurrected the program in 1989. The Pentagon canceled it to save money, but lawmakers demanded its return to the defense program.

Current Air Force plans call for the service to acquire 50 CV-22s. USAF will piggyback on the Marine program, paying only for the aircraft it buys and for the development of the special features the AFSOC version will require.

These features include extra fuel tanks in the wings, terrain-following and terrain-avoidance radar, a more detailed digital map, an in-flight refueling probe, and the Suite of Integrated Radio-frequency Countermeasures, or SIRC. The USAF model will also have additional “buckets” of chaff and flares as well as two additional radios. Later in the program, a gun will be added as part of a preplanned product improvement program.

The Navy, too, will buy a search and rescue and utility version called HV-22, but the 48 aircraft it has in mind would come at the end of the V-22 production run. The V-22's wings rotate and its rotors fold for compact stowage aboard ship. All



**The Osprey is a big aircraft, at nearly half the size of a C-130. Its extended range will reduce the number of refuelings needed, permitting retirement not only of the MH-53 force it will replace but of some MC-130 tankers as well.**



**Combat controllers like these from the 23d Special Tactics Squadron, Hurlburt Field, Fla., can hardly wait to see what new capabilities can be squeezed from the CV-22, which can out-carry, outrun, and outlast their MH-60G.**

three types will come with a forward-looking infrared system.

Today, the Army is the only US armed service that is not involved in the program. It formerly was a partner with the other services, and it viewed the V-22 as the eventual replacement for the aging CH-47 Chinook helicopter, but it bowed out in the 1980s because it lacked the money for a long-term effort.

In Air Force plans, the CV-22 is earmarked for what AFSOC calls the "long range covert-penetration" mission. The mission is handled today by the MH-53J Pave Low III helicopter, a heavily modified version of the H-53 series designed in the 1950s. The Pave Low III is used to fly at treetop level or lower to get commandos deep inside enemy territory and out again. It can carry small vehicles—jeeps, motorcycles, or all-terrain vehicles—and operate in all types of weather.

However, the Pave Low lacks long range. For most missions, it requires multiple refuelings from another AFSOC aircraft, the MC-130P. The introduction of the 50 CV-22s will give the force the long legs it always has lacked and, at a stroke, will permit the Air Force to retire 80 AFSOC aircraft—Pave Lows, tankers, and some MH-60G Pave Hawks, which complement the Pave Low but lack its lifting power or range.

### Deep and Dark

The long-range covert penetration

mission is an important one, having unique requirements. To do it, AFSOC forces operate "in the hours of darkness," Jay said, noting, "That's when we operate very well and our adversaries tend not to."

Operating in nighttime darkness, Pave Lows and Pave Hawks find holes in an enemy's radar coverage, slip through, and go to the objective over the path least likely to attract attention. Refuelings—performed in blackout conditions at breathtakingly low altitudes—are inherently risky.

For very long missions deep inside enemy territory, the aircraft have to hide during the day, continuing their mission at night. It is not easy to keep these machines under wraps. With their array of extra tanks, FLIR turrets, radomes, infrared countermeasures, antennas, and other gadgetry, the SOF choppers are unlikely to be mistaken for civilian aircraft, even at a distance.

Air Force special operators have concluded that the CV-22 will vastly simplify the mission. It offers "double the radius and double the speed" of the MH-53J, Jay noted, adding that this adds up to "doing things faster, without refueling, and offering us more flexibility" to undertake missions previously considered not feasible or simply out of range.

Jay cited a case in point: Operation Eagle Claw, which is better known as Desert One, the disastrous 1980 attempt to rescue US hostages held in Iran.

"If you recall Desert One," Jay said, "that operation was to have taken a couple of days," including on-ground and aerial refuelings, as well as daytime hiding layovers. With the CV-22, he said, AFSOC could do the entire mission "in one night." The Osprey could fly at 300 knots and even incorporates some stealth features, such as infrared suppressors on the exhausts.

"The single greatest advantage" of the CV-22, Jay said, is its range. "We could take a 10-man team 700 miles in, 700 miles out, [and] drop them off, ... and that's all in the hours of darkness; ... whereas before, if we did that with a helicopter, it would take at least three or four air refuelings, [and] probably a full day. ... That's the quantum leap, here."

Combining the speed of a turbo-prop with the attributes of a helicopter also adds mission flexibility in other ways, Jay said.

"If we need to go somewhere really fast, we can do that. If the mission calls for ... going really low and slow, we can do that, too." While the CV-22 will have the inherent capability for "slung" loads like its Marine cousins, AFSOC doesn't plan to use it in that configuration.

Jay noted, moreover, that the CV-22 will give Air Force SOF crews a highly upgraded, sophisticated electronic warfare suite. "If we do go in harm's way, it gives us a much better potential of getting out safely," he said.

### Flying Armor

Officials also cite the aircraft's inherent battle-worthiness. To keep its exotic technology flying in the event of a system failure or hostile fire, Osprey's designers made its systems redundant, separated, and in some places, armored. One engine can power both rotors if necessary, thanks to cross-shafting between them. The composite materials can absorb the hit of a bullet and not crack. The seats and some parts of the cockpit are also armored.

The Air Force will put into the CV-22 a flight crew of three—pilot, copilot, and flight engineer. The service has not yet decided which of the three will be designated to use the Osprey's chin-mounted gun. "I think it may be that ... depending on where they are in the mission, it might be



**The Osprey will go first to the Marines for ship-to-shore lift of troops and cargo, then to USAF for special operations, and finally to the Navy for Combat Search and Rescue, a mission USAF is also considering for the plane.**

that any of the [three] could operate the gun," Jay said.

The computer displays will update threats in near real time, offering the crew a chance to see in a 3-D display where they can safely fly. Should any of the multifunction displays fail, others will take over its task, reducing the risk of "flying blind" from a display failure or lucky hit. There are "no knobs" on the computers, Jay noted.

The CV-22 won't be able to land like a conventional airplane, moving down the runway horizontally with engines tilted forward like propellers. The propellers are too big for this and would strike the ground.

Even so, each CV-22 will have a capability to make such a landing on a one-shot basis. The propellers are designed to break in a way that aids crew survivability, if such a landing were made in an emergency. The composite rotors, rather than breaking up into guillotine-like pieces of shrapnel, would simply shred into brittle filaments. The aircraft could, in an emergency, make an unpowered landing in helicopter mode; it has a limited ability to autorotate to a hard but survivable landing.

The Osprey can even fly backwards. The trick can be done by tilting the rotors past 90 degrees vertical. At this point, the power to fly backwards is more a quirk than a capability, but such maneuvers may someday yield a useful combat tactic for the special operators. Such

characteristics will be explored during the Air Force's Initial Operational Test and Evaluation effort.

#### **On the CSAR?**

The revolutionary Osprey is being considered for another important Air Force mission—Combat Search and Rescue. Today, the Air Force meets this requirement with a force of MH-60G helicopters. Officials note that the Air Force has not changed this situation and at present plans to continue using MH-60s for the task.

Even so, change may well come. Brig. Gen. Richard L. Comer, deputy

assistant secretary of defense for policy and missions, ASD for Special Operations and Low Intensity Conflict, recently told a Washington audience that the CV-22 offers too many advantages in CSAR work for the Air Force not to buy it, eventually, for that purpose.

In CSAR, Comer said, "The critical element ... is time," since there may only be a few minutes in which to rescue a downed crewman who is either badly injured or facing imminent capture. The CV-22, he said, is a "deep battle machine." That fact dovetails with the Air Force, he said, because USAF is "culturally ... a deep battle force."

At present, Air Combat Command manages the CSAR mission, with its equipment falling under ACC purview. According to Comer, the CSAR and SOF communities "often don't communicate well when it comes to planning requirements and missions." He speculated that CSAR operators are afraid that they will be "swallowed" by AFSOC.

Comer voiced his approval of the CV-22 for CSAR because it offers the opportunity to "go in high," if such an approach would work better in certain missions. Also, he pointed out, the CV-22 can self-deploy to a far-forward base, whereas CSAR helicopters must be transported in a heavy airlifter like the C-17 or C-5, undergo reassembly at the destination, and then go through test flights before use.



Photo by Randy Jolly

**Looking like a Rube Goldberg special, the MH-53J Pave Low III has been heavily modified with strap-on fuel tanks, terrain-following radar, night vision equipment, and countermeasures. The CV-22 carries this gear internally.**



*Flight testing is going well with the V-22. Built to last as many as 40 years, the V-22 will likely take on new missions, should it prove as versatile as expected. A civil tilt-rotor for intercity commutes is on the drawing board.*

Comer cautioned, however, that the purchase of CV-22s for the CSAR mission is still not in the Air Force's plan. USAF also has not identified funds to apply to such a program.

Ever since the aircraft's engineering and manufacturing development program got under way, developers have carried out simulations to improve the cockpit layout and arrangement of gear inside the aircraft for maximum efficiency and common sense, Jay noted.

"We've made lots of changes based on getting a real wide variety of crew members in [the simulator] from all different SOF backgrounds," he said. "This airplane [has] the capabilities of a helicopter and the capabilities of a C-130, and we have inputs from both of those career fields to really understand how to maximize that system."

Like a C-130, the V-22 has a rear ramp for loading vehicles and cargo. Like a helicopter, it has a rescue hoist, which is located inside the

cabin to avoid drag and swings out in helicopter mode.

Jay added that "I think this [the extensive simulator work] is really revolutionary. It's a huge step for us in maximizing our cockpit management system." By that, he means that, when IOT&E gets under way with the real aircraft, endless notional rehearsals in the simulator will "put us way ahead of the game" and keep IOT&E more of a "validation" experience than a discovery period for making costly changes to the aircraft.

Air Force Chief of Staff Gen. Michael E. Ryan flew the V-22 in September and emerged pronouncing it "a very easy airplane to fly." Ryan said he had no trouble adjusting to what he expected to be the tricky part of the flight—making the transition from helicopter mode to airplane mode. The left hand control is a throttle in airplane mode and functions like a collective in helicopter mode; on the right hand, the "stick" between the pilot's legs functions as the cyclic in helicopter mode.

Ryan noted that a small thumbwheel on the left hand "thrust control" lever controls the angle of pitch of the engine nacelles and permits the aircraft to safely go into many attitudes that would be a precursor to a crash in any other airplane.

The first CV-22s will reach AFSOC in 2003. In that year, USAF expects to have four aircraft at Hurlburt Field, Fla. The services will send their V-22 pilots to MCAS New River, N.C., for what Jay called "basic, 100-level training" in the airplane. After that, CV-22 pilots will train at Kirtland AFB, N.M., in the special missions and capabilities of the SOF version, and finally from there go to operational units.

The Air Force should be able to declare initial operational capability in 2004, when it's expected that 10 aircraft will have been delivered. The full buy of 50 won't be completed until 2012. That's when the last MH-53Js will be phased out.

Jay said the Air Force is getting its money's worth from the Osprey multiservice program. "This has been a very cooperative effort across the services, for the most part. You always have challenges in a joint program. Sometimes you have to pull teeth and sometimes you get so much," but "I think right now we've got a very successful ... effort." ■

### CV-22 in Brief

Operator	AFSOC
Function	Multimission airlift
Length	57.3 ft
Width (rotors turning)	84.6 ft
Weight (empty)	33,140 lb
Max takeoff weight (self-deployment)	60,500 lb
Ceiling	26,000 ft
Contractor	Bell/Boeing
SOF mission range	500 nm
Cruise speed	261 knots
Self-deployment range	2,487 nm
Shipboard compatibility	Yes
Air refueling capability	Yes
Programmed production number	50
First flight (V-22)	March 19, 1989
Planned delivery	2003
Initial operational capability	2004
Power plant	2 turbines
Thrust per engine	6,150 hp



It was justifiably called "the airlift that saved Israel."

# Nickel Grass

By Walter J. Boyne





*USAF's Operation Nickel Grass airlifted war materiel to Israel during the 1973 Mideast war. As part of the commemoration of the airlift's 25th anniversary, aviation artist Gil Cohen recently completed this painting, depicting a typical scene at the Lod/Ben-Gurion air complex near Tel Aviv, Israel. The painting hangs at the Air Mobility Command Museum at Dover AFB, Del.*



**New to USAF's fleet, the C-5 proved itself in Nickel Grass, hauling in oversize items like tractors, helicopters, and M-60 tanks (above). The first C-5 airlifter to land at Lod delivered 97 tons of 105 mm howitzer shells.**

**O**NE of the most critical but least celebrated airlifts in history unfolded over a desperate 32 days in the fall of 1973. An armada of Military Airlift Command aircraft carried thousands of tons of materiel over vast distances into the midst of the most ferocious fighting the Middle East had ever witnessed—the 1973 Arab-Israeli War. MAC airlifters—T-tailed C-141s and C-5As—went in harm's way, vulnerable to attack from fighters, as they carved a demanding track across the Mediterranean, and to missiles and sabotage, as they were off-loading in Israel.

Though not as famous as the 1948–49 Berlin Airlift or as massive as the 1990–91 Desert Storm airlift, this 1973 operation was a watershed event. Code-named “Nickel Grass,” it restored a balance of power and helped Israel survive a coordinated, life-threatening Soviet-backed assault from Egypt and Syria. It proved the Air Force concept of global mobility based on jet-powered transport aircraft. The airlift also transformed the image of the C-5 from that of expensive lemon to symbol of US might.

A quarter of a century ago, in summer and fall 1973, the Mideast seethed with tensions. Six years earlier, in June 1967, Israeli forces conquered vast swaths of land controlled by Egypt, Syria, and Jordan. Cairo and Damascus failed over the years to persuade or force Israel to relinquish its grip on the

land and, by 1973, the stalemate had become intolerable. Egypt's Anwar Sadat and Syria's Hafez al-Assad meticulously planned their 1973 offensive, one they hoped would reverse Israeli gains of the earlier war and put an end to Arab humiliation. The war was set to begin on the holiest of Jewish religious days, Yom Kippur.

### Trapped by Complacency

The Arab states had trained well and Moscow had supplied equipment on a colossal scale, including 600 advanced surface-to-air missiles, 300 MiG-21 fighters, 1,200 tanks, and hundreds of thousands of tons of consumable war materiel. On paper, the Arabs held a huge advantage in troops, tanks, artillery, and aircraft. This was offset, in Israeli minds, by the Jewish state's superior technology, advanced mobilization capability, and interior lines of communication. Despite unmistakable signs of increasing Arab military capability, Israeli leaders remained unworried, even complacent, confident in Israel's ability to repel any attack.

The Israeli government became unequivocally convinced of impending war just hours before the Arab nations attacked at 2:05 p.m. local time, Oct. 6. Prime Minister Golda Meir, despite her immense popularity, refused to use those precious hours to carry out a pre-emptive attack; she was concerned that the US

might withhold critical aid shipments if Washington perceived Israel to be the aggressor.

