

February 1999/\$3

# AIR FORCE

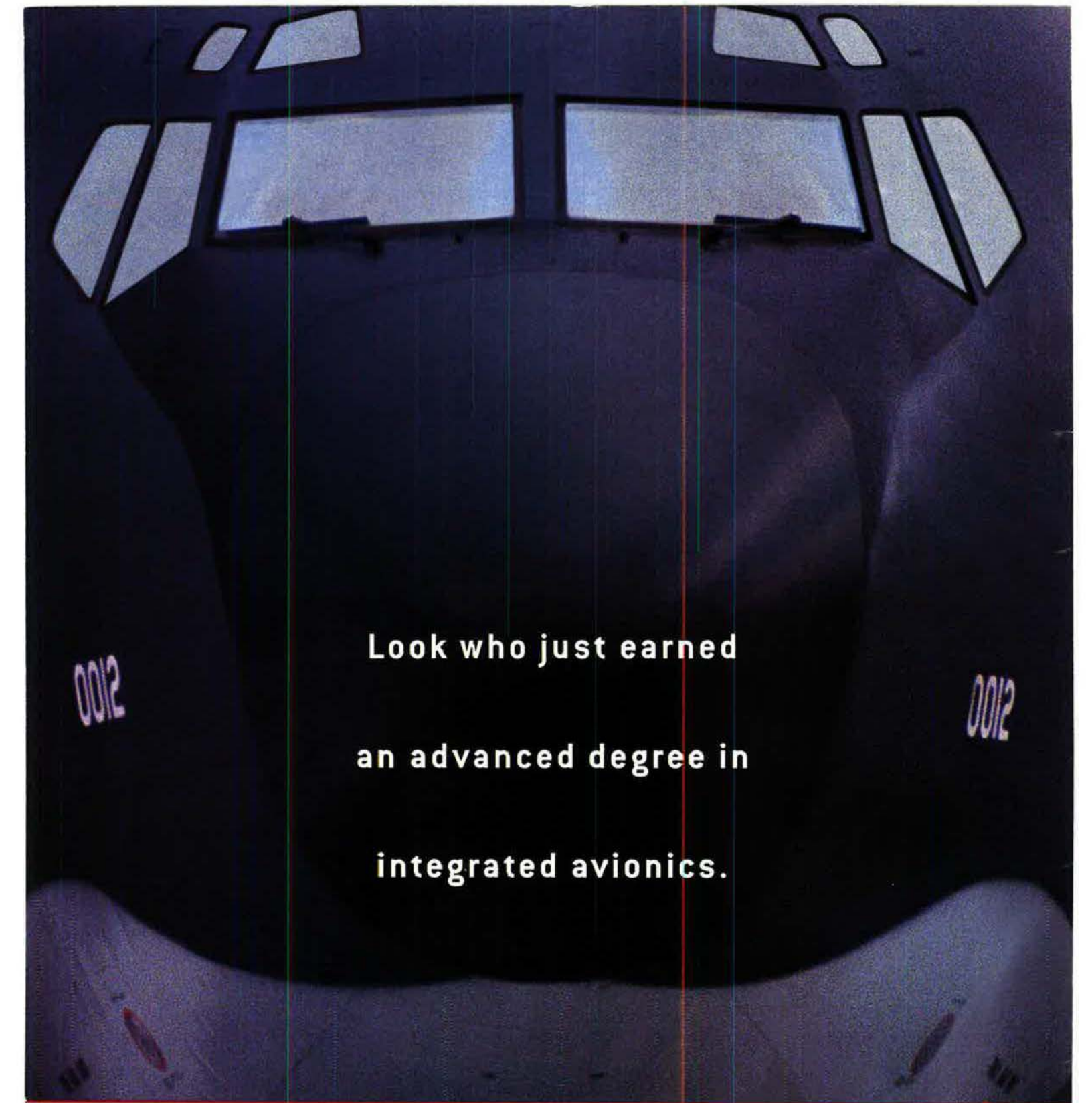
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MAGAZINE

SIDE 1 -

**Desert Stronghold**  
**Prince Sultan Air Base**  
**Strategic Control**  
**Lessons in Limited Force**





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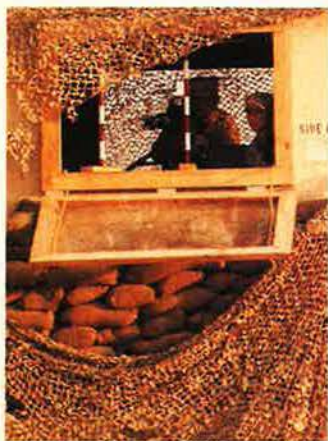
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MAGAZINE

February 1999, Vol. 82, No. 2

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- 4 Letters
- 7 Chart Page
- 8 Aerospace World
- 14 Index to Advertisers
- 16 Senior Staff Changes
- 18 Valor
- 67 State Contacts
- 74 AFA/AEF National Report
- 78 Unit Reunions
- 79 Bulletin Board
- 80 Pieces of History



**About the cover:** Amn. Steven Freeman and SrA. Sharon Henry man machine guns along the road at one of several checkpoints at Prince Sultan AB, Saudi Arabia. See "Desert Stronghold," p. 44. Photo by William H. McMichael.