On the southern front, the onslaught began with a 2,000-cannon barrage across the Suez Canal, the 1967 cease-fire line. Egyptian assault forces swept across the waterway and plunged deep into Israeli-held territory. At the same time, crack Syrian units launched a potent offensive in the Golan Heights. The Arab forces fought with efficiency and cohesion, rolling over or past shocked Israeli defenders. Arab air forces attacked Israeli airfields, radar installations, and missile sites.

Day 4 of the war found Israel's once-confident military suffering from the effects of the bloodiest mauling of its short, remarkably successful existence. Egypt had taken the famous Bar Lev line, a series of about 30 sand, steel, and concrete bunkers strung across the Sinai to slow an attack until Israeli armor could be brought into play. Egyptian commandos ranged behind Israeli lines, causing havoc. In the north, things looked equally bad. The Syrian attack had not been halted until Oct. 10.

Grievously heavy on both sides were the losses in armored vehicles and combat aircraft. Israeli airpower was hard hit by a combination of mobile SA-6 and the man-portable SA-7 air-defense missiles expertly wielded by the Arabs. The attacking forces were also plentifully supplied with radar-controlled ZSU-23-4 anti-aircraft guns. Israeli estimates of consumption of ammunition and fuel were seen to be totally inadequate. However, it was the high casualty rate that stunned Israel, shocking not only Meir but also the legendary Gen. Moshe Dayan, minister of defense.

The shock was accompanied by sheer disbelief at America's failure to comprehend that the situation was critical. Voracious consumption of ammunition and huge losses in tanks and aircraft brought Israel to the brink of defeat, forcing the Israelis to think the formerly unthinkable as they pondered their options.

Half a world away, the United States was in a funk, unable or unwilling to act decisively. Washington was in the throes of not only post-Vietnam moralizing on Capitol Hill but also the agony of Water-

gate, both of which impaired the leadership of President Richard M. Nixon. Four days into the war, Washington was blindsided again by another political disaster—the forced resignation of Vice President Spiro T. Agnew.

Not surprisingly, the initial US reaction to the invasion was one of confusion and contradiction. Leaders tried to strike a balance of the traditional US support of Israel with the need to maintain a still-tenuous superpower détente with the Soviet Union and a desire to avoid a threatened Arab embargo of oil shipments to the West.

### Shifting Scenarios

The many shifts in US military planning to aid Israel are well-documented, notably in *Flight to Israel*, Kenneth L. Patchin's official MAC history of Operation Nickel Grass. Nixon, in response to a personal plea from Meir, had made the crucial decision Oct. 9 to re-supply Israel. However, four days would pass before the executive office could make a final decision on how the re-supply would be executed.

Initially, planners proposed that Israel be given the responsibility for carrying out the entire airlift. (Israel did use eight of its El Al commercial airliners to carry 5,500 tons of materiel from the US to Israel.) Israel attempted to elicit interest from US commercial carriers, but they refused to enlist in the effort, concerned as

they were about the adverse effects Arab reaction would have upon their businesses. MAC's inquiries with commercial carriers received the same negative response. Then, it was suggested that MAC assist the Israeli flag carrier by flying the material to Lajes, the base on the Portuguese Azores islands in the Atlantic, where it could be picked up by Israeli transports.

The US dithered in this fashion for four days. Then, on Oct. 12, Nixon personally decided that MAC would handle the entire airlift. Tel Aviv's Lod/Ben-Gurion air complex would be the off-load point.

"Send everything that can fly," he ordered.

USAF had been preparing right along to take on the challenge. Gen. George S. Brown, USAF Chief of Staff, telephoned Gen. Paul K. Carlton, MAC commander, to begin loading MAC aircraft with materiel but to hold them within the US pending release of a formal order sending them onward. Carlton put his commanders on alert and contacted the heads of other involved commands, including Gen. Jack J. Catton of Air Force Logistics Command. AFLC accorded the same high priority to Nickel Grass, and the results showed immediately. More than 20 sites in the United States were designated to be cargo pick-up points where the US military would assemble materiel for shipment to Israel. Equipment, some directly from war-

reserve stocks, began pouring into these sites.

Less than nine hours after Nixon's decision, MAC had C-141s and C-5s ready to depart. There would be some initial delays, and they would encounter some difficulties en route, but they would be the first of a flood of aircraft into Israel.

The complex nature of Nickel Grass required a flexible chain of command. Within MAC, 21st Air Force, commanded by Maj. Gen. Lester T. Kearney Jr., was designated as the controlling Air Force. The vice commander of 21st, Brig. Gen. Kelton M. Farris, was named MAC mission commander. The prime airlift director was Col. Edward J. Nash.

### We'll Hold Your Coat

The threat of an oil embargo frightened US allies. With a single exception, they all denied landing and overflight rights to the emergency MAC flights. The exception was Portugal, which, after hard bargaining, essentially agreed to look the other way as traffic mushroomed at Lajes Field. Daily departure flights grew from one to 40 over a few days. This was a crucial agreement for MAC, which could not have conducted the airlift the way it did without staging through Lajes.

When Nixon flashed the decision Oct. 12, top American officials instantly applied pressure for immediate results. MAC's complex machinery sprang into action, but it took some hours to establish a steady, regulated flow of aircraft and crews. Initial flights were delayed because of high winds at Lajes, generating White House fury that supplies had not magically reached Israel.

Adm. Thomas H. Moorer, Chairman of the Joint Chiefs of Staff, called Carlton about this, saying, "We'll have to get them moving, or we'll lose our jobs."

Carlton knew the airlift business. He knew that he had an adequate number of aircraft, crews, and required equipment. The fleet consisted of 268 C-141s and 77 C-5As, and Carlton knew that he could sustain a steady flow of three C-141s every two hours and four C-5s every four hours—indefinitely. He also knew that MAC could orchestrate the operation, establishing a rational flow of aircraft matching the cargo to be



The Air Force initially set the daily flow of airlifters at 12 C-141s and four C-5s, then raised it to 17 and six, respectively, until Oct. 30. The pace was rough on aircrews and support personnel alike.

carried with off-loading equipment at the destination. In his plan, MAC would essentially become a conduit through which materiel would flow in a well-adjusted stream.

At first, however, he could not convey either his concept or his confidence to the White House, State Department, or Pentagon.

Carlton had already begun to expedite things, taking extraordinary actions in the interest of saving time. These steps included waiving crew rest requirements, weight limitations, daily utilization restrictions, and routine maintenance demands. He had to fight a continuing change of orders streaming out of the White House and State and Defense departments. There was continuing pressure to enlist the help of commercial airlines, despite their universal reluctance. At one point, late in the game, officials threatened to remove MAC entirely from the operation.

Even so, Carlton was confident he could establish a flow that not only would let MAC handle the initial requirement of 4,000 tons of materiel but also continue to handle all of MAC's other assignments. He asked for patience, stating that "once this flow starts, it [the materiel] is going to come like a bushel basket of oranges just being dumped."

The average distance from US departure points to Lajes was 3,297 miles. It was another 3,163 miles from Lajes to Lod/Ben-Gurion. The route varied from eastern depar-

ture points (McGuire AFB, N.J.; Dover AFB, Del.; and Charleston AFB, S.C.) to Lajes, but from Lajes onward it was precise. Aircraft flew to Gibraltar at the southern tip of Spain and then followed a narrow path over the Mediterranean to Tel Aviv.

The route was deliberately placed along the center of the Mediterranean Sea on the Flight Information Region boundary line dividing the airspace of the hostile African states to the south and that of the "friendly" European states to the north.

### Fighters All the Way

The threat of Arab interception was real, and the US Navy's Sixth Fleet acted as protector until the transports came within about 200 miles of Israel. There Israeli air force fighters took over. Although threats were made by radio, and several unidentified fighters were seen, no overt hostile action was taken.

Neither Lajes nor Lod possessed adequate aerial port facilities. Carlton called for establishment of Airlift Control Elements at both places, accurately estimating the number of personnel and the equipment that each would require. (More than 1,300 people would work at Lajes, seriously taxing all the facilities.) Other ALCEs were established at points within the US where aerial port facilities were not sufficient to handle the rush.

The initial missions to Israel were

delayed as a result of 50-knot crosswinds at Lajes. Scheduled to be the first aircraft at Lod was a C-5 carrying the ALCE team, headed by Col. Donald R. Strobaugh. However, it encountered engine trouble and had to return to Lajes, where Strobaugh and his team transferred to a C-141.

The first C-5 (Tail No. 00461) to land at Lod touched down at 22:01 Zulu. It carried 97 tons of 105 mm howitzer shells, and it arrived at a time when Israeli forces were down to their last supplies of ammunition. Another 829 tons would be delivered in the next 24 hours. Even as Israeli workers unloaded those first cargo airplanes, huge formations of Israeli and Egyptian armor, maneuvering just 100 miles to the southwest, were locked in a desperate tank battle that would prove to be the largest clash of armor since the World War II Battle of Kursk.

Carlton was only too aware of the C-5's vulnerability to ground attack. Whenever possible, the Air Force would have only a single C-5 on the ground at any one time.

The first C-141 (Tail No. 60177) to arrive at Lod landed at 23:16 Zulu. The aircraft carried more ammunition but, more importantly, it delivered Strobaugh and his ALCE crew. The group ultimately numbered 55, all of whom worked 12 hours a day, seven days a week. They were given three 40K loaders as well as locally improvised unloading gear.

The arriving MAC airplanes were greeted ecstatically by the Israelis. The crews received red-carpet treatment. Israel put in place a system to expedite cargo handling; materiel unloaded from the transports usually were at the front in Syria in about three hours and in the Sinai in less than 10 hours.

The original 4,000-ton airlift requirement grew daily. After the first day, USAF set the daily flow requirement at four C-5s and 12 C-141s. After Oct. 21, it raised the aircraft flow level to six C-5s and 17 C-141s and maintained it there until Oct. 30, when the demand began to drop.

The continuous flow of aircraft on the long flights was tough on the aircrews, but MAC was judicious in its positioning of relief crews for the C-141 and using augmented crews on the C-5. A special pool of naviga-



**Supplies airlifted into Lod kept aircraft like this Israeli air force A-4 flying. From Nickel Grass USAF learned the importance of an overseas staging base such as Lajes and the requirement for aerial refueling of airlifters.**

tors was created for the vital but tedious task of navigating the Mediterranean.

### To the Offensive

Because it eliminated the need to husband ammunition and other consumable items, the continuous flood of US war materiel enabled Israeli forces to go on the offensive in the latter stages of the war. In the north, Israel's ground forces recovered all territory that had been lost and began to march on Damascus. In the Sinai, tank forces led by Maj. Gen. Ariel Sharon smashed back across the Suez, encircled the Egyptian Third Army on the western side of the canal, and threatened Ismailia, Suez City, and even Cairo itself.

Egypt and Syria, which had previously rejected the idea of a negotiated settlement, now felt compelled on Oct. 22 to agree to the arrangement hammered out by Washington and Moscow with the goal of preventing the total destruction of the trapped Egyptian army. Israel was reluctant to comply immediately, wishing to gain as much as possible before a cease-fire.

The Soviet Union, faced with Israel's continuing offensive, raised the stakes. Moscow declared to the United States that, if the US could not bring Israel to heel, it would take unilateral action to dictate a settlement. On Oct. 24, the United States, in order to intensify the image of risk in Soviet minds and keep Soviet forces out of the crisis, responded by taking its armed forces to a worldwide DEFCON III alert, implying readiness for nuclear operations, if necessary.

Fortunately, after several abortive efforts, an effective cease-fire finally took hold Oct. 28.

Israel suffered 10,800 killed and wounded—a traumatic loss for a nation of some 3 million persons—plus 100 aircraft and 800 tanks. The Arab nations suffered 17,000 killed or wounded and 8,000 prisoners, and lost 500 aircraft and 1,800 tanks.

The airlift officially ended Nov. 14. By then, the Air Force had deliv-



**The largest tank battle since World War II took place during the 1973 Arab-Israeli War. Airlifters not only resupplied the Israelis with M-60s but also brought in new anti-tank weapons and electronic countermeasures equipment.**

ered 22,395 tons of cargo—145 missions by C-5 Galaxy and 422 missions by C-141 Starlifter. The C-5s delivered about 48 percent of the tonnage but consumed 24 percent less fuel than the C-141s. Included in the gross cargo tonnage was a total of 2,264.5 tons of "outsize" materiel, equipment that could be delivered only by a C-5. Among these items were M-60 tanks, 155 mm howitzers, ground radar systems, mobile tractor units, CH-53 helicopters, and A-4E components.

The airlift had been a key to the victory. It had not only brought about the timely resupply of the flagging Israeli force but also provided a series of deadly new weapons put to good use in the latter part of the war. These included Maverick and TOW anti-tank weapons and extensive new electronic countermeasures equipment that warded off successful attacks on Israeli fighters. Reflecting on the operation's vital contribution to the war effort, *Reader's Digest* would call it "The Airlift That Saved Israel."

Both US transport types distinguished themselves by performing reliably and economically. The C-5A had an 81 percent reliability while the C-141 registered a 93 percent

reliability. No accidents occurred. The abort rate of all planned flights came in under 2 percent.

The airlift taught the Air Force many lessons, large and small. One was that Lajes was a godsend—one that the US best not take for granted in a future emergency. The Air Force established an immediate requirement for aerial refueling to become standard practice in MAC so that its airlifters could operate without forward bases, if necessary. Another lesson was that commercial airlines, on their own, could not be expected to volunteer their services and aircraft. This meant that access to commercial lift in the future would have to be met by activating the Civil Reserve Air Fleet, as in fact it was during the Gulf War. Nickel Grass also led to the consolidation of all airlift aircraft under Military Airlift Command and its designation as a specified command Feb. 1, 1977.

Finally, the C-5 proved to be the finest military airlift aircraft in history, not the expensive military mistake as it had been portrayed in the media. Its ability to carry huge amounts of cargo economically, carry outsize pieces of equipment, and refuel in flight fully justified the expense of the program.

"For generations to come," said Golda Meir not long after the war's end, "all will be told of the miracle of the immense planes from the United States bringing in the material that meant life for our people." ■

Walter J. Boyne, former director of the National Air and Space Museum in Washington, is a retired Air Force colonel and author. He has written more than 100 articles about aviation topics and 29 books, the latest of which is *Horizons: The Lockheed Story*. His most recent article for *Air Force Magazine*, "MiG Sweep," appeared in the November 1998 issue.

# Gallery of NATO Airpower

By Paul Jackson and Kenneth Munson

Together with the "Gallery of USAF Weapons" in the May 1998 issue of *Air Force Magazine*, this Gallery gives information on all first-line aircraft and missiles in service with NATO air forces. The French air force is also included, as France remains a member of NATO although it withdrew from NATO military command in 1966.