## 2 Editorial: Lessons in Limited Force

By John T. Correll  
*Desert Fox was a tactical success, but the strategic value of it was dubious.*

## 20 Strategic Control

By John A. Tirpak  
*This could turn out to be the successor to the Cold War concept of Containment.*



20

## 28 Partners in Space

By Peter Grier  
*The future of space will be a joint venture by the armed forces, the civil sector, and industry.*

## 34 High Plains Luftwaffe

Photography by Ted Carlson  
*Fighter crews from the German Luftwaffe stretch their wings in the skies over the New Mexico desert.*

## 40 Bell at the White House

By Stewart M. Powell  
*Robert Bell of the National Security Council staff talks about the complex, politically charged effort to protect US interests in space.*

## 44 Desert Stronghold

By William H. McMichael  
*Prince Sultan AB features miles of fenced desert, scores of barriers, hundreds of security forces, special motion sensors, razor wire, bomb-sniffing dogs, and lots of clenched jaws.*

## 52 The Radar Game

By Rebecca A. Grant  
*The invention of radar changed the balance between attacker and defender—but it was changed again by the invention of stealth.*

## 62 Troop Carriers of World War II

By C.V. Glines  
*Troop carrier airmen entered enemy airspace unarmed to deliver men and supplies.*

## 68 Stuart Symington

By Walter J. Boyne  
*The first Secretary of the Air Force was a talented, hard-nosed businessman—but first and foremost a man of courage, who resigned on principle.*



62

**AIR FORCE Magazine** (ISSN 0730-6784) February 1999 (Vol. 82, No. 2) is published monthly by the Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Phone (703) 247-5900. Second-class postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** \$30 per year; \$75 for three-year membership. **Life Membership (nonrefundable):** \$450 single payment, \$475 extended payments. **Subscription Rate:** \$30 per year; \$25 per year additional for postage to foreign addresses (except Canada and Mexico, which are \$9 per year additional). Regular issues \$3 each. Special issues (USAF Almanac issue and Anniversary issue) \$5 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send changes of address to Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air Force Association. Copyright 1999 by Air Force Association. All rights reserved. Pan-American Copyright Convention.



By John T. Correll, Editor in Chief

## Lessons in Limited Force

**I**n one ambiguous operation after another, the Clinton Administration practically conducted a clinic in 1998 on the shortcomings of limited force. It must have set some sort of record for the variety and number of instances in which we used or threatened to use military force to send political signals, crack the whip on a recalcitrant foe, or pursue some other limited objective.

The Administration came to office in 1993 believing that the policy for committing US forces to combat should be relaxed. Under the new policy, lethal military power could be used in small increments for limited purposes, even if no vital US interest was at stake or if our intentions were a little fuzzy. Such actions reached a peak in 1998.

As the year began, the White House had maneuvered itself into a showdown with Iraq over weapons inspections. However, it was not prepared to follow through on its bluster threats of military force. UN Secretary General Kofi Annan defused that crisis by brokering a deal in which we accepted transparently false promises from Iraqi leader Saddam Hussein and rewarded him with concessions.

In June, UN inspectors found the residue of nerve gas in an Iraqi weapons pit. In August, Iraq refused to permit any more spot inspections. In public, we talked tough and issued more warnings. Privately, the State Department was pressuring the inspectors to ease up as we edged toward a less confrontational policy.

On Aug. 20, US warships launched 79 cruise missiles against the terror network of Osama bin Laden, the exiled Saudi millionaire responsible for the bombing of our embassies in Kenya and Tanzania. The targets were training camps in Afghanistan and, supposedly, a chemical weapons plant in Sudan. Damage to bin Laden's network was minor. The strikes were billed as the first round of a sustained campaign against terrorism, but that seems to have gone by the wayside.

The scene shifted again in October. After repeated threats and warnings throughout the summer—during which Serbian leader Slobodan Milosevic ran up the casualty count in Kosovo—the US and its NATO allies planned airstrikes, postponed them, planned them again, and finally canceled them on Milosevic's pledge of good behavior. By December, with peace in Kosovo coming

### **Desert Fox was a tactical success, but the strategic value of it was dubious.**

apart at the seams, the State Department was sending new and stronger warnings to Milosevic.

In late October, Iraq ended all cooperation with the UN inspectors. For once, even eight Arab states blamed Saddam for the worsening crisis, but President Clinton could not bring himself to pull the trigger. On Nov. 14, with B-52 bombers already in the air, he aborted the strikes on the strength of an unseen letter from Saddam to Kofi Annan. Within hours, the White House discovered the letter had "more holes than Swiss cheese," rescheduled the airstrikes, then aborted them a second time when Saddam submitted a revised letter.

The provocations soon resumed, and so did the warnings. On Dec. 16, acting on a UN inspectors' report on Saddam's deliance, the White House ordered Operation Desert Fox to begin. There was less international support than for the aborted attack in November, and the visible provocation was no greater, but the Administration said the operation could not be delayed, even for a few days. It launched 650 air sorties and 400 cruise missiles against Iraq, but it had all the earmarks of limited force.

The considerations in Desert Fox

were mostly political rather than military. Avoidance of casualties—on the Iraqi side as well as on our own—was a big constraint, as was concern about world opinion. Our objectives were stated in the language of hesitation: to "degrade," "diminish," or "weaken" Saddam's position. There was no plan to "destabilize" the Iraqi dictator. The operation was to terminate after 70 hours, partly because bombardment of Iraq during the Muslim holy month of Ramadan would be "profoundly offensive."

Desert Fox was not a valid measure of military power. In a tactical sense, it could be judged a success. The four-day bombing campaign was effective against the assigned targets, but the strategic value of it was dubious. Saddam emerged from it with enhanced standing in the international community. Within a week, Iraq, which had no qualms at initiating hostilities during Ramadan, was shooting at American and British aircraft in the no-fly zone.