## Bombers

### Mirage 2000N and D

**Brief:** Two bomber versions of the Mirage 2000 are employed by France for "pre" strategic and tactical missions.

**Function:** Strike/attack.

**Operator:** France.

**First Flight:** Feb. 3, 1983.

**Delivered:** February 1987–present.

**IOC:** July 1, 1988.

**Production:** more than 130 (continuing).

**Inventory:** 125 (mid-1998).

**Contractor:** Dassault Aviation, France.

**Data for Mirage 2000N.**

**Power Plant:** one SNECMA M53-P2 afterburning turbofan; 21,385 lb thrust.

**Accommodation:** pilot and WSO in tandem, on zero/zero ejection seats.

**Dimensions:** span 29 ft 11 in, length 47 ft 9 in, height 16 ft 11 in.

**Weight:** empty 16,755 lb, gross 37,480 lb.

**Ceiling:** 54,000 ft.

**Performance:** max speed at height Mach 2.2, at S/L Mach 1.2; range hi-lo-hi 748 miles.

**Armament:** ASMP nuclear missile (2000N only); up to 13,890 lb of external stores, incl bombs, rockets, and Magic self-defense AAMs, but specifically APACHE (and derivatives) standoff weapons dispenser, BGL 1000 LGB (with laser designator pod), and AS 30L ASM. No internal guns.

### COMMENTARY

**2000N.** By comparison with the Mirage 2000C, the 2000N has a strengthened airframe for flight at a typical 690 mph at 300 ft above the terrain. Three squadrons are assigned to the *Forces Aériennes Stratégiques*. Primary weapon is the 150 or 300 kT *Air-Sol Moyenne Portée* (ASMP) medium-range air-to-surface nuclear missile. Equipment includes ESD Antilope 5 terrain-avoidance radar, two SAGEM inertial platforms, two improved TRT AHV-12 radio altimeters, and Thomson-CSF color CRT head-down displays in each cockpit. Self-defense aids comprise two Magic IR AAMs and an integrated countermeasures suite comprising a Serval RWR, Caméleon electronic jammers, and Spirale automatic chaff/flare dispensers. The last of 75 aircraft was delivered in 1993. All have additional conventional-attack capability. SAT Samir missile plume detectors were fitted in 1995.

**2000D.** Conventional-attack version, of which 86 have been funded and about 60 delivered to date. Minor differences from the 2000N include the addition of GPS, one more multifunction display (MFD) in the front cockpit and two more in the rear. ICMS fully integrated self-defense suite, and deletion of the ASMP interface; the radar is Antilope 5-3C with terrain-following capability.

Both versions can carry two 528-gallon drop tanks, but the 2000D offers a wider choice of weapons, including laser-guided AS 30L ASMs and BGL bombs, APACHE standoff weapon dispensers (from 1999), bombs, and rockets, as well as several types of sensor pod. The first squadron was declared operational at Nancy on March 31, 1994, and two more have followed.

### Tornado IDS

**Brief:** The Tornado fulfills two roles for NATO forces: interdiction/strike and air defense (described separately).

**Function:** Interdiction/strike.

**Operator:** Germany, Italy, and UK.

**First Flight:** Aug. 14, 1974.

**Delivered:** July 1979–98.

**IOC:** June 1, 1982.

**Production:** 780.

**Inventory:** Germany 202, Italy 75, UK 178.

**Contractor:** Panavia Aircraft, a UK/German/Italian consortium.

**Power Plant:** two Turbo-Union RB199 Mk 103 afterburning turbofans; each 16,075 lb thrust.



Mirage 2000N, French air force



A-7 Corsair II, Greek air force (Paul Jackson)

**Accommodation:** crew of two in tandem, on zero/zero ejection seats.

**Dimensions:** span 45 ft 8 in spread, 28 ft 3 in swept, length 54 ft 10 in, height 19 ft 6 in.

**Weight:** empty 31,065 lb, gross approx 61,620 lb.

**Ceiling:** not available

**Performance:** max speed at height Mach 2.2, with external stores 691 mph; T-O run less than 2,950 ft, landing run 1,215 ft, radius of action, hi-lo-hi 863 miles.

**Armament:** two 27 mm IWKA–Mauser guns in fuselage; seven fuselage and wing hardpoints for 19,840 lb of external stores, incl AAMs, ASMs, and ARMs; cluster bombs, napalm; nuclear, smart, retarded, and conventional bombs; rocket packs; flare bombs; jamming/deception and chaff/flare ECM pods; and fuel tanks.

### COMMENTARY

Key to the IDS Tornado's all-weather interdiction capability is a Texas Instruments multimode ground-mapping and terrain-following radar. This is backed in UK aircraft by a laser range finder and marked target seeker (LRMTS) in an undernose pod. Specialist weapons of RAF squadrons include ALARM anti-radar missiles and Paveway II/III LGBs guided by Thermal Imaging Airborne Laser Designator (TIALD) pods. The WE177 nuclear bomb was withdrawn in March 1998.

The Tornado IDS aircraft of the Italian and German air forces can carry B61 nuclear bombs, AGM-88 HARM anti-radar missiles, and MW-1 anti-airfield bomblet dispensers. Italy also has six equipped to carry Thomson-TRT CDLP laser designator pods for Paveway II LGBs and a squadron armed with Kormoran anti-ship missiles.

**GR. Mk 1B.** RAF variant, in two squadrons (26 aircraft), capable of carrying up to four Sea Eagle anti-ship missiles. The weapon will be phased out early next century in favor of TIALD/Paveway III.

Tornados of all three NATO operators are currently receiving a Mid-Life Update. A joint German-Italian MLU has been formulated in two parts, the first involving addition of increased computer power, MIL-STD-1760 digital databus, and provision for the Rafael Litening designator pod and associated GBU-24. Part 2, in 1999–2001, will add FLIR and an associated MFD, Litening laser INS, GPS, new defensive aids computer, missile approach warning, and enhanced RWR. Hav-

ing withdrawn from the APACHE program in 1996, Germany's replacement standoff weapons dispenser will be the DASA/Bofors KEPD 350 Taurus. Updated Italian Tornados will also have a microwave landing system.

**GR. Mk 4.** The RAF MLU version includes an undernose FLIR, a digital map generator, new 25° raster HUD and pilot's color MFD, improved ECM, upgraded radar, fleet-wide TIALD compatibility, NVG compatible cockpit, and GPS. The prototype Mk 4 flew May 29, 1993, and the first of 142 conversions was redelivered Oct. 31, 1997. The last is due in October 2002, by which time the Tornado will be equipped with Storm Shadow standoff dispensers and Brimstone anti-armor weapons, although the MLU involves loss of one of the internal guns.

## Fighter and Attack Aircraft

### A-7 Corsair II

**Brief:** The Corsair has been withdrawn from US Air Force and Navy service but continues to play a role in two other NATO air arms.

**Function:** CAS and Tactical Air Support of Maritime Operations.

**Operator:** Greece and Portugal.

**First Flight:** Sept. 27, 1965 (USN).

**Delivered:** October 1966 (USN)—1983.

**IOC:** December 1967 (USN).

**Production:** 1,610.

**Inventory:** Greece 95, Portugal 15.

**Contractor:** Vought Corp., USA.

**Data for A-7E.**

**Power Plant:** one Allison TF41-A-2 non-afterburning turbofan; 15,000 lb thrust.

**Accommodation:** pilot only, on rocket-powered Escapac ejection system.

**Dimensions:** span 38 ft 9 in, length 46 ft 2 in, height 16 ft 1 in.

**Weight:** empty 19,127 lb, gross 42,000 lb.

**Ceiling:** 42,000 ft.

**Performance:** max speed (clean) at S/L 691 mph, T-O run 5,600 ft, landing from 50 ft: 4,695 ft, combat radius (hi-lo-hi) 715 miles.

**Armament:** one 20 mm M61A1 cannon with 1,000 rds, two pylons under fuselage and three under each wing for up to 15,000 lb of Sidewinder AAMs, ATMs, ARMs, ASMs, bombs, rocket packs, and TV- or laser-guided weapons.

### COMMENTARY

**A-7H.** Sixty land-based A-7H Corsair IIs were delivered to the Greek air force in 1975–77 for TASMO. They retain the folding wings and Allison TF41 turbofan of the US Navy's A-7E, on which they are based, but have no in-flight refueling capability. Stationed at Araxos, the A-7Hs have a NATO assignment which includes B61-5 nuclear bombs. Five TA-7H two-seat trainers were also delivered.

**A-7E.** Greece received a follow-on batch of 32 A-7Es and four TA-7C trainers to equip two squadrons previously flying Starfighters. The batch was supplied from US Navy surplus, beginning March 1993.

**A-7P.** The 43 A-7Ps delivered to the Portuguese air force since 1981 are refurbished USN A-7As, with 13,400 lb thrust TF30-P-408 engine, a mix of A-7D and A-7E standard avionics, AIM-9P Sidewinders for the secondary role of air defense, Tracor ALE-40 chaff/flare dispensers, Elisra SPS-1000 RWR, and a Westinghouse ALQ-131 (Block II) ECM pod. Six TA-7Ps were also supplied. One of the two original operating squadrons was disbanded in 1996; the other is to follow in 1999.

### AMX

**Brief:** The AMX multirole jet is a joint Brazilian/Italian venture optimized for the attack mission.

**Function:** CAS, battlefield interdiction, and reconnaissance.  
**Operator:** Italy.  
**First Flight:** May 15, 1984 (prototype); May 11, 1988 (production).  
**Delivered:** April 19, 1989 (Italy)-present.  
**IOC:** 1991 (Italy).  
**FOC:** Aug. 5, 1994 (Italy).  
**Production:** more than 160 (continuing).  
**Inventory:** Italy 102 AMX and 26 AMX-T.  
**Contractor:** AMX International (Alenia and Aermacchi of Italy, Embraer of Brazil).  
**Power Plant:** one Rolls-Royce Spey Mk 807 non-afterburning turbofan; 11,030 lb thrust.  
**Accommodation:** pilot only, on zero/zero ejection seat.  
**Dimensions:** span 32 ft 9 in (over missiles), length 43 ft 5 in, height 14 ft 11 in.  
**Weight:** empty 14,837 lb, gross 23,700-28,660 lb.  
**Ceiling:** 42,650 ft.  
**Performance:** max speed at 30,000 ft 583 mph, at S/L 639 mph; T-O run 2,070-3,220 ft, landing run 1,520 ft, combat radius with 6,000 lb of external stores 328 miles lo-lo-lo, 576 miles hi-lo-hi.  
**Armament:** one 20 mm M61 multibarrel gun; twin centerline pylon and four under-wing pylons for bombs, cluster bombs, ASMs, and rocket pods; and two wingtip Sidewinder rails. Specific weapons incl the 1,000-lb GBU-16 LGB and Elbit Opher IR-guided bombs; designation provided by Thomson-TRT CLDP laser guidance pods. Max external stores load 8,377 lb. Internal bay for reconnaissance or ECM pallets.

#### COMMENTARY

**AMX.** Italy's original requirement for 187 single-seat AMXs to re-equip eight squadrons was scaled down to 136. Six squadrons have been equipped, of which one disbanded in September 1997. Another unit has a partial reconnaissance commitment, using Oude Delft Orpheus camera pods inherited from withdrawn RF-104 Starfighters. These pods will be replaced by an internal sensor package in 2001.

**AMX-T.** The tandem-seat AMX-T advanced trainer (26 ordered) first flew March 14, 1990, and entered service Nov. 24, 1994. Each squadron has at least one for training, but the principal operator is 101 Squadron. AMX-T has been cleared to launch the Marte anti-ship missile.

**AMX-E.** Projected conversion of AMX-T for escort jamming with external pods. Radar and enhanced navigation aids but no rear seat flying controls or internal gun. Armament to include AGM-88 HARM.

#### Eurofighter

**Brief:** The Eurofighter is to become the primary single-seat air superiority aircraft of four NATO air forces.  
**Function:** Air superiority, with a secondary ground-attack capability.

**Operator:** Germany, Italy, Spain, and UK.

**First Flight:** March 29, 1994.

**Delivered:** 2001 onwards.

**IOC:** 2005.

**Production:** 620 planned, incl 160 two-seat.

**Inventory:** Germany 180, Italy 121 (plus nine options), Spain 87, and UK 232 (plus 65 options).

**Contractors:** Eurofighter Jagdflugzeug, Germany: air-frame manufacture by Alenia, Italy; BAe, UK; CASA, Spain; and DASA, Germany. Assembly in all four countries.

**Power Plant:** two Eurojet EJ200 afterburning turbofans; each 20,250 lb thrust. A thrust vectoring version is under consideration.

**Accommodation:** pilot only, on zero/zero ejection seat; two seats in trainer version.

**Dimensions:** span over ECM pods 35 ft 11 in, length (incl two-seat) 52 ft 4 in, height 17 ft 4 in.

**Weight:** empty 21,495 lb, gross 46,300 lb.

**Ceiling:** not available

**Performance (est.):** max level speed at height Mach 2, T-O run (air combat mission) 985 ft, combat radius 115-863 miles.

**Armament:** one 27 mm Mauser gun in fuselage; 13 external stations for up to 14,330 lb of AMRAAM, Aspide and short-range AAMs, three external fuel tanks, or air-to-surface weapons.

#### COMMENTARY

Following considerable delays caused by political posturing and rigorous cross-checking of the flight control system, a multinational contract for 620 Eurofighters and associated support was agreed to by four defense ministers Dec. 22, 1997, and formally signed Jan. 30, 1998. Production of the first batch of 148 (including 105 two-seat trainers) is now under way, comprising 37 for Germany, 29 for Italy, 20 for Spain, and 62 for the UK; the initial 48 aircraft in this batch will be to an interim standard which will be raised to full production configuration later.

All seven prototypes (including two tandem-seat) had flown by March 1997 and accumulated over 600 hours by the time of the 700th sortie in May 1998. Additionally, the first five production aircraft will be instrumented for weapon clearance trials. Although



*Eurofighter 2000 prototype*



*F-4F Phantom II, German Luftwaffe (Gert Kromhout)*



*F-5B Freedom Fighter, Norwegian air force (Gert Kromhout)*



*F-16C Fighting Falcon, Greek air force*

Eurofighter is dual-role, the final 40 German aircraft will be optimized for ground attack.

Eurofighter has a 53° swept tailless delta configuration, with canards, quadruplex digital fly-by-wire flight controls, and instability in pitch, combining to give high agility and STOL capability. Design life is 6,000 hours or 30 years. A degree of low observability is embodied, with fuselage, wings, fin, and rudder mainly of carbon-fiber composites; but stores are carried externally. Operational equipment includes ECR 90 multimode pulse-Doppler radar, IRST, and an advanced integrated defensive aids subsystem with towed radar decoy.

#### F-4 Phantom II

**Brief:** The F-4 Phantom II serves NATO air forces in air defense and attack roles.

**Function:** Air defense and attack.

**Operator:** Germany, Greece, and Turkey.

**First Flight:** May 27, 1958.

**Delivered:** June 1961 (US Navy)-May 1987.

**IOC:** October 1961 (US Navy).

**Production:** 5,195.

**Inventory:** Germany 145, Greece 90, and Turkey 205.  
**Contractor:** McDonnell Douglas, USA.

**Data for F-4E.**

**Power Plant:** two General Electric J79-GE-17A afterburning turbojets; each 17,900 lb thrust.

**Accommodation:** crew of two, in tandem, on ejection seats.

**Dimensions:** span 38 ft 5 in, length 63 ft, height 16 ft 6 in.

**Weight:** empty 31,850 lb, gross 41,487-61,795 lb.

**Ceiling:** 58,750 ft.

**Performance:** max speed (clean) at 36,000 ft Mach 2.16; T-O to 50 ft: 4,490 ft, landing run 3,680 ft, typical combat radius (hi-lo-hi) 495 miles.