Iraqi Vice President Taha Yassin Ramadan captured one weakness of the limited force policy when he told reporters last November that "Iraq does not fear the threat of the United States because it has been threatening Iraq for the past eight years."

Going to war—or threatening to do so—is a serious step. Combat operations ought to be a last resort, undertaken only when other approaches have failed and when we are grimly steadfast in our purpose.

In February 1998, though, describing potential action against Iraq that was of roughly the same scope as Operation Desert Fox, Secretary of State Madeleine Albright said that "we are talking about using military force, but we are not talking about war."

That distinction has not served us very well so far. Neither has the doctrine of Limited Force, with its legacy of half measures and lost credibility. The experience of 1998 strongly suggests that we should think again about the use of force and the threshold of combat. ■





## **THE SUCCESS OF PRESENT AND FUTURE WARRIORS IS OUR CONCERN**

**C**urrently, there is an emphasis on concepts of information-intensive warfare coupled with striking advances in weapons capabilities. In this context, managing and harmonizing the relation between force and protection assets and information assets becomes a topic of sharp interest.

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## The Integration of Aerospace

John Correll raises an important issue in making the case for integration of air and space into an aerospace force, rather than establishing a separate space force as a new branch of the military services. [*"The Integration of Aerospace," January, p. 2.*] But I am not convinced the "common operational characteristics that include elevation, perspective, speed, range, and freedom from the geographic constraints of the Earth's surface" should be the basis for resolving the debate. And it seems to me that Correll's conclusion that "if aerospace integration succeeds, it will overcome the fractionalization of air and space" is in opposition to jointness: by combining air and space, don't we fractionalize integration of space with ground warfare and fractionalize integration of space with naval warfare?

The creation of a separate Air Force was not undertaken because integration of airpower into Army operations was not successful, nor because they lacked common operating principles (surprise, concentration of force, etc.). A separate service was needed because the potential of airpower could not be optimized in a service whose operational paradigm was focused on ground warfare. Because of the need for airpower tailored to the needs of every service, even after the creation of a separate Air Force, the Army, the Navy, and the Marine Corps developed their own flying arms to meet service-specific needs. Today they come together in joint operations, joint training, and, in some cases, joint aircraft procurements.

Although "the successor to the B-2 bomber could be a high-altitude hypersonic aircraft" ("Mission to Mach 5," January, p. 28), couldn't it also be an airborne laser or a new strategy to defeat an enemy through information operations—attacking his ability to communicate with and control his forces? Isn't it possible that the integration of air and space could lead to compromise in the capabilities of both airpower and space power in the name of integration? Is it possible that in an

Air Force reorganized to put a fighter pilot in command of every major command there may be a paradigm issue with regard to space, as was faced by the early Army Air Corps?

The physics of space is different. Space systems are unmanned vehicles controlled by ground operators. The dividing lines between airpower and space power are blurred. They're blurred because airpower advocates are focusing on creating manned air and space (aerospace) craft which can operate as Star Wars fighters in space. Who has validated this as the best operational use of airpower or of space power? Perhaps a separate space force could identify ways to reduce the need for men and women in aircraft, ground assault vehicles, and ships to confront and attack each other.

It is not "inevitable that air superiority and space superiority will eventually merge," any more than it was inevitable that airpower would render land and sea operations obsolete. Is there really a fear of "fractionalization"? Or is the fear obsolescence of airpower (more likely with integration than with separate services) or, even more frightening, a new breed of space warriors which unseats the fighter pilot as the ultimate military hero in the new millennium?

Col. Robert J. Sallee,  
USAF (Ret.)  
Colorado Springs, Colo.

## The Duel

I appreciated Elaine M. Grossman's article about doctrine [*"Duel of Doc-*

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

*trines," December 1998, p. 30].* I found it very enlightening. I would respectfully like to take issue with [retired] Maj. Gen. [Charles D.] Link's doctrine on airpower. His assertion [that to] "kill his horse" [is sufficient] doesn't hold if the rider walks over to you and hacks your head off with his sword.

To think that airpower alone can deny the enemy access to war materials has been shown to be clearly unachievable. History in three wars has proven this. In World War II the German forces [were] able to mount large defensive and offensive operations despite the loss of air superiority and the huge strategic bombing campaign. In Vietnam we were unable to prevent North Vietnam from bringing supplies to the south. Finally the lessons of the Gulf War have proven that a determined enemy, willing to accept tremendous losses in personnel and equipment, cannot be defeated by airpower alone.

The argument that "airpower would be the best instrument for carrying out the main thrust of a war, especially in light of the US public's sensitivity the loss of soldiers under ambiguous circumstances," fails to realize the propaganda value of killed or captured pilots, especially in circumstances where prisoners are used as hostages or bargaining tools. After nearly a quarter of the century, POWs from Vietnam are still used as a political tool, and many Americans are still justly concerned about the fate of these soldiers and airmen.

In summary, I find it a dangerous doctrine to believe there is a "low risk" strategy for the deployment of airpower as "the" decisive weapon in contingency or low intensity operations. Clearly, airpower can influence the actions of third rate military powers, but it is doubtful airpower could be decisive in such operations. I feel the use of airpower to significantly alter long-range, long-term political policies of potential enemies needs to be based on a joint doctrine of cooperation/employment with forces on the ground.

Michael Kordus  
Yardley, Penn.



In 1996, I was the US Central Command action officer responsible for writing the strategic concept referred to in "Duel of Doctrines." I take issue with a number of [the author's] assertions. I am an F-15 Weapons School graduate and when I arrived at USCENTCOM I had just completed ACSC and the year-long School of Advanced Airpower Studies. In SAAS we looked in-depth at airpower history, theory, and doctrine. We analyzed where airpower had worked and where it had failed, and we analyzed a number of theories about how warfare may change in the future. Additionally, we studied the evolution of surface warfare and the integration of air and ground forces.

At USCENTCOM, I was present at numerous meetings with [Army] Gen. [J.H. Binford] Peay, his senior staff, and his component commanders. I was also present when he briefed the plan to the Chairman and the Secretary of Defense. Never did I hear Peay suggest airpower would be less effective in a future war than it was in the Persian Gulf War. This Air Staff inference is incorrect, counterproductive to effective joint planning, and highlights the friction caused by service parochialism. It is interesting to note the Air Force component commander never raised serious objections during the coordination process.

As for the plan itself, given the assumptions we made regarding the Iraqi threat and more importantly the desired end state, the air operations portion of the plan was right on target. I do not believe the plan's end state could have been accomplished with airpower alone. Regardless of how well airpower worked, there would be a ground force requirement. Further discussion is impossible based on classification and the Air Staff knew this when they decided to wage their campaign in *Air Force Magazine* after the fact.

The assertion that airpower was tasked to batter the invaders for "a couple of days" and "hold its fire for weeks" is just plain wrong. The [joint force air component commander] was tasked to slow and halt the Iraqi advance, conduct strikes against a variety of strategic and operational centers of gravity, and to prepare the battlefield for follow-on operations. For planning purposes, the time period for these air operations matched the time line required to move ground forces into place. As the CINC acknowledged on several occasions, if airpower could achieve favorable force ratios sooner, he would conduct the ground operation earlier with fewer forces. Planning

for a ground attack is only prudent from a planning standpoint because as [the author] states "airpower could ... perhaps even defeat an enemy." "Perhaps" being the key word.

The primary sticking point with the plan was a disagreement between the USCENTCOM J-2 and the national intelligence community on the threat. The "excursion" we produced to achieve final approval addressed a reduced threat. There was no excursion written that added a so-called "air campaign." Air operations that supported the joint campaign were already described in sufficient detail.

There are two somewhat independent processes going on in our national defense community. The war-fighting CINCs are trying to develop joint campaign plans that make best use of the forces available to achieve the desired objectives. The service staffs are working as hard as they can to hold on to as much of the defense budget as possible. These are not mutually supporting objectives. I still cannot figure out what the Air Staff wanted written in the plan. Perhaps we should have written a plan that purported to achieve the desired end state with 20 B-2s and a troop of Boy Scouts.

I am not naive. There are certainly senior officers working in joint commands who are trying to appropriate portions of the Air Force budget and who do not believe in airpower's unique capability to have a decisive impact at the tactical, operational, and strategic levels of war. I do not think deception, "spin doctoring," and outright falsehoods are the best way to fight them.

Lt. Col. Brett Williams,  
Langley AFB, Va.

### The Aerospace Medium

Lt. Col. Timothy K. Roberts' characterization [*Letters: Thinking Aerospace Part 2*, December 1998, p. 9] of my comments on aerospace terminology [*Letters: Thinking Aerospace*, September 1998, p. 6] as being "antiquated" should have been applied instead to the new Air Force Doctrine Document 2-2, titled "Space Operations." Dated Aug. 23, 1998, it carried in its foreword the clearly stated endorsement of Air Force Chief of Staff Gen. Michael E. Ryan.

There, Roberts could learn the Air Force's position on the meaning of "aerospace." In Chap. 1, the new doctrine document states: "The aerospace medium can be most fully exploited when considered as a whole. Although there are physical differences between the atmosphere and space, there is no absolute boundary between them. The same basic military activities can

# AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION  
MAGAZINE

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be performed in each, albeit with different platforms and methods. Therefore, space operations are an integral part of aerospace power. ... Space affords a commanding view of operations and provides an important military advantage. At the level of basic aerospace doctrine, the principles that govern aerospace operations are the same for air and space."

Roberts' implication that the commonly used definition of aerospace "has no basis in reality" is thoroughly contradicted in the December "Letters" column by TSgt. Rollan B. Yocum's excellent review of the term's effective use by the Aerospace Defense Command and other Air Force organizations since 1968. Not only the Air Force, but the Air Force Association and commerce and industry in general have found the term to be the most operationally realistic description of our planet's environment.

Frank W. Jennings  
San Antonio

**Degraded Benefit**

Col. [Peter E.] Boyes' letter ["*Degraded Benefit*," *December 1998*, p. 4] was well-taken and the lack of spirit leaves a void for younger airmen, and they don't feel [a sense of] "belonging." In World War II the English said we were overpaid, oversexed, and over here. [Now] the military is under paid, still oversexed but back here and confused about the future. Since the programs are run by those [who] never experienced the life, the military is a pawn in politics, and that is a shame.

Col. William M. Fagan,  
USAF (Ret.)  
Fort Walton Beach, Fla.

**It's No Wonder**

The letter ["*Retention Woes—You Bet*," *December 1998*, p. 7] from retired MSgt. [David] Palmer, who claims to have "tripled" his income since retiring from the Air Force, made me mad enough to take pen in hand.