**Armament:** one 20 mm M61 multibarrel gun internally (640 rds); four Sparrows or AMRAAMs and four Sidewinders. Provision for 11 x 1,000-lb bombs, SNEB rockets, and 370- and (centerline only) 600-gallon external fuel tanks.

#### COMMENTARY

**F-4F.** Beginning in 1992, 110 German F-4Fs received an upgrade to give them look-down/shoot-down capability against multiple targets. MBB (now DASA) was prime contractor for the program, known as Improved Combat Effectiveness (ICE), which replaced the existing Westinghouse APQ-120 radar with an all-digital multimode Hughes APG-65 embodying advanced ECCM. The cockpit has also been updated. New equipment includes a Litef digital fire-control computer, Honeywell laser INS, GEC-Marconi digital air data computer, improved IFF, and provision for four AMRAAMs. A further 40 F-4Fs, serving in the fighter-bomber role or as conversion trainers with the detachment inaugurated at Holloman AFB, N.M., in January 1997, have undergone a partial upgrade.

**F-4E.** The other NATO Phantom operators have F-4Es, in both air defense and attack roles. The 56 originally received by Greece were augmented in 1991 by 28 from USAF. In 1997, DASA began upgrading 39 of these to a similar standard to the German ICE. Turkey gained 125 surplus aircraft to add to 72 delivered new. Of these, 54 are being upgraded by IAI of Israel almost to the standard of the IAI Kurnass, including Elta EL/M-2032 radar, Kaiser/EL HUD and Elisra EW systems, plus the ability to carry Rafael Popeye and other precision guided missiles.

#### F-5 Freedom Fighter

**Brief:** Single-seat F-5As and RF-5As, and two-seat F-5Bs, are now used mostly for advanced/lead-in training.

**Function:** Ground attack, reconnaissance, and training.

**Operator:** Greece, Norway, Spain, and Turkey.

**First Flight:** July 30, 1959.

**Delivered:** April 1964 (USAF)-1975 (first-generation only).

**IOC:** October 1965 (USAF).

**Production:** 1,199 (first-generation only).

**Inventory:** Greece 25, Norway 15, Spain 29, and Turkey 48.

**Contractors:** Northrop, USA; Canadair, Canada; CASA, Spain.

**Data for F-5A.**

**Power Plant:** two General Electric J85-GE-13 afterburning turbojets; each 4,080 lb thrust.

**Accommodation:** pilot only, on ejection seat; two pilots in F-5B.

**Dimensions:** span over tip tanks 25 ft 10 in, length 47 ft 2 in, height 13 ft 2 in.

**Weight:** empty 7,860 lb, gross 20,040 lb.

**Ceiling:** 50,500 ft.

**Performance:** max speed (clean) at 36,000 ft Mach 1.4, T-O run 2,650 ft, landing from 50 ft: 3,900 ft, max range 1,750 miles, range with max weapons 368 miles.

**Armament:** two 20 mm M39A2 guns in nose; Sidewinder on each wingtip; centerline pylon and two under each wing for about 4,400 lb of AAMs or ASMs, rocket packs, gun pods, bombs, or 275-gallon fuel tanks.

#### COMMENTARY

**F-5A, RF-5A, and F-5B.** Norway's No. 336 Sq operates as an advanced training unit for four squadrons of F-16s; its F-5As and F-5Bs have received improved avionics and self-protection systems for wartime air defense duties with AIM-9L Sidewinders or ECM support with SAMOVAR (SAM Obstruction in Velocity, Angle, and Range) jamming pods. Seven of the F-5As and eight Bs have been equipped by Sierra in the US with F-16 avionics, the first two returning to service in September 1993 and the last in July 1994. Their 1553B digital databus, air data computer, GEC-Marconi HUDWAC, Litton LN-93 ring-laser INS, multifunction throttle grip, and instrument panel are all similar or identical to F-16 equipment.

Greece and Turkey have absorbed many surplus F-5s from elsewhere, including NF-5s built by Canadair for Netherlands. Greek F-5s, including a few nominally reconnaissance-tasked RF-5As, will soon be replaced by F-16As, but Turkey is to update 48 NF-5s as lead-in trainers with avionics comparable to the Norwegian retrofit but supplied by Israeli contractors.

**SF-5B and SRF-5A.** CASA-built SF-5Bs (AE.9s) operated by the Spanish air force's weapons school completed a structural rebuild in the early 1990s for a further 4,000 hours of service. All 22 now have up-









**First Flight:** Jan. 27, 1983 (Netherlands).  
**Delivered:** February 1983–July 1984 (Netherlands).  
**IOC:** Oct. 1, 1984.  
**Production:** 22 (plus conversions).  
**Inventory:** Belgium 12, Denmark six, and Netherlands 21.  
**Contractor:** Lockheed Martin, USA.  
**Power Plant:** one Pratt & Whitney F100-PW-220 afterburning turbofan; 23,770 lb thrust.  
**Accommodation:** pilot only, on zero/zero ejection seat.  
**Dimensions:** span over missiles 32 ft 10 in, length 49 ft 4 in, height 16 ft 9 in.  
**Weight:** empty 18,238 lb, gross 42,300 lb.  
**Ceiling:** above 50,000 ft.  
**Performance:** max speed at 40,000 ft above Mach 2, radius of action more than 575 miles.  
**Armament:** Sidewinder AAM on each wingtip for self-defense. Can revert to multirole fighter with up to 12,000 lb of stores.

#### COMMENTARY

Purpose-built F-16A(R)s were supplied to Netherlands. They are fitted with a radar altimeter and carry on their centerline pylon an Oude Delft Orpheus pod. This contains a fan of three TA-8 cameras, plus one panoramic F.415 and infrared linescan.  
 In 1995, Netherlands loaned some Orpheus pods to Belgium, which modified three F-16s to carry them. Denmark received six reconnaissance pods home-built by the air force in early 1994, using cameras from retired Saab Drakens, pending availability of a specially designed Modular Reconnaissance Pod (MRP) by Per Udsen Aircraft Industry. Six MRPs with an electro-optic framing camera and IR camera are on order for imminent delivery; four more long-range optical MRPs are due in 2000. Belgium ordered 12 MRPs in 1996, and these have just entered service on the first of 16 suitably modified aircraft. Netherlands plans to buy MRPs next year.

#### G222VS

**Brief:** This modified transport aircraft is used on special duty missions by the Italian air force.  
**Function:** Elint.  
**Operator:** Italy.  
**First Flight:** March 9, 1978.  
**Delivered:** 1978–81.  
**IOC:** July 1979.  
**Production:** two.  
**Inventory:** two.  
**Contractor:** Alenia (formerly Aeritalia), Italy.  
**Power Plant:** two General Electric T64-GE-P4D turbo-props; each 3,400 shp.  
**Accommodation:** Pilot, copilot, and up to 10 systems operators.  
*Other data generally as for transport.*

#### COMMENTARY

Externally distinguishable by a small thimble radome beneath the nose and a larger doughnut radome at the tip of the tail fin, this version has a modified cabin fitted with racks and consoles for detection, signal processing, and data recording equipment, with an electrical system providing up to 40 kw of power for its operation.

#### Mirage F1-CR-200

**Brief:** Optimized for reconnaissance, this version of the Mirage has a secondary ground-attack role.  
**Function:** Tactical reconnaissance and ground attack.  
**Operator:** France.  
**First Flight:** Nov. 20, 1987.  
**Delivered:** not available  
**IOC:** July 9, 1983.  
**Production:** 64.  
**Inventory:** 52.  
**Contractor:** Dassault Aviation, France.  
*Data generally as for Mirage F1 fighter.*  
**Armament:** self-defense Magic AAM at each wingtip; bombs and rocket pods in secondary role.

#### COMMENTARY

The standard tactical reconnaissance aircraft of the French air force differs from the basic F1-C fighter in being fitted with Cyrano IVMR radar (with additional ground mapping, contour mapping, air-to-ground ranging, and blind let-down modes), a SAGEM Uliks 47 inertial platform, ESD 182 navigation computer, a fixed in-flight refueling probe, and an SAT SCM2400 Super Cyclope infrared linescan reconnaissance system replacing the starboard gun. An under-nose bay houses either a 75 mm Thomson-TRT 40 panoramic camera or a 150 mm Thomson-TRT 33 vertical camera. FLIR is installed in the port gun bay.

F1-CR-200s can also carry a centerline podded sensor in the form of a Thomson Raphaël TH SLAR or an 880-lb Thomson-CSF Astac electronic reconnaissance system for detecting ground radars. Data from Raphaël can be downloaded in flight if within 400 miles of a SARA mobile ground station. In 1998, the F1-CR force received the first of five Thomson-CSF Presto pods with a 900 mm electro-optical (CCD) camera for stand-off photography at ranges up to 30 miles. A Barax ECM pod can be carried under one wing, and a flare dispenser fitted in place of the brake chute.



**RF-4 Phantom II, Spanish air force**  
*(Gert Kromhout)*

#### Mirage IVP

**Brief:** This version of the first-generation Mirage is now used in its former secondary role of reconnaissance.  
**Function:** Strategic reconnaissance.  
**Operator:** France.  
**First Flight:** June 17, 1959.  
**Delivered:** February 1964–January 1968.  
**IOC:** Oct. 1, 1964.  
**Production:** 62.  
**Inventory:** five.  
**Contractor:** Dassault Aviation, France.  
**Power Plant:** two SNECMA Atar 9K-14 afterburning turbojets; each 14,840 lb thrust. Provision for 12 JATO rockets; total 11,000 lb thrust.  
**Accommodation:** crew of two, in tandem, on ejection seats.  
**Dimensions:** span 38 ft 11 in, length 76 ft 5 in, height 17 ft 9 in.  
**Weight (approx):** empty 31,965 lb, gross 72,750 lb.  
**Ceiling:** 54,000 ft.  
**Performance:** max speed Mach 2 at high altitude, 745 mph IAS at low altitude, radius of action 930 miles unrefueled.  
**Armament:** none.

#### COMMENTARY

The Mirage IV bomber force stood down July 4, 1996, but one squadron continues in the strategic reconnaissance role with a CT 52 pod semirecessed on the centerline. Recent duties have included regular missions over former Yugoslavia.

For low-level photography, the Mirage IV has four OMER 35 cameras (three with 150 mm lenses for forward and oblique use and one 75 mm vertical). In the high-level role, the configuration is three 600 mm OMER 36 cameras and one 152 mm Wild RC 8F, all vertical. An SAT Super Cyclope linescan is a third option, usually for low-level missions.

Equipment includes Thomson-CSF Arcana pulse-Doppler radar, dual INS and, typically, a Thomson-CSF TMV 015 Barem self-protection jamming pod and a Bofors BOZ-103 chaff/flare pod on under-wing pylons, plus two 436- or 660-gallon external fuel tanks. Thomson-CSF Serval RWRs are standard. Operational radius can be extended by in-flight refueling.

#### Nimrod R. Mk 1

**Brief:** The Nimrod is known as a maritime reconnaissance aircraft, but three are assigned to other duties.  
**Function:** Elint.  
**Operator:** UK.  
**First Flight:** Oct. 30, 1973.  
**Delivered:** 1973–74.  
**IOC:** May 10, 1974.  
**Production:** three, plus one conversion.  
**Inventory:** three.  
**Contractor:** British Aerospace, UK.  
*Data as for Nimrod MR. Mk 2 except:*  
**Accommodation:** four flight crew and up to 24 systems operators.  
**Armament:** none.

#### COMMENTARY

This version can be identified by the short tailcone that replaces the MR. Mk 2's MAD boom and by modifications to the wing leading-edge pods. The three original aircraft were fitted with an in-flight refueling probe between 1982 and 1988, thus becoming Mk 1Ps. BOZ-107 chaff/flare dispenser pods, modified with AN/AAR-47 missile approach warning systems, were added under the wings in 1990. At the same time, an Ariel towed radar decoy was installed temporarily in the lower rear fuselage.

Early in 1995, one of the R. Mk 1Ps was recommissioned after being fitted with new E-Systems equipment under the Starwindow project. This includes two high-speed search receivers, 22 pooled digital intercept receivers, wideband digital D/F system, color active-matrix consoles, and distributed digital maps, databases, and analytical tools. Another two aircraft have been similarly upgraded, including a converted Nimrod MR. Mk 2 replacement for the third of the original aircraft that was lost after a safe ditching. Early

in 1998, proposals were invited for a further upgrade, code-named Extract, to automate some of the data collection processes.

#### RF-4 Phantom II

**Brief:** Three NATO air forces in Europe continue to operate reconnaissance versions of the Phantom II.  
**Function:** Tactical reconnaissance.  
**Operator:** Greece, Spain, and Turkey.  
**First Flight:** Aug. 8, 1963 (RF-4C).  
**Delivered:** 1964–75.  
**IOC:** September 1964 (USAF).  
**Production:** 667.  
**Inventory:** Greece 21, Spain 14, and Turkey 44.  
**Contractor:** McDonnell Douglas, USA.  
*Data for RF-4C.*  
**Power Plant:** two General Electric J79-GE-15 afterburning turbojets; each 17,000 lb thrust.

**Accommodation:** crew of two, in tandem, on ejection seats.  
**Dimensions:** span 38 ft 5 in, length 62 ft 11 in, height 16 ft 6 in.  
**Weight:** empty 28,276 lb, gross 40,267–52,823 lb.  
**Ceiling:** 55,200 ft.  
**Performance:** max speed at 40,000 ft Mach 2.10, at S/L 898 mph, T-O to 50 ft: 3,990 ft, landing run 3,100 ft, typical combat radius 755 miles, ferry range 1,632 miles.

**Armament:** four self-defense Sidewinder AAMs.

#### COMMENTARY

**RF-4E.** The Greek and Turkish air forces operate ex-German RF-4Es, as well as their original new-build aircraft. These versions have -17 engines and performance similar to the F-4E.

**RF-4C.** Ex-USAF RF-4Cs (CR.12s) serve in the Spanish air force. Their internal equipment comprises the usual one KS-91 and four KS-87 cameras. Following cancellation of the ATARS reconnaissance system intended for Spanish Hornets, the CR.12s have been upgraded with fixed in-flight refueling probes, APQ-172 terrain-following radar (replacing APQ-99), a new INS, 1553B digital databus and other improved avionics, plus chaff/flare dispensers and up to four self-defense AIM-9L Sidewinder AAMs.