During my 20 years of active duty, I came across several NCOs who, like him, damaged enlisted retention by constantly complaining about the negative aspects of an Air Force career. These same people could never be heard to say anything positive about it, yet never failed to re-enlist themselves when their [date of separation] rolled around (someone held a gun to their heads). This type of person, both officer and enlisted, whose sole purpose in life seems to be to bite the very hand that feeds him, is neither a follower or a leader;

he simply gets in the way. He gets out of the Air Force exactly what he gives—nothing.

Is the Air Force perfect? Certainly not. Is any civilian company on this planet perfect? Same answer. The important thing is not to be a hypocrite. Don't accept six promotions, a COLA raise every single year, 11 fogey raises, shop at the commissary and [base exchange], etc., while on active duty. Then, after spending two years' worth of retirement checks (another two COLA raises), bad mouth the very organization which made, and will continue until your death to make, all those positive things possible.

One final note. I am extremely proud of the fact that one of my sons is a captain in the Air Force and has completed seven years of active duty. I hope that he stays in for many more.

MSgt. Stephen P. Gremillion,  
USAF (Ret.)  
Alexandria, La.

DoD flails away with bonuses and pay as the only solution. If we truly want retention it's simple: Restore the old military retirement system. Restore full health care to active duty, retired [military], and families. Active duty folks know ice flows and an Eskimo solution when they see one. Restore faith in the system: 20 years for those who serve well. Eliminate up or out. Allow a career in the cockpit or the helm. Don't move commanders around every two years just to fill promotion squares.

Curtail use of temporary duty as a way to solve force structure problems. If we don't have the troops to do it on a continuous basis, own up to it. Man for it or don't do it. Surge for war not for whims. Don't establish 10 super bases to create a target rich environment as a solution for inadequate force structure, planning, and funding.

Col. James McMillen Owen,  
USAF (Ret.)  
Indialantic, Fla.

My squadron commander said, "Accept this Regular commission, serve 20, retire, and have no medical expenses for the remainder of your life for you or your wife." Forty years later I have had my 65th birthday, and if I stay well my medical expenses will be \$329 per month. This will nearly double the next year when my wife becomes 65. This is the bottom line, and it stinks for retirees and for young active duty personnel.

Lt. Col. J. Brock Sanders Jr.,  
USAF (Ret.)  
Niceville, Fla.



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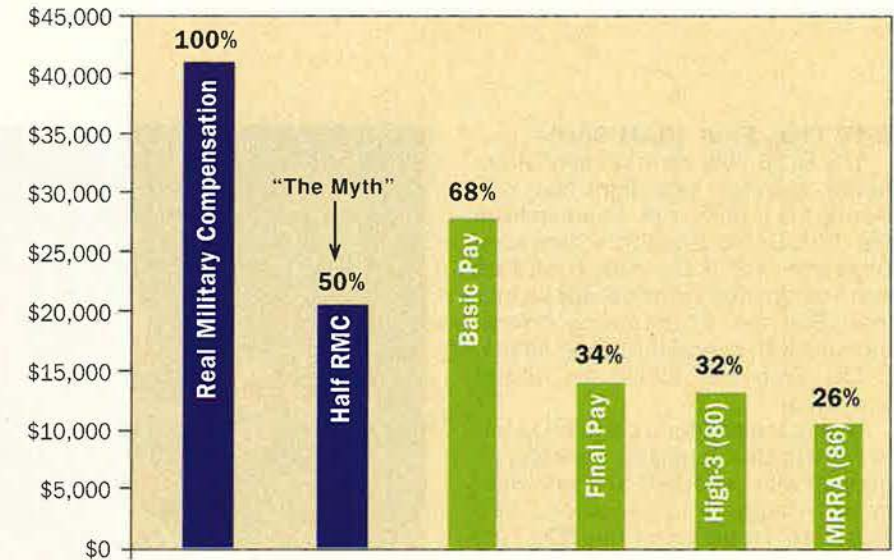


# The Chart Page

By Tamar A. Mehuron, Associate Editor

## Three Plans, Three Benefits

"Serve 20 years, retire with 50 percent of pay." That has long been an article of faith with the troops. The real story is different, however. Just how different depends on which of three current military retirement plans is being discussed. Fig. 1 portrays an Air Force E-7 with 20 years of service who makes \$42,000 a year in total compensation—base pay plus special pay and bonuses. The myth is he would receive half the total, or \$21,000, at retirement. But retired pay is a function of *base pay*, which is only 68 percent of total compensation. If the master sergeant enlisted before 1980, he falls under the "Final Pay" plan; in reality, he receives 34 percent of final total compensation (\$14,280). If he enlisted after Sept. 8, 1980, but before 1986, he falls in the "High-3" category, based on an average of the three highest years of base pay, and receives 32 percent of final compensation (\$13,440). Those hurt most are troops who enlisted on or after Aug. 1, 1986. They fall



**Fig. 1 Myth vs. Reality: Gaps in Military Retired Pay Plans**

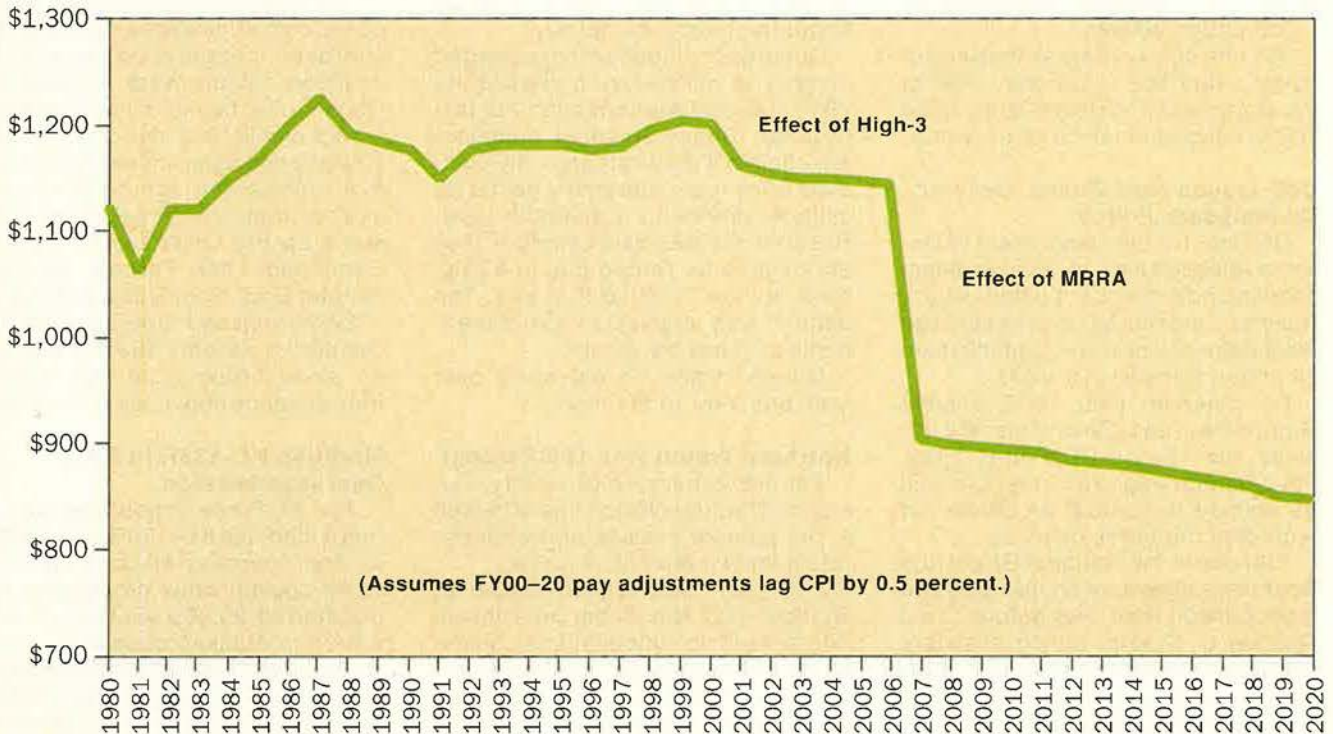
(Based on 1998 retirement and 3.5 percent inflation.)

under the Military Retirement Reform Act, also known as Redux. MRRA provides 40 percent of the average of the high three years. The benefit shrinks to just 26 percent of final total compensation (\$10,920). Fig. 2

shows the dramatic drop in monthly retired pay for an E-7 with 20 years under the 1986 MRRA plan. Last month, the Clinton Administration proposed returning to the pre-1986 High-3 plan.

**Fig. 2 Off a Cliff: Retirees Under 1986 Retirement Act**

Source: USAF





# Aerospace World

By Peter Grier

## B-1B Flies First JDAM Sortie

The B-1B flew its first Joint Direct Attack Munition test flight Nov. 24. During the training run, a Lancer from the 77th Bomb Squadron flew from Ellsworth AFB, S.D., to the Utah Test and Training Range and dropped four inert BDU-56 2,000-pound bombs outfitted with operating JDAM tail kits.

The drop was filmed for further evaluation.

"We're looking for a correlation between what the engineers think should happen with the JDAM and with what actually happens in a mission," said Maj. Dan Troutman of the 53d Test and Evaluation Group, Det. 2, part of the 53d Wing at Eglin AFB, Fla.

The addition of JDAM will give the B-1 near-precision strike capability for the first time in its history. Guided by signals from the Global Positioning System, JDAM can hit with great accuracy. It is less expensive than many other precision systems, however, because it is a kit of steerable fins that is added on to a "dumb" munition.

A standard two-airplane formation of B-1s is capable of deploying 48 2,000-pound JDAMs.

"No one else can wreak that kind of havoc," said Maj. Jim Fryer, chief of the Aeronautical Systems Center's B-1 JDAM integration office at Ellsworth.

## DoD Issues New Guard, Reserve Commissary Policy

On Dec. 16, the Department of Defense released a policy memorandum detailing how members of the Guard, Reserve, and retired reserve can take advantage of a new law granting them 24 annual commissary visits.

For calendar year 1999, eligible Guardsmen and Reservists will receive two 12-visit DD Forms 2529. For calendar year 2000 the form will be revised to contain 24 blocks for recording the dates of visits.

"Service in the National Guard and Reserve is now more challenging and more difficult than ever before," said Charles L. Cragin, acting assistant secretary of defense for reserve affairs. "Doubling the commissary access for reservists and their families



USAF photo by SSgt. Angela Stafford

**USAF Chief of Staff Gen. Michael Ryan testifies before the Senate Armed Services Committee Jan. 5 with Army Gen. Hugh Shelton, Chairman of the Joint Chiefs of Staff, and the other service chiefs. Ryan called the President's proposed defense increase in Fiscal 2000 "a good start" but termed USAF readiness "very fragile."**

helps to level the playing field and improve their quality of life. For that reason, it was very important for us to get the policy out quickly."

Congress authorized the expanded number of visits when it passed the 1999 Defense Authorization Act last October. Ready Reserve members are eligible if they satisfactorily complete 50 or more retirement points for military service in a calendar year. Reserve retirees can benefit if they are eligible for retired pay at 60 but have not yet reached that age. The benefit also applies to the dependents of these personnel.