#### Tornado ECR and GR. Mk 1A/4A

**Brief:** General and specific versions of the Tornado interdicator are used for reconnaissance with a variety of sensors.  
**Function:** Tactical reconnaissance and defense suppression.  
**Operator:** Germany, Italy, and UK.  
**First Flight:** Aug. 18, 1988.  
**Delivered:** 1990–91.  
**IOC:** May 1990.  
**Production:** 35, plus conversions.  
**Inventory:** Germany 73, Italy 15, and UK 24.  
**Contractors:** Panavia Aircraft, a UK/German/Italian consortium.  
*Data for Tornado ECR.*  
**Power Plant:** two Turbo-Union RB199 Mk 105 afterburning turbofans; each approx 16,235 lb thrust.  
**Accommodation:** crew of two in tandem, on zero/zero ejection seats.  
**Dimensions:** span 45 ft 8 in spread, 28 ft 3 in swept, length 54 ft 10 in, height 19 ft 6 in.  
**Weight:** not available  
**Ceiling:** not available  
**Performance:** generally as for Tornado IDS.  
**Armament:** two Sidewinder self-defense AAMs; two AGM-88 HARM anti-radar missiles (ECR/IT-ECR).

#### COMMENTARY

**Tornado IDS/GR. Mk 1A.** The RAF's GR. Mk 1A has a BAe sideways-looking IR system, Vinten Linescan 4000 IR surveillance system, and Computing Devices signal processing and video recording system, all located internally. Full attack capability is retained, except for the absence of guns. Later this year, delivery will begin of eight RAPTORs (Reconnaissance Airborne Pods for TORNADO) for long-range optical photography.

Germany and Italy jointly developed a reconnaissance pod. Hung from the centerline pylon, the MBB pod contains two Zeiss cameras (610 mm Lorop and 57 mm low-level vertical), TV sensors, and a Texas Instruments RS-710 Infrared linescan. Nine pods were assigned as interim equipment to 40 ex-German navy Tornados transferred to the Luftwaffe in 1994, and others are used by one Italian IDS squadron. A new DASA pod, incorporating two Zeiss KS-153 optical cameras (one Trilems 80 and one Pentalens 57) and a Honeywell IR linescan, is now being delivered.

**Tornado ECR and IT-ECR.** A specially developed Tornado Electronic Combat and Reconnaissance (ECR) version retains an air-to-surface combat role, except for removal of guns. It is fitted with a ground emitter locator; FLIR; on-board systems for processing, storing, and transmitting reconnaissance data; and advanced tactical displays for the pilot and WSO. It is normally configured to carry two HARMs, two Sidewind-

















Dodt photo by J02 Craig P. Strawser

The Marine Corps and the Army believe future conflicts will take place in the streets, high-rises, and sewers of the urbanized Third World.

# War in the Urban Jungles

By James Kitfield

**M**ARINE Corps Cpl. Lynne Blanke in 1998 learned firsthand the dangers inherent in urban military operations.

Earlier this year, the civil affairs specialist was working in Bosnia in the Croat-dominated town of Drvar. She returned from a patrol to her unit's downtown offices only to discover that an ill-tempered, unruly Croat mob had formed in the city center. The protestors were enraged by the repatriation of 150 Serb refugees.

Blanke and her colleagues, lacking prior intelligence warning or adequate backup, decided to evacuate. Before they could leave the building, rioters stormed it and set it on fire. Outside, the mob surrounded Blanke's Humvee, smashing its bulletproof window.

Blanke, thrown onto the defensive, reached for her side arm to fire a warning shot but held back. It turned out to be the right move: The protest petered out and an uneasy calm returned. Yet things might easily have gone the other way.

"That was hard to take," she said. "That incident proved to me that once you sense something isn't right on the street, it's probably already too late." She added grimly, "Things can go wrong really quickly here."

That is the fundamental lesson of urban warfare, and it is being learned today by more and more US servicemen and -women. US forces in the past decade have fought pitched battles in the mean streets of Panama City and Mogadishu, Somalia, and conducted perilous urban operations in cities ranging from Port-au-Prince, Haiti, to Tirana, Albania.

## Bouts of MOUT

In the murky world between peace and all-out war that has come to characterize much of the post-Cold War era, the breed of activity the Army calls Military Operations on Urbanized Terrain—or MOUT—is increasing. Each of the Army's major deployments of the 1990s—with the notable exception of the Gulf War—entailed urban operations. The same is true for Marines.

On any given day, US forces confront the myriad dangers of operations in Bosnian cities such as Sarajevo, Tuzla, Drvar, and Zvornik, where they average 100 patrols a month through the heart of angry, sullen, and potentially dangerous populations.

Tasks as mundane as moving people and supplies from base to base require detailed, painstaking planning, much as would be the case in combat. Four-vehicle convoys are mounted, missions are briefed, and force protection measures meticulously rehearsed.

For regular military forces, urban warfare is like a knife fight—chaotic, close range, and extremely bloody. The cities are brutal and dangerous, and US military doctrine advises the services to avoid urban conflicts whenever possible. Despite that, the Marine Corps and, to a lesser extent, the Army, take a different view. To find it, one need look no further than Gen. Charles C. Krulak, the commandant of the US Marine Corps.

"For our entire lifetime," said Krulak, "our whole doctrine has said, 'Do not go into the cities; avoid them at all costs,' and yet, that's where the center of gravity is going to be. Take everything you've watched on CNN since Desert Storm and try to remember anytime when you saw a conflict taking place that it wasn't in an urban slum or city. You can't."

According to Krulak, the US has to go into the urban warfare business for a simple reason. "If there is an enemy out there that wants to make a difference, he can only make a difference by getting us into a complex, chaotic, deadly environment that negates our technology, negates our strength, and capitalizes on their strengths. That place is called the cities."

Some analysts, while acknowledging that it might be prudent and necessary for US forces to hone their

urban warfare skills, argue that nothing in the future would compel American forces to enter or to fight in cities; the US would go in only after having chosen to do so. In so doing, it would be choosing to discard its trump card—its highly trained, technologically superior conventional forces.

These experts caution against taking the view that urban combat is the unavoidable wave of the future, lest it become a self-fulfilling prophecy.

"I think there's some danger in confusing that which may become common with that which threatens our vital interests," said retired Air Force Maj. Gen. Charles D. Link, the officer who served as the Air Force's point man for both the National Defense Review and Commission on Roles and Missions studies.

## Seoul Cleansing

As an example, Link noted the kind of situation that could occur in a new Korean conflict. "Rather than sending thousands of young Americans to clear Seoul, city block by city block, ... I think you work the problem in other ways," said Link. "Maybe you encourage the South Koreans to take on that task, while US forces focus on attacking the enemy at his nerve centers."

Link said that "another alternative would be to use your dominance of air and space to isolate enemy forces in Seoul and attrit them very carefully."

Urban operations, of course, are not new for US military forces. In World War II, roughly 40 percent of the battles fought in Europe took place in urban areas. The Korean War also included significant urban combat, as did the Vietnam War during the 1968 Tet Offensive, when US forces fought street-to-street to dislodge Communist units from Hue.

If anything, however, those engagements provide a powerful cautionary tale about the dangers of urban warfare. More recent warnings abound. They can be seen in the disastrous experience of the Russians in the rebellious city of Grozny or in the British difficulties coping with sectarian strife of Belfast.

The view that urban operations constitute the future of war stems from at least three factors:

**Rampant Urbanization.** Demographic trends suggest that most of the world's population soon will live

in the cities, many of them megacities. Given a seemingly inexorable movement of rural populations to cities—and of urban sprawl—an estimated 70 percent of the world's population is likely to reside in urban centers by 2015.

Retired Army Lt. Col. Ralph Peters, a key urban warfare proponent, sees an obvious message: "The future of warfare lies in the streets, sewers, high-rise buildings, industrial parks, and the sprawl of houses, shacks, and shelters that form the broken cities of our world."

**US Military Supremacy.** Some experts also believe that the US military's overwhelming conventional military superiority, as revealed in the Persian Gulf War, will drive future enemies to search for friendlier venues in which to challenge US power—with urban cityscapes being one that might negate superior American mobility, command and control, and standoff weapons.

The most harrowing example was seen in Somalia, where 18 American soldiers died in a close firefight in the labyrinthine alleys of Mogadishu. Two multimillion dollar helicopters were downed by ground fire.

**The Humanitarian Imperative.** As some analysts see it, Third World cities are collapsing under the weight of population and poverty, and such developments may trigger humanitarian crises characterized by famine and disease that could require military involvement. According to one recent federal study, "We must also expect to be involved in cities while conducting ... peacekeeping and peace enforcement operations."

These factors, taken together, have convinced some commentators that a large urban danger awaits. The final report of the National Defense Panel, which reviewed US military forces and strategy in late 1997, gave heavy emphasis to the challenges presented by global urbanization.

The Marine Corps has taken the most aggressive stance in tackling the issue of urban warfare. For the past two years the Marine Corps Warfighting Lab at Quantico, Va., has conducted a series of experiments dubbed Urban Warrior. The goal of the program, which will conduct final phase exercises early next year, is to find innovative concepts,

tactics, and technologies that will aid Marines in future urban operations.

### **"We Can Get Beat"**

"Why are we spending two years on Urban Warrior?" asked Krulak. "Because that's where we can get beat. We don't know how to fight there."

Much of the focus of Urban Warrior has been directed at trying to better understand the urban environment and the unique challenges it presents to military commanders and forces.

In one exercise, Marine Corps participants received an in-depth tour of Chicago. Local police and fire officials acted as tour guides as they explored underground sewer networks and power grids. In another exercise, participants visited New York City and experimented with equipment that might allow them to travel from skyscraper to skyscraper without descending to street level, the traditional killing ground of urban warfare.

In Charleston, S.C., Marines worked with emergency response teams trained to cope with chemical and biological weapons. Their goal: to better understand how weapons of mass destruction can alter the dynamic in an urban warfare setting.

Urban Warrior also tapped the minds of some of the most experienced urban fighters. Retired Marine Lt. Gen. Ron Christmas, a company commander during the battle of Hue, discussed how the dispersed and chaotic nature of urban battles makes them "squad leader" wars. With communications technology being pushed down to the lowest levels, and massive firepower in the hands of junior officers, squad leaders in future urban battles will need to master skills required today of company commanders.

Marine Corps Maj. Gen. Emil R. Bedard, who served in Somalia, emphasized the importance of constant patrols to stabilize an area and calm local inhabitants; the need to protect convoys to ensure the safe movement of people and supplies in potentially hostile urban areas; and the use of strategically placed road blocks to gain control over sizable urban areas.

Urban Warrior participants concluded that, in at least one way, ur-

ban warfare has become more complex and deadly than ever.

"We realized that the strategies and tactics of urban warfare used in World War II and Korea, which was essentially to go in and destroy parts of the city and push an enemy out, are no longer relevant," said Timothy Jones, a spokesman for the Marine Corps Warfighting Lab at Quantico.

By that, he means that heightened US domestic political sensitivity to civilian casualties will make it impossible to use certain tried and true tactics—for example, clearing a room by first blindly lobbing in a grenade.

### **Three-Block War**

"Our experiences of the past decade have convinced us that we're probably not going to see that kind of warfare again," said Jones.

"In places such as Somalia, Haiti, and Bosnia," Jones continued, "we've had to essentially fight a three-block war in urban settings. On one block, we may be conducting humanitarian operations. On another we may be involved in a peacekeeping mission. In the third block, we may be fighting an all-out battle. So we have to develop the concepts, tactics, and Marines flexible enough to do all of those things."

The Army has also been studying the unique challenges of urban operations through a series of experiments on urban warfare funded as an Advanced Concept Technology Demonstration. Most of the work has been conducted at the Army's Dismounted Battle Space Battle Lab, at Ft. Benning, Ga.

While the study is still very much in flux, both the Marine Corps and Army have identified some common themes and challenges associated with urban operations.

They say that urban operations will put a premium on reliable and timely intelligence. Intelligence becomes even more important in light of the fact that US troops will operate on unfamiliar and unfriendly turf, where even a wrong turn on a city street can channel forces into a "kill sack."

Urban warfare exponents maintain that many of the intelligence systems used to great effect in the Persian Gulf War will have only limited utility in the city, meaning that greater emphasis will be placed on human intelligence. One Urban Warrior participant even suggested that squad

leaders in urban combat carry around wads of cash in small denominations to readily buy information and assistance from local inhabitants.

"Military intelligence must be profoundly reordered to cope with the demands of urban combat," Peters argued in the article "Our Soldiers, Their Cities," first published in the US Army War College's *Parameters*. "From mapping to target acquisition, from collection to analysis, and from battle damage assessment to the prediction of the enemy's future intent, intelligence requirements in urban environments are far tougher to meet than they are on traditional battlefields. ... From language skills to a knowledge of urban planning, ... many of the abilities essential to combat in cities are given low, if any, priority in today's intelligence architecture."

Because urban operations largely would be the purview of dismounted infantry, they are also notoriously manpower- and casualty-intensive. Veterans of Operation Just Cause, the brief 1989 conflict in Panama, have noted that Panama City absorbed every soldier the United States could pour into it, and American forces still found it difficult to adequately sweep the city. During the operation, 23 US troops died and 320 were wounded against outgunned and disorganized opposition forces.

The fact that only four of the Army's 10 divisions are light infantry organizations has led some experts to suggest that the service would struggle to cope with the demands of a major urban operation in the future. The present division structure also may not provide enough specialized units whose skills are optimized in an urban setting, especially military police, civil affairs, and psychological operations units.

### **Shadow of Mogadishu**

Given that they provide excellent cover for ambushes, city centers also present major challenges in terms of force mobility. US forces in Bosnia, for instance, are not allowed to leave base unless in four-vehicle convoys with a crew-manned .50-caliber machine gun. In Mogadishu, several Army Humvees had to be abandoned because they did not provide enough protection from ambushes. Former Defense Secretary Les Aspin was forced to resign when lawmakers learned he had denied the military's

request for armored forces to operate in the city.

The firefight in which 18 American soldiers died also revealed that low-flying helicopters are especially vulnerable in urban environments. Individual soldiers who may have to rapidly ascend in skyscrapers or maneuver in sewer systems, meanwhile, cannot be overly burdened by heavy equipment or packs.

Urban centers would pose major challenges to command-and-control and communications systems. Units dispersed in such areas would be dispersed and operating largely independently, meaning communications systems would have to be distributed down to the individual soldier in some cases. Dense city structures would also significantly degrade radio reception.

"Communications is a major problem in urban environments. We know that transmissions in city centers dominated by steel and concrete structures will be very difficult with FM radio systems," said Jones. "We're looking hard at digital burst radios and possibly even cellular systems to possibly solve the problem."

The Marine Corps Warfighting Lab has also experimented with equipping squad leaders with handheld computers that might allow them to tap into the same data stream as a shipboard commander of an entire Marine Expeditionary Unit. "We're trying to figure out exactly what kinds of information a squad leader might need to know in an urban setting," said Jones.

While cityscapes negate many of the traditional technological advantages enjoyed by US forces, Marine Corps and Army experts are directing research efforts at specific technologies which might solve some of the thorniest challenges of urban operations.