Unused visits do not carry over from one year to the next.

## Northern Watch Hits 100 Percent

For the first time in its history, Operation Northern Watch has achieved a 100 percent mission effectiveness rating for two months in a row.

Every scheduled ONW mission for October and November was flown. There were no cancellations caused by maintenance or political constraints. Two days were scrubbed because of weather, which does not

count when judging the mission effectiveness rate.

Improved airspace control procedures, communications upgrades, and improved cooperation among the coalition nations were all factors in ONW's effectiveness improvement.

"Accomplishing this feat demonstrates once again the dedication and motivation of the high-caliber professionals from the three nations that make up the ONW team," said the Combined Task Force's US commander Brig. Gen. David A. Deptula.

ONW replaced Operation Provide Comfort in January 1997. It enforces an air-exclusion zone that controls Iraqi airspace above the 36th parallel.

## Modified KC-135R in First Overseas Mission

The Air Force announced Dec. 21 that a modified KC-135R refueler flew its first overseas mission under revised cockpit crew procedures and transferred 95,000 pounds of fuel to a B-52 in Alaskan airspace.

The Dec. 12 air refueling sortie was the first operational Pacer CRAG overseas mission flown under three-





**Desert Fox** marked the combat debut of B-1s from Dyess AFB, Texas, and Ellsworth AFB, S.D.

## Desert Fox—and Beyond

### WASHINGTON, Jan. 14

In a limited, four-day operation, American and British aircraft and US air- and sea-launched cruise missiles struck some 100 Iraqi targets with no losses. However, the effect of the raids was in doubt as confrontation with Iraq continued.

US officials said Washington and London mounted the 70-hour campaign, dubbed Desert Fox, to punish Iraq for blocking United Nations arms inspectors, "degrade" its ability to acquire weapons of mass destruction, and to curb Baghdad's ability to threaten neighboring countries.

The attacks commenced Dec. 16 and targeted Iraq's integrated air defenses, command and control facilities, weapons development facilities, Republican Guard barracks, airfields, and an oil refinery. Iraqi put up virtually no resistance.

Navy F-14s and Navy/Marine F/A-18s aboard USS *Enterprise* struck with precision weapons, and surface ships and submarines launched 325 Tomahawk Land Attack Missiles. USAF A-10s, F-16s, and F-117s participated, using precision munitions. In action were B-52Hs, launching Conventional Air Launched Cruise Missiles, and B-1B Lancers, in their first combat, employing 500-pound bombs. UK Tornado attack aircraft flew numerous sorties. In all, allied air services flew some 650 combat sorties.

The Joint Chiefs of Staff Chairman, Army Gen. Hugh Shelton, said Iraq's missile effort was set back "at least a year." Defense Secretary William S. Cohen claimed "substantial" degradation of Iraq's command and control setup. Cohen and Shelton acknowledged many targets were not destroyed but insisted the attacks had the desired effect.

Skeptics—and they were many—saw Desert Fox not as a 1998 replay of 1991's 43-day-long Desert Storm campaign but as a rerun on a bit larger scale of earlier, ineffectual "pinprick" attacks on Saddam Hussein. "The Administration clearly rejected ... a policy of coercion, a policy of bombing until Saddam complied," former Bush advisor Richard Haass told the *Washington Post*. "It looks to me like 'pinprick-plus.'"

Baghdad within days was again defying allied demands. On Dec. 28, US warplanes exchanged fire with Iraqi air defenses, which had launched Surface-to-Air Missiles at them. The US aircraft were not hit. On Dec. 30, Iraqi defense forces fired six to eight SAMs at a British aircraft enforcing a no-fly zone over southern Iraq. USAF F-16s responded by firing two HARM missiles and several precision guided munitions at the site.

Then, on Jan. 5, two USAF F-15s and two Navy F-14s tussled with several Iraqi fighters violating a no-fly zone over southern Iraq. The US fighters fired several air-to-air missiles, which apparently failed to hit the Iraqi airplanes. One Iraqi fighter ran out of fuel and crashed. Five more incidents (Jan. 7, 11, 12, 13, and 14) took place in the northern no-fly zone.

person cockpit crew procedures, according to Maj. Hal Rice, 905th Air Refueling Squadron (Grand Forks AFB, N.D.) deputy commander for operations.

Pacer CRAG upgrades allow the aircraft to be flown by a pilot, copilot, and boom operator. Unmodified KC-135s are flown by a four-member aircrew, which includes a navigator.

Besides improving the KC-135's operational capability, the Pacer CRAG upgrade also reduces maintenance-related costs. During a 1994 study that compared existing KC-135 maintenance costs to the Pacer CRAG-equipped aircraft maintenance costs, the Air Force found the Pacer CRAG is cheaper and easier to maintain.

### Global Hawk Still Soars

Global Hawk continues to fly successfully, with two aircraft now in operation and eight sorties completed as of early December.

The second flight of the long-range Unmanned Aerial Vehicle's airframe No. 2 took place Dec. 4, 1998. The UAV soared to 50,000 feet after its takeoff from Edwards AFB, Calif., and checked wideband communications links during its three hours and 18 minutes aloft.

"We confirmed the system's ability to send imagery data to the warfighter on the ground," said Col. Pat Bolibrzuch, program manager. "This is another first step and will help pave the way as we enter sensor flight testing in a couple of weeks."

The operation of Global Hawk's Integrated Sensor Suite is the next major item on the test agenda. Both air vehicles will be used to characterize ISS Electro-Optical and Synthetic Aperture Radar functions.