The Army's Dismounted Battle Space Battle Lab, for instance, is looking into various types of body armor that could cut down on injuries and casualties in city settings. Items as simple as kevlar knee and elbow pads, and eye and ear protectors, for instance, can help soldiers avoid injuries from splintering wood and masonry and percussive sound in close-in firefights. Other researchers are studying the use of camouflage uniforms specially designed for urban settings.

Researchers are studying thermal imaging systems and advanced sensors that would offer greater situational awareness inside dark buildings and sewer systems. Daylight cameras and remotely operated weapons may, one day, allow soldiers to look around corners and engage targets without exposing themselves to hostile fire. At a minimum, personal weapons will have to become lighter and fire at a more rapid clip.

### Enter the Robots?

Robots could prove a critical tool in future urban battles, with soldiers using them to clear minefields, locate snipers, or detect chemical and biological weapons.

Some experts argue that the demands of urban warfare may well place a premium on airpower and close air support over traditional artillery and indirect fire. In the future a premium may be placed on precision guided munitions that are designed not to take out whole buildings but perhaps destroy only a single room. "Because of attack angles and the capabilities of precision munitions, airpower will prove much more valuable and will function as flying artillery," wrote Peters.

The demands of urban warfare will also likely revolutionize armored vehicles. The tanks and armored vehicles of the future, Peters argued, will have to boast different and more varied weapons, be faster in sprint mode and more maneuverable, and offer greater protection than today's models. "The primary job of armored vehicles in urban areas will be to protect maneuver, movement, and resupply," Peters wrote in *Parameters*. "Because urban environments promise endless ambushes, we need new forms of armored protection—not just layers of steel or laminate or ceramics, or even reactive armor as it presently exists. Tomorrow's layers of armor will begin with spoofing techniques that complicate target detection on the part of enemy systems."

While advanced research efforts hold promise, however, Jones and other experts on urban combat caution against hopes that high-tech

gadgetry would somehow solve the challenges or negate the unpleasantness of urban combat. "Hopefully technology will help enable us in urban settings, but I don't want to imply that it's going to be a panacea," said Jones. "No technology is going to substitute for leadership, training, and physical toughness."

To drive home that point, both the Army and Marine Corps have focused much of their efforts on improving training for urban operations. The Army has constructed numerous mock cities for this purpose. The service has MOUT training facilities at Fts. Hood, Campbell, Bragg, Lewis, Drum, Stewart, and Polk.

Before deploying to Bosnia, troops train in urban settings either at the 7th Army Combat Maneuver Training Center, Hohenfels, Germany, or at the service's premier MOUT facility at the Joint Readiness Training Center, Ft. Polk, La. The Army is also developing the Transportable Instrumentation System that will replicate the instrumentation technologies at the National Training Center, Ft. Irwin, Calif., allowing the service to adapt any urban terrain into a high-tech training area.

The Army, even though it is devoting more energy to the preparation for urban warfare, has resisted suggestions that it embrace urban warfare as the inevitable wave of the future. Army officials have gone on record against recommendations that it turn some of its divisions into specially trained and equipped "urban combat" units.

Even the Marine Corps shies from basic changes as a result of urban warfare. "Because we can easily envision missions that would require us to operate in an urban setting, we see this as something else we have to prepare and train our Marines to do," said Jones. "However, we don't see urban warfare as changing our fundamental nature. We still have to be able to conduct high-intensity warfare in open settings."

He added, "To the extent we can bypass urban centers and still achieve our objectives, it still makes a lot of sense." ■

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*James Kitfield is the defense correspondent for National Journal in Washington, D.C. His most recent article for Air Force Magazine, "Nuclear Adjustments," appeared in the August 1998 issue.*

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<sup>2</sup> Health Insurance Association of America, 1997

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# Books

Compiled by Chanel Sartor, Editorial Associate

**Ambrose, Stephen E.** *The Victors: Eisenhower and His Boys: The Men of World War II.* Simon & Schuster, 1230 Avenue of the Americas, New York, NY 10020 (800-223-2348). 1998. Including photos, maps, sources, and index, 396 pages. \$28.00.

**Astor, Gerald.** *The Right to Fight: A History of African Americans in the Military.* Presidio Press, 505 B San Marin Dr., Ste. 300, Novato, CA 94945-1340 (415-898-1081). Including photos, bibliography, and index, 529 pages. \$29.95.

**Burg, David F., and Edward L. Purcell.** *Almanac of World War I.* The University Press of Kentucky, 663 S. Limestone St., Lexington, KY 40508-4008 (606-257-2951). 1998. Including bibliography and index, 320 pages. \$22.00.

**Cambone, Stephen A.** *A New Structure for National Security Policy Planning.* The CSIS Press, Center for Strategic and International Studies, 1800 K St. N.W., Washington, DC 20006 (202-887-0200). 1998. Including charts, notes, appendices, and index, 262 pages. \$23.95.

**Chandler, Robert W.,** with John R. Backschie. *The New Face of War: Weapons of Mass Destruction and the Revitalization of America's Transoceanic Military Strategy.* AMCODA Press Publications Service, 1390 Chain Bridge Rd., Ste. 204, McLean, VA 22101 (888-262-6322). 1998. Including photos, maps, charts, bibliography, and index, 465 pages. \$33.00.

**Ford, Daniel.** *Glen Edwards: The Diary of a Bomber Pilot.* Smithsonian Institution Press, PO Box 960, Herndon, VA 20172-0960 (800-782-4612). 1998. Including photos, glossary, sources, and index, 195 pages. \$24.95.

**Griffith, Thomas E. Jr.** *MacArthur's Airman: General George C. Kenney and the War in the Southwest Pacific.* University Press of Kansas, 2501 W. 15th St., Lawrence, KS 66049-3904 (913-864-4155). 1998. Including maps, notes, bibliography, and index, 338 pages. \$39.95.

**Haulman, Daniel L.** *The United States Air Force and*

*Humanitarian Airlift Operations 1947-1994.* US Government Printing Office, Superintendent of Documents, PO Box 371954, Pittsburgh, PA 15250-7954 (202-512-1800). 1998. Including photos, glossary, and notes, 535 pages. \$43.00.

**Ilfrey, Jack,** with Mark Copeland. *Happy Jack's Go Buggy: A Fighter Pilot's Story.* Schiffer Publishing Ltd., 4880 Lower Valley Rd., Atglen, PA 19310-9717 (610-593-1777). 1998. Including photos, appendix, bibliography, and index, 125 pages. \$35.00.

**Kimball, Jeffrey.** *Nixon's Vietnam War.* University Press of Kansas, 2501 W. 15th St., Lawrence, KS 66049-3904 (913-864-4155). 1998. Including photos, notes, bibliography, and index, 495 pages. \$39.95.

**Kutta, Timothy J.** *U-Boat War.* Squadron/Signal Publications, 1115 Crowley Dr., Carrollton, TX 75011-5010 (972-242-8663). 1998. Including photos, 64 pages. \$9.95.

**Leonhard, Robert R.** *The Principles of War for the Information Age.* Presidio Press, 505 B San Marin Dr., Ste. 300, Novato, CA 94945-1340 (415-898-1081). 1998. Including illustrations, appendix, bibliography, and index, 287 pages. \$29.95.

**Mack, Pamela E.,** ed. *From Engineering Science to Big Science: The NACA and NASA Collier Trophy Research Project Winners.* Superintendent of Documents, PO Box 371954, Pittsburgh, PA 15250-7954 (202-512-1800). 1998. Including photos, graphs, charts, and index, 427 pages. \$35.00.

**Maguire, Jon A., and the Men of the 27th ATG.** *Gooney Birds & Ferry Tales: The 27th Air Transport Group in World War II.* Schiffer Publishing Ltd., 4880 Lower Valley Rd., Atglen, PA 19310-9717 (610-593-1777). 1998. Including photos, appendices, and glossary, 347 pages. \$59.95.

**Marley, David F.** *War of the Americas: A Chronology of Armed Conflict in the New World, 1492 to the Present.* ABC-CLIO, Inc., 130 Cremona Dr., PO Box 1911, Santa Bar-

bara, CA 93116-1911 (800-422-2546). 1998. Including photos, maps, and index, 722 pages. \$99.00.

**McLaren, David R.** *Lockheed T-33: A Photo Chronicle.* Schiffer Publishing Ltd., 4880 Lower Valley Rd., Atglen, PA 19310-9717 (610-593-1777). 1998. Including photos and bibliography, 125 pages. \$24.95.

**Nelson, Curtis L.** *Hunters in the Shallows: A History of the PT Boat.* Brassey's, Inc., 22883 Quicksilver Dr., Ste. 100, Dulles, VA 20166 (703-260-0602). 1998. Including photos, maps, notes, bibliography, and index, 242 pages. \$28.95.

**Newberry, Maj. Robert D.,** USAF. *Space Doctrine for the Twenty-first Century.* US Government Printing Office, Superintendent of Documents, PO Box 371954, Pittsburgh, PA 15250-7954 (202-512-1800). 1998. Including tables, appendices, notes, and bibliography, 68 pages. \$11.00.

**Nijboer, Donald.** *Cockpit: An Illustrated History of World War II Aircraft Interiors.* Howell Press, Inc., 1713-2D Allied Ln., Charlottesville, VA 22903 (800-868-4512). 1998. Including photos, bibliography, and index, 176 pages. \$39.95.

**Patton, W. Wayne.** *Aces.* Squadron/Signal Publications, 1115 Crowley Dr., Carrollton, TX 75011-5010 (972-242-8663). 1998. Including photos and illustrations, 64 pages. \$14.95.

**Rogers, Jeff, and Rick School.** *Valor at Polebrook: The Last Flight of Ten Horsepower.* Order from: Rick School, PO Box 83, Kimberly, WI 54136. 1998. Including photos and bibliography, 134 pages. \$28.00.

**Sawyer, Richard D.** *The Tao of Spycraft: Intelligence Theory and Practice in Traditional China.* Westview Press, 5500 Central Ave., Boulder, CO 80301-2877 (303) 444-3541. 1998. Including notes and index, 617 pages. \$35.00.

**Smith, Richard K.** *Seventy-Five Years of Inflight Refueling: Highlights, 1923-1998.* US Government Printing Office, Superintendent of Documents,

PO Box 371954, Pittsburgh, PA 15250-7954 (202-512-1800). 1998. Including photos, appendices, and notes, 86 pages. \$8.50.

**Taylor, Theodore.** *The Flight of Jesse Leroy Brown.* Avon Books, 1350 Avenue of the Americas, New York, NY 10019 (212-261-6900). 1998. Including photos and index, 300 pages. \$23.00.

**Thixton, Marshall J., George E. Moffat, and John J. O'Neil.** *Bombs Away: By Pathfinders of the Eighth Air Force.* FNP Military Division, 6527 Main St., Trumbull, CT 06611 (203-261-8587). 1998. Including photos, maps, bibliography, and index, 182 pages. \$25.00.

**Tucker, Spencer C.,** ed. *Encyclopedia of the Vietnam War: A Political, Social, and Military History, Vols. I-III.* ABC-CLIO, Inc., 130 Cremona Dr., PO Box 1911, Santa Barbara, CA 93116-1911 (800-422-2546). 1998. Including photos, maps, bibliography, chronology, glossary, appendix, and index, 1,196 pages. \$275.00.

**Whitcomb, Darrel D.** *The Rescue of Bat 21.* Naval Institute Press, 2062 Generals Hwy., Annapolis, MD 21401 (800-233-8764). 1998. Including photos, notes, glossary, and index, 196 pages. \$27.95.

**Whitney, Daniel D.** *Vee's For Victory: The Story of the Allison V-1710 Aircraft Engine 1928-1948.* Schiffer Publishing, Inc., 4880 Lower Valley Rd., Atglen, PA 19310-9717 (610-593-1777). 1998. Including photos, charts, appendices, bibliography, glossary, and index, 470 pages. \$59.95.

**Winkowski, Frederic, and Frank D. Sullivan.** *100 Planes 100 Years: The First Century of Aviation.* Smithsonian Publishers, 115 W. 18th St., New York, NY 10011 (212-519-1300). 1998. Including photos, 167 pages. \$19.98.

**Woulfe, James B.** *Into the Crucible: Making Marines for the 21st Century.* Presidio Press, 505 B San Marin Dr., Ste. 300, Novato, CA 94945-1340 (415-898-1081). 1998. Including photos and bibliography, 183 pages. \$24.95.

# AFA / AEF National Report

By Frances McKenney, Assistant Managing Editor, with Chanel Sartor, Editorial Associate

## Building Named for Former AFA Leader

A federal court building in Washington, D.C., was renamed at an Oct. 23 ceremony in honor of Howard T. Markey, a former Air Force Association national president and chairman of the board.

Markey was a nationally prominent jurist, the first chief judge of the US Court of Appeals for the Federal Circuit. He retired from the Air Force Reserve as a major general and had served on active duty in World War II and Korea.

Joining Markey and family members and friends, who traveled from Chicago, at the former National Courts Building were distinguished guests, including Supreme Court Justice Anthony M. Kennedy, who made the opening remarks, Rep. Henry J. Hyde (R-Ill.), delivering the main address, and Lt. Gen. Donald L. Peterson, USAF deputy chief of staff for personnel.

Thomas J. McKee, AFA national president, John R. Alison, national director emeritus, and John O. Gray, national director, were among the AFA leaders present for the unveiling of the name plaque.

Markey served as AFA national president from 1959 to 1960 and as chairman of the board from 1960 to 1961. He was also an AFA regional vice president and vice chairman of AFA's Executive Committee.

According to family member Peggy Markey, the retired judge said he was "honored and humbled" by the building dedication. "It was a great day," he said.

The Howard T. Markey National Courts Building is located at 717 Madison Place N.W. in Washington, D.C.

### Fighting for Soldiers' and Airmen's Home

The Military Coalition, of which AFA is an associate member, was among the veterans organizations voicing opposition to a congressional amend-



*AFA National President Thomas McKee (left) greets Howard Markey in the courtroom that was jam-packed with well-wishers for a ceremony renaming a federal court building for Markey. He is a former AFA national president and board chairman.*

ment that would force the US Soldiers' and Airmen's Home in Washington, D.C., to sell a tract of land to its neighbor, the Roman Catholic Archdiocese of Washington.

The legislation specifically addresses an unused 49-acre plot of land that the home had hoped might produce a continuing source of income to help offset an \$8 million-\$10 million yearly deficit. The USSAH was moving in that direction through a public-private venture with a national real estate development firm. Church officials opposed the business plan, based on concerns about the effect of commercial development near its properties in the area, including Catholic University.

The amendment forcing the sale to the church was added to the defense appropriations bill by Sen. Rick Santorum (R-Pa.). But as of mid-October, he agreed to a six-month moratorium on the plan because of opposition from fellow senators and veterans groups such as the Military Coalition. The Senate Armed Services Committee and House National Security Commit-

tee staffs will study the issue during the moratorium.

In operation since 1851, the USSAH has struggled because of a downsized military; it is supported in part by a monthly 50-cent fee paid into a trust fund by active duty troops. The home has shut two of its four dormitories, cut the number of residents from 1,800 to 1,100, cut staff, and increased resident fees in an effort to remain solvent.

### An Overseas Connection

AFA is working with the Air Force Office of Legislative Liaison on a program to link members of Congress traveling overseas on fact-finding trips to AFA chapters in Europe and Asia.

The OLL coordinates significant numbers of such overseas trips for congressmen, arranging for refueling, rest, or overnight stops at Air Force bases in the area.

AFA recognizes this situation as an opportunity to educate congressional members about the special needs of USAF members stationed



overseas and to help those overseas feel more connected to the political process back home.

The association envisions working with OLL and members of Congress to determine who is traveling overseas and when they might have blocks of free time. AFA will then use home of record information to match the congressmen with constituents stationed overseas. If there is no chapter in the area where the congressmen will visit, AFA plans to work to establish one. The overseas chapters will then bring together the congressmen and USAF members through events ranging from an informal coffee break to a full scale AFA chapter dinner meeting, where the congressmen would serve as guest speakers.

AFA, OLL, and Frank Swords, AFA special assistant Europe, plan to have this method for welcoming visiting congressmen to AFA chapters overseas in place for the start of the 106th Congress next month.

#### Required Reading

Several members of the Air Force

Caucus sent a "Dear Colleague" letter to fellow congressmen, recommending that they read "The Access Issue" in the October 1998 issue of *Air Force Magazine*.

The article addresses the threat of a "lockout," in which the US military might be denied access to key overseas bases during a crisis. The *Air Force Magazine* special report pointed out that the lockout problem has not stopped a military operation to which the US was seriously committed.

"Those who use the access issue to promote carriers ... must recognize that carriers cannot sustain their own operations without maintaining access to land bases for replenishment," the letter stated. "It is time to stop the parochial rhetoric and to give this issue the serious consideration it deserves."

The letter was signed by Rep. Cliff Stearns (R-Fla.), caucus chairman, Rep. Sam Johnson (R-Texas), co-chairman, and Reps. Van Hilleary (R-Tenn.), James A. Gibbons (R-Nev.), and John C. Cooksey (R-La.)

The Air Force Caucus was formed in August. Its other members are

Reps. Joseph R. Pitts (R-Pa.), Jerry Kleczka (D-Wis.), Ron E. Paul (R-Texas), Lindsey Graham (R-S.C.), Nick Smith (R-Mich.), John Linder (R-Ga.), Paul E. Gillmor (R-Ohio), Roger Wicker (R-Miss.), Peter A. DeFazio (D-Ore.), and Heather Wilson (R-N.M.).

#### Dougherty in the Hall of Fame

Russell E. Dougherty, AFA national director emeritus and former executive director, was inducted into the Kentucky Aviation Hall of Fame at the Aviation Museum of Kentucky in Lexington.

More than 20 members of the **Lexington (Ky.) Chapter** turned out for the induction Oct. 2, which was the third annual enshrinement ceremony. It was organized largely by chapter members George Gumbert Jr. and Wendell Murphy.

Dougherty is a native of Glasgow, Ky., and a graduate of Western Kentucky University and the University of Louisville Law School. The retired general began his military career as an aviation cadet at the outbreak of World War II and went on to become Strategic Air Command commander in chief and chief of staff of NATO's Allied Command Europe.

A member of AFA for more than 40 years, Dougherty is also currently an AFA senior advisor. The **Gen. Russell E. Dougherty (Ky.) Chapter** is named in his honor.

Others inducted with Dougherty were astronaut Story Musgrave, a veteran of six space shuttle flights; Robert W. "Todd" Moore, a World War II pilot credited with 12 aerial victories; Henry Meigs II, a World War II P-38 pilot credited with six kills in the Pacific; and the "godfather of Kentucky aviation," LaRue Coy, who opened several airports in Kentucky and trained hundreds of pilots.

University of Kentucky AFROTC cadets, whose commander is Lexington Chapter President Col. James S. "Steve" Parker, performed as color guard for the event as well as distinguished guest escorts.

Also in October the Lexington Chapter hosted a dinner meeting, featur-



Newly inducted into the Aviation Museum of Kentucky's Hall of Fame, Russell Dougherty, national director emeritus, poses with University of Kentucky AFROTC cadets (l-r) Timothy Purcell, Deborah Perry, Anna Hilb, and Jacob Lutterman, who is a member of the Lexington Chapter.



**Col. Wyatt "Chris" Cook, Misawa (Japan) Chapter president, congratulates SrA. Lawrence W. Bredwell, 35th Fighter Wing, at an Airman Leadership School graduation. Bredwell earned an AFA Citation for his essay on enlisted heritage. He wrote about the pride he feels as a maintainer, responsible for pilots' lives.**

ing John B. Conaway as guest speaker. A retired lieutenant general, Conaway is a native of Kentucky and former commander of the Kentucky Air National Guard. He is co-author of *Call Out the Guard! The Story of Lieutenant General John B. Conaway and the Modern Day National Guard*. According to Parker, Conaway had, as a lieutenant colonel, started the Gen. Russell E. Dougherty Chapter.

During the evening, Reginald K. Wise was named Chapter Member of the Year.

### Nickel Grass Anniversary

At Dover AFB, Del., in October, the **Delaware Galaxy Chapter** and the Central Delaware Chamber of Commerce co-sponsored a commemoration of the 25th anniversary of Operation Nickel Grass, the USAF airlift to Israel during the Mideast war of 1973.

Dover's 3d Military Airlift Squadron crewed the first C-5 aircraft to arrive at the Lod/Ben-Gurion air complex, Israel, to begin the 32-day airlift.

The two-day Nickel Grass 25 celebration began with a Governor's Reception, hosted by Lt. Gov. Ruth Ann Minner, held at the base's Air Mobility Command Museum. The reception featured a tribute to the US Navy's 6th Fleet, which had provided escort and air traffic control for Nickel Grass airlifters flying over the Mediterranean. Retired USAF Gen. David C. Jones, a former Chairman of the Joint Chiefs of

Staff, was a special guest at the event, attended by more than 200.

Minner also unveiled an oil painting by world-renowned aviation artist Gil Cohen, portraying an M-60 tank being offloaded from a C-5 at Lod Airport during the airlift. Galaxy Chapter member Ronald H. Love, who was among those who spent two years organizing this event, said the chapter had arranged for Cohen to visit Lod Airport, as part of his research for this painting.

The second day of commemorations included a Nickel Grass Roundtable. The panelists were Robert T. Cossaboom, command historian at AMC headquarters at Scott AFB, Ill.; retired Col. Emery J. Crane, a **North-east Texas Chapter** member and director of operations at the 436th Airlift Wing at Dover during Nickel Grass; retired Col. Donald R. Strobaugh, Nickel Grass Airlift Control Element commander; and retired Maj. Gen. Itzhak Hoffi, commander of Israel's northern front during the 1973 Mideast war.

On the flight line, there was a recognition ceremony for Nickel Grass aircrews and support personnel, and a C-5 veteran of the airlift was re-dedicated *Nickel Grass*. As the re-naming came to a close, a C-5 pulled up nearby, its cargo door opened, and an M-60 was unloaded—a real-life re-creation of the events of Nickel Grass, noted Love.

Later, Lt. Gen. Walter S. Hogle Jr., AMC vice commander, spoke about the future of air mobility.

The commemorative activities culminated with an evening banquet, in honor of AMC, Nickel Grass crews, Israel, and Portugal, which had allowed USAF to use Lajes Field in the Azores as an en route base during the airlift.

Bernard Kalb, a longtime newsman and CNN host, served as the banquet's keynote speaker. He covered the Middle East during that time and accompanied Henry Kissinger on his "shuttle diplomacy" trips that eventu-



**Col. Felix Grieder, 436th Airlift Wing commander, speaks at a Nickel Grass 25th anniversary ceremony at Dover AFB, Del., where a C-5 was renamed Nickel Grass to commemorate the 1973 airlift to Israel. Grieder is a member of the Delaware Galaxy Chapter, which helped sponsor the anniversary.**



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Several of the newly elected national vice presidents met in Minneapolis in October. Gathered around the table (l-r) are Robert Williams, AFA National President Thomas McKee, AFA Chairman of the Board Doyle Larson, Barbara Brooks-Lacy, AEF President Jack Price, Jack Steed, Marleen Eddlemon, AFA Executive Director John Shaud, Cheryl Waller, and Thomas Kemp.

ally led to a peace treaty between Israel and Egypt following the Mid-east war. Kalb co-authored *Kissinger*, a book that includes observations of the war and events leading up to Operation Nickel Grass.

Among the more than 300 guests at the banquet were Sens. Joseph R. Biden Jr. (D-Del.) and William V. Roth Jr. (R-Del.); Lt. Gen. Maxwell C. Bailey, 21st Air Force commander at McGuire AFB, N.J.; and Maj. Gen. William Welser III, Air Mobility Warfare Center, also at McGuire.

Guests at the AFA table included AFA National President Thomas J. McKee and Stephanie M. Wright, Delaware state president.

Another significant AFA contribution to the celebration: Galaxy Chapter's Kenneth K. Robertson Jr., the Nickel Grass 25 Committee chairman, spent a year researching the airlift and produced a 70-page history of it.

#### Convention in the "Diamond State"

Delaware State AFA hosted its state convention in September at the Air Mobility Command Museum at Dover AFB, Del.

Col. Peter K. Sullivan, commander, 512th Airlift Wing (AFRC Assoc.), spoke about the mission of the wing and its host at Dover, the 436th Airlift Wing.

As part of the convention, state officers were elected. Stephanie M. Wright was elected president; Ronald H. Love, vice president; Stephen W. Welde, 2d vice president; Mary E.

Frey, secretary; and Teresa A. Connor, treasurer. All are from the Delaware Galaxy Chapter.

Awards went to Connor, Frey, Love, Welde, and fellow chapter member Margaret A. Whitman and to Howard G. Sholl Jr. and Norman Runge, both of the **Diamond State Chapter**.

The State of Delaware AFA Premier Salute Award went to Delaware Galaxy Chapter's Jack G. Ander-

son for outstanding leadership during his tenure as state president.

#### Promoting the Partners

In August, the **Fairbanks Midnight Sun (Alaska) Chapter** and the Greater Fairbanks Chamber of Commerce co-hosted a membership luncheon to highlight the chapter's Community Partner program and to recognize Brig. Gen. Tommy F. Crawford, commander, 354th Fighter Wing, Eielson AFB, Alaska. He is also a chapter member.

Crawford discussed the mission and achievements of Eielson AFB units, including the 168th Air Fueling Wing (ANG), the only Arctic region refueling unit in Pacific Air Forces. Crawford also discussed Eielson's role in Cope Thunder, two-week air combat exercises hosted by the base, and construction on Eielson—of interest to the 100 or so audience members because many were business leaders welcoming the boost to the local construction industry.

Afterwards Community Partner chairman James A. Messer discussed the purpose and advantages of being a Community Partner. Membership forms and materials were placed on each table.

#### Steak on the Barbecue

What better way to attract a crowd than a good old-fashioned barbecue?

The **Dale O. Smith (Nev.) Chapter** sponsored a steak barbecue fund-



Jerry Waterman (Fla.) Chapter President George Norwood (center) presents an \$850 check to SMSgt. Becky Ritz, 6th Civil Engineering Squadron first sergeant. The donation to the MacDill AFB, Fla., Education Council helps active duty personnel with college expenses. With them (l-r) are Lt. Col. Joni Miranda, 6th Air Refueling Wing special assistant, Brig. Gen. James Soligan, 6th ARW commander, and at far right Lt. Col. Lance Young, chapter treasurer.

raiser in September at the Nevada Air National Guard's All Ranks Club at Reno/Tahoe IAP.

Some 40 people attended the event including seven past presidents: Don Schwartz, Victor R. Hollandsworth, Clarence E. Becker, Anthony Martinez, Carl G. Peterschmidt, Paul B. Kincaide, and Kathleen Clemence.

The guest speaker at the barbecue was chapter member Maj. Leslie M. Gonzales, commander, 152d Intelligence Squadron (ANG). He spoke about the squadron's new missions and high-tech equipment that provide a variety of imagery intelligence products to military leaders in near real time, anywhere in the world.

The barbecue was one of four fund-raising efforts the chapter holds each year. All proceeds go to the chapter's scholarship fund for ANG dependents and for sending Civil Air Patrol cadets to summer camp. Fund-raising efforts have generated more than \$2,000 over this past year.

#### Helping a Reunion

When the 505th Bomb Group held its reunion in Baton Rouge, La., in September, the **Maj. Gen. Oris B. Johnson (La.) Chapter** lent a helping hand.

More than 100 people attended the event, hosted by chapter member and 505th veteran Harry Sumrall.

The chapter provided commemorative cups as souvenirs for all who attended, and then—State President Michael F. Cammarosano, with the help of supporters and friends, rounded up vans to transport 70 attendees who wanted to dine out one evening. The chapter also provided supplies for the hospitality suite.

ROTC cadets from the Louisiana State University AFROTC Det. 310 in Baton Rouge, helped run the hospitality suite. They also provided the color guard and rifle squad for the reunion's memorial ceremony held at the *USS Kidd* and Nautical Center.

Throughout the reunion, display tables bearing banners, copies of *Air Force Magazine*, and membership applications were available, said Cammarosano.

#### Warbirds Visit New York

It was two days of high flying fun at Republic Airport in Farmingdale, N.Y., in September when the **Nassau Mitchel (N.Y.) Chapter** co-sponsored a visit of two fully restored B-17 and B-24 warbirds, owned by the Collings Foundation of Stow, Mass.

The bombers on display attracted thousands and proved to be an excellent way to spread the word about AFA, its Community Partners, and Aerospace Education Foundation programs.

Chapter President Fred DiFabio and Gerald Hunter, vice president of veterans affairs, set up a display that featured chapter history, Air Force uniforms, photos, and other USAF memorabilia.

They also handed out copies of *Air Force Magazine*, the chapter's newsletter, and AFA applications, while Hunter provided important veterans information.

The Collings Foundation's B-17G was produced late during World War II, so it never saw combat. It did fly as part of the Military Air Transport Service before it spent 20 years as a fire bomber. It was named after a 91st Bomb Group, Eighth Air Force, B-17 that flew 140 missions without a crew fatality before being scrapped.

The foundation's B-24 is a Pacific theater veteran. It is named after a 461st Bomb Group, Fifteenth Air Force, *Liberator* that shot down 14 enemy fighters and was eventually lost over Yugoslavia (her crew survived).

#### Give the Gift of Video! AFA Members Receive a \$3 Discount!

The newly released video, *People, Power, and Mission* commemorates the fiftieth anniversary of the United States Air Force. Its stirring, visually rich history is presented in compelling style, featuring rarely seen footage.

Featured are interviews with General Brent Scowcroft, Gabby Gabreski (the world's greatest living ace), General Bernard Schriever, and dozens of others who have made the USAF the best in the world.

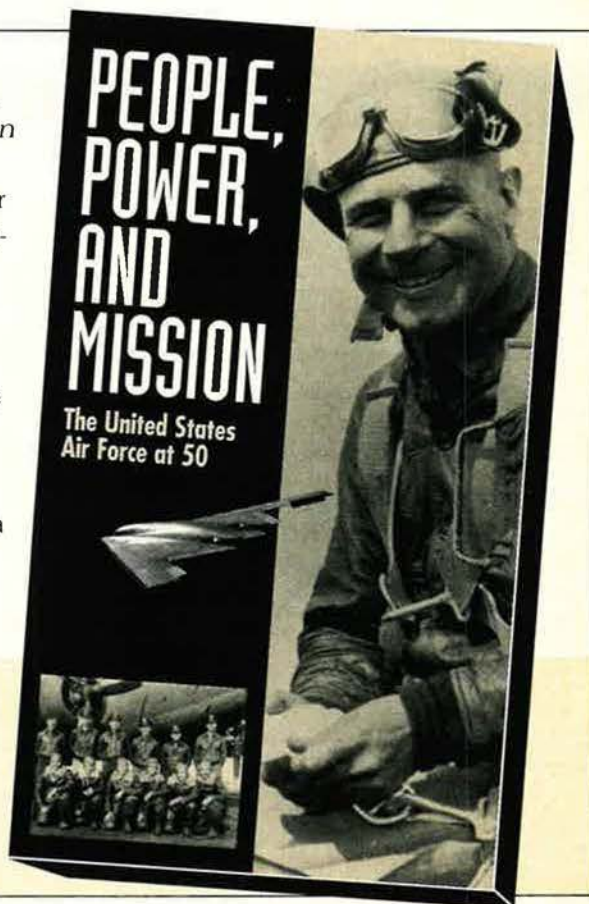
The Air Force Association has joined the Emmy Award-winning production team of Russ Hodge, Tim White, and a production staff with more than a half-dozen Emmys to produce this must-have video. Order your copy today!

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**More Chapter News**

■ The **PE-TO-SE-GA (Mich.) Chapter** held its fourth-quarter membership luncheon in September to discuss the future plans of the chapter. At the top of the meeting's agenda was member recruitment. The small chapter of 82 has been holding steady to its membership numbers. Also at the luncheon, members re-elected its chapter leaders for another term.

Jonathan Dayton, a retired USAF lieutenant colonel and Vietnam veteran, is again chapter president. He's a resident of Traverse City and has been a realtor for 14 years. David W. Hauser, a retired USAF lieutenant colonel and a former B-52 pilot, was re-elected as vice president. He is a realtor in the same office as Dayton. Robert H. Witkop was re-elected as treasurer. Thomas E. Largent was

re-elected secretary. Both Witkop and Largent are private pilots and aviation buffs.

**Have AFA/AEF News?**

Contributions to "AFA/AEF National Report" should be sent to *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 2209-1198. Phone: (703) 247-5828. Fax: (703) 247-5828. E-mail: fmckenney@afa.org. ■

**Unit Reunions**

**49th FG Assn.** April 22-25, 1999, at the former Castle AFB, CA. **Contact:** Earl R. McIver, 1561 Austin St., Atwater, CA 95301 (209-358-6758).

**57th BW Assn of WWII** (all B-25 units in the Mediterranean Theater). Aug. 31-Sept. 5, 1999, at Cavanaugh's Inn at the Park, Spokane, WA. **Contact:** Bob Evans, 1950 Cunningham Rd., Indianapolis, IN 46224-5341 (317-247-7507).

**446th BG**, Eighth AF (WWII). May 19-23, 1999, at the Viscount Suite Hotel in Tucson, AZ. **Contact:** Marv Anderson, 8411 E. Albion Pl., Tucson, AZ 85715 (520-296-4829).

**483d BG (H)** (WWII) and **566th Air Engineers**. Oct. 4-10, 1999, in Oklahoma City. **Contact:** Harold Leveridge, 4729 NW 70th St., Oklahoma City, OK 73132-6839 (405-721-4913).

**555th, 563d, 564th, 566th, and 573d Signal Air**

**Warning Battalions.** Sept. 16-18, 1999, in Atlanta. **Contact:** Walter Bryson, 524 Knox Bridge Crossing Rd., Lavonia, GA 30553 (706-356-8886).

**556th Recon Sq** March 26-27, 1999, in Las Vegas. **Contact:** Donald J. Chase (402-493-5612) or Don Hein (949-454-8986).

**820th BS**, 41st BG, Seventh AF (WWII). May 13-16, 1999, at the Colorado Springs Marriott in Colorado Springs, CO. **Contact:** William W. Childs, 3637 Patsy Ann Dr., Richmond, VA 23234-2951 (804-275-6012).

**4080th Strategic Recon Wg.** May 27-29, 1999, at the Civic Center in Del Rio, TX. **Contact:** 4080th SRW Reunion Committee '99, PO Box 1526, Del Rio, TX 78841 (830-775-5346).

**AFTAC/WF0-1155TH, TOD.** April 8-11, 1999, in Sacramento, CA. **Contact:** Rich Charles, PO

Box 888, North Highlands, CA (916-332-5877).

Seeking members of **AFROTC Dets. 420 and 930**, University of Minnesota Duluth, to plan a reunion in October 1999. **Contact:** Helen Sandwick, AFROTC Det. 420, University of MN Duluth, 10 University Dr., Duluth, MN 55812-2496 (218-726-8159) (air@d.umn.edu). ■

Mail unit reunion notices well in advance 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.

**Bulletin Board**

Seeking information on the pilot of a **P-47** shot down Dec. 18 or 19, 1944, after strafing the Grossachsenheim, Germany, airfield. Also seeking information on B-17 pilot **Timothy A. Ahern**, who was MIA in late 1944. **Contact:** G.C. Burns, Box 2308, Framingham, MA 01703.

Seeking contact with **Bill Spellman** of Boston, who was in the Air Force and stationed near Liverpool, UK, around 1948-50 and who knew June Jones. **Contact:** Patricia Melander, 40 Third Ave., Manor Park, London, UK, E12 6DU (0181-553-1305).

Seeking information on **Edmund Whately**, of Mississippi, who was a crew chief with the 33d TCS, flying C-47s out of Townsville, Australia, and Port Moresby and Hollandia, New Guinea. He became a C-47 crew chief in the Berlin Airlift and was killed in an airplane crash, fall 1948. **Contact:** Bob Monson, 1310 Daveric Dr., Pasadena, CA 91107-1644.

Seeking anyone who knows or knew **Anthony Rizzo**, an artist who was a patient at the base hospital at Grenier Field, NH, in 1945 and had possibly just returned from overseas duty. **Contact:** Bill Rains, 207 N. Best St., Goldsboro, NC 27530 (phone or fax: 919-735-1638).

Seeking an original or copy of the **314th College Training Detachment** cadet newspaper, Ellensburg, WA, published December 1943 and containing the name John Darr. **Contact:** John

W. Darr, 6811 Moreland Ave., Cheyenne, WY 82009 (307-635-2924) (JWDarr@prodigy.net).

Seeking information on the history of and where to buy armed forces insignia, divisional shoulder patches, USAF shoulder insignia, and Marine Corps, Navy, defense, and service command patches. **Contact:** Rocco Cavallieri, 1804 S. Dover St., Philadelphia, PA 19145.

Seeking contact with **George Batchelor**, born about 1919, who was stationed around Manchester and Cheshire, UK, in 1943. His last known address was Hyattsville, MD, and he also lived in North or South Carolina and Virginia. **Contact:** S. Hepplestone, 16A North Memorial Homes, Stoughton Rd., Oadby, Leicestershire, UK, LE2 4FL.

Seeking USAF Vietnam veterans, officers and enlisted, who served with any **Caribou units**, 1966-72, at Cam Ranh, Phu Cat, or Vung Tau, South Vietnam. **Contact:** Nick Eavanish, 210 48th St., Gulfport, MS 39507-4317 (601-863-8688) or Bill Avon, 729 Kaderly Ave., Strasburg, OH 44680-9785 (330-878-7451).

Seeking contact with anyone who served with USAF missions to **Peru, Nicaragua, or Haiti** during the 1950s. **Contact:** Dan Hagedorn, 13125 Pennerview Ln., Fairfax, VA 22033 (703-222-5390) (nasarc04@sivm.si.edu).

Seeking contact with or information on **Capt.**

**Lawrence T. Dissette**, 358th FS, 355th FG, Eighth AF, whose P-57 crashed April 16, 1945, near Straubing, Germany. Also seeking information on **1st Lt. Thurman C. Long**, **1st Lt. Francis N. McCollom**, and **2d Lt. Joseph E. Yuryan**. **Contact:** Josephine H. Schulte, Eagle's Nest Apt. 933, 5211 Fredericksburg Rd., San Antonio, TX 78229 (210-524-9853).

Seeking information on or contact with **Sgt. William Gibson**, whose last known address was in Albuquerque, NM, and **Thomas L. French**, a native of the Oklahoma panhandle, or anyone who served in the 20th MMS at Barksdale AFB, LA, during the early 1960s. **Contact:** John E. Howell Jr., 1875 Grubb Rd., Lenoir City, TN 37771-7128 (423-986-8898) (johnfiero@aol.com).

Seeking information on and military or civil aviation photos of **Kai Tak IAP**, Hong Kong, China, from the 1920s to the present. **Contact:** Joe Chan, PSC 464, Box 30, FPO AP 96522-0002.

Seeking contact with **Ailey, Clyde English, Tom Flavin, Walter Keinath, William A. Pennington, Storey, and Pern A. Todd**, who knew Edward H. Grossheim Jr. and were stationed in Horham, UK, during WWII. **Contact:** Maria E. Grossheim-Schultz (jschultz@parkave.net).

For a collection, seeking **Military Payment Certificates** used overseas from 1946 to 1975 in Vietnam. **Contact:** Nick Schrier, Box 60104, Sacramento, CA 95860 (916-486-8720).



Seeking anyone who knew **MSgt. Roy B. Brooks**, 71st BS, 38th BG, who was stationed at Patterson Field, OH; Langley Field, VA; Jackson AAF, MS; Australia; New Guinea; and was in the southwest Pacific January 1942-April 1944. He was promoted to chief warrant officer. **Contact:** Donn Brooks, Box 147, Kyle, TX 78640 (dbrooks@haysco.net).

Seeking information on, memorabilia, or contact with members of the **Elmendorf AFB (Alaska) Catholic Men's Choir**, 1950-55. **Contact:** William F. Costa Jr., PO Box 796174, Dallas, TX 75379-6174 (972-417-3840) (wcosta19@sprynet.com).

Seeking to share information with **Vietnam War veterans** with prostate cancer who have filed or plan to file for Veterans Affairs compensation. **Contact:** M.C. Garrison, 805 Copperas Dr., Caldwell, TX 77836 (409-567-3976) (ADUA70A@Prodigy.com).

Seeking contact with members of **Aviation Cadet Pilot Training Classes 44-A, B, C, and D**, particularly from eastern and southern training commands. **Contact:** A.E. Purinton, 717 Red Oak Ln., Arlington, TX 76012-4859 (pinkfly@airmail.net).

To collaborate on memoirs, seeking contact with **retired general officers** who live in the northern Virginia area and who were with Air Defense Command, Air Force Systems Command, or Strategic Air Command in 1956, 1960, or 1963-67. **Contact:** W. Witt, 5823 N. Washington Blvd., Apt. 80, Arlington, VA 22205-2934.

Seeking **Don A. Borden, Arthur Burstein, and Jack A. Johnson Jr.**, 52d BG, Eighth AF, crew members during 1944-45. **Contact:** Howard Towns, 1138 Circle Dr., Lake Wales, FL 33853.

Seeking metal **models** of aircraft for collection and display. **Contact:** Ira Kuperstein, 22 Brush Hill Terr., Kinnelen, NJ 07405 (973-283-2420).

Seeking contact with members of **Pilot Class of 41-I**, Ellington AFB, TX, Dec. 12, 1941, who knew Lt. Charles L. Maggart, 9th Pursuit Sq., 49th Gp, Morrison Field, FL. He was killed in action Dec. 5, 1941, while a member of the 38th BG. **Contact:** Philip E. Maggart, 516 Spencer Ave., Marion, IN 46952 (765-664-8552).

Seeking contact with **Joseph (Fry) Frye** of Atlanta, GA, who was in the Air Force and stationed at Huntingdon, UK, between 1955-58 and who knew Pansy Ruby Berkeley of west London. **Contact:** Michael A. Berkeley, 80 Forest Hill Rd., East Dulwich, London, UK, SE22 0RS.

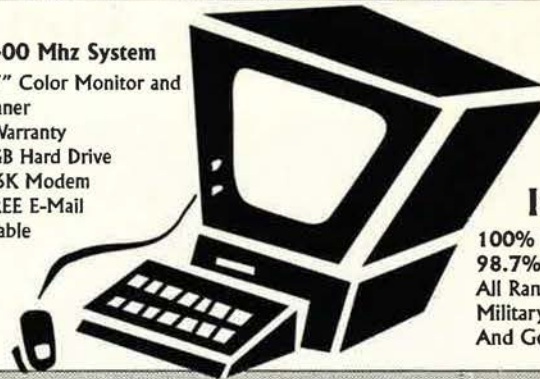
Seeking information on or contact with anyone who knew **Carl Chapman**, 23d Photo Recon Sq, Alghero, Sardinia, 1944, who received the Distinguished Flying Cross for his participation in an April 1944 mission over Germany. **Contact:** Frank G. Dorber, Wyvern, Morannedd, Criccieth, Gwynedd, Wales, UK, LL52 0PP.

If you need information on an individual, unit, or aircraft, or want to collect, donate, or trade USAF-related items, write to "Bulletin Board," *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 22209-1198. Items submitted by AFA members have first priority; others will run on a space-available basis. If an item has not run within six months, the sender should resubmit an updated version. Letters must be signed. Items or services for sale, or otherwise intended to bring in money, and photographs will not be used or returned.

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# Pieces of History

Photography by Paul Kennedy

## The Heart of the Night



*The Nighthawk's roots go back to 1974, when the Defense Advanced Research Projects Agency asked five military aircraft manufacturers to develop a stealth fighter. The first F-117A flew in June 1981, but the Nighthawk's existence wasn't officially revealed until 1988. The next year during Operation Just Cause in Panama, the stealth fighter went into combat for the first*

*time. In the Persian Gulf War, F-117s flew more than 1,200 sorties, with no losses or battle damage. This is the cockpit of the second F-117A built, with modifications to test various systems. Some of the more sensitive instruments have been removed—thus the gaps in the dashboard. This aircraft spent most of its career at Edwards AFB, Calif., before being retired in 1991 to the*

*USAF Museum at Wright-Patterson AFB, Ohio. Its markings are as it appeared during tests conducted for Air Force Systems Command between 1981 and 1991.*



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