Manufactured by Teledyne Ryan, Global Hawk is intended to provide commanders with near-real-time intelligence imagery from high altitudes for long periods of time, using SAR, Moving Target Indicator, EO, and infrared sensor systems.

### C-17 Quality Honored

The C-17 program, once near death due to design and production problems, won a major quality honor Nov. 17. Consistent improvements led Boeing's Globemaster III production team to a prestigious Malcolm Baldrige National Quality Award.

The Commerce Department's National Institute of Standards and Technology, which bestows the Baldrige awards, cited a 54 percent reduction in C-17 rework and repair since 1992 and 100 percent on-time delivery of new aircraft since 1995, among other things.





An F-16CJ returns from an Operation Northern Watch mission minus a high-speed anti-radiation missile fired against an Iraqi surface-to-air missile site. SSgt. Rodney Johns, with the 22d Expeditionary Fighter Squadron deployed from Spangdahlem AB, Germany, marshals the fighter aircraft.

"Exceptional" ratings in C-17 contractor performance assessment reports have also increased significantly since 1995, noted the Commerce Department.

"The process improvements made by Boeing continue to give us great confidence in the C-17 program. ... Better reliability and reduced ground time help keep us light, lean, lethal, and ready to move quickly to the fight," said Brig. Gen. George N. "Nick" Williams, director of plans for Air Mobility Command.

The Baldrige awards were established by Congress in 1987 to enhance US competitiveness by recognizing significant quality improvements by US companies.

### US Rebuffs German Nuke Proposal

The US has rebuffed an effort by new German Foreign Minister Joschka Fischer to get NATO to change its policies on the use of nuclear weapons. Fischer, a leader of the anti-nuclear Greens Party and a key member of Germany's new coalition government, urged the Alliance to renounce first use of nuclear arms at a press conference on the eve of his debut at a NATO foreign ministers' meeting in December.

He was given a polite hearing. But the organization's nuclear powers, the United States, France, and Britain, rejected any attempt to lessen their flexibility in a crisis.

"We do not believe that a review is necessary. We have the right nuclear

strategy," said US Secretary of State Madeleine K. Albright.

### AMRAAMs Find Y2K Is No Problem

On Dec. 9, an Advanced Medium-Range Air-to-Air Missile passed a Year 2000 test with no problems when it destroyed a target drone over the Eglin AFB test range off the coast of Florida.

The test was accomplished by entering data into both the AMRAAM and the F-15C fighter which carried it that indicated the year 1999 had already passed into history.

Extensive ground testing by the makers of both the missile and the aircraft had indicated neither had a Y2K problem. But the Air Force directed a flight test to make sure.

"This test indicates the seriousness with which the Air Force takes the Y2K problem," said Brig. Gen. William A. Peck Jr., director of requirements for Air Combat Command. "With this test, we were able to demonstrate that the two centerpieces of our current air superiority fighter force, the F-15 fighter and the AMRAAM missile, will work together beyond the year 2000."

### Board Thinks Space Based Laser Unready

The Air Force Scientific Advisory Board believes it is too early for the service to forge ahead with its Space Based Laser Readiness Demonstrator. There are still too many unanswered questions about the technol-

ogy involved, the board said in a report on space issues.

As an alternative the Air Force should aim to make a decision in 2003 about whether to conduct an SBL on-orbit demonstration. Leading up to this decision point, risk reduction activity should focus on high-performance optical systems and ground demonstrations, said the SAB.

The Air Force should also consider alternatives to the current planned use of a hydrogen fluoride laser in the SBL system, said the study. It would be too expensive, at some \$2.5 billion, to conduct the system engineering, beam and fire control, and integration fixes needed to make the hydrogen fluoride system work.

An alternative would be a number of satellites equipped with electric solid-state lasers. These weapons could be recharged when not in use, unlike the hydrogen fluoride system, which carries a limited amount of fuel.

Meanwhile, the board report was effusive in its praise for another effort, the Space Based Radar program. SBR is "the one major new system to which we believe the Air Force should commit," said the SAB.

### JASSM Program Slows, a Bit

The Joint Air to Surface Standoff Missile program is entering the Engineering and Manufacturing Development phase—but that phase will take a little longer than planned.

Pentagon officials have approved a change in JASSM's EMD schedule from 34 to 40 months amid concerns that the program's fast pace was a tad too aggressive.

Terry Little, JASSM program director at the USAF Air Armament Center, Eglin AFB, Fla., pointed out that the entire development of the long-range cruise missile is expected to take five years, as compared to 10 years for other such weapon programs.

"Folks were skeptical about that and our ability to achieve that," he said.

JASSM is a joint Air Force-Navy effort intended to provide US aircraft with a weapon capable of destroying high-value targets without putting aircrews at risk. The program entered EMD in November 1998. Plans call for JASSM to enter the Air Force inventory in 2002. The F-16 and the B-52 will be its first two delivery platforms.

"One of this program's initiatives is an early focus on manufacturing," said Little. "It's an integral part of our design phase. That's the way you have to do it if you want to be able to have a low-cost solution."



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Retired Gen. Benjamin Davis Jr. received his fourth star from President Clinton at a White House ceremony in December. At right is Elnora Davis McLendon, Davis' sister.

### Benjamin O. Davis Jr. Gets Fourth Star

Gen. Benjamin O. Davis Jr. was "the first black everything" in the United States Air Force, says one historian. He was the service's first African-American lieutenant, captain, major, lieutenant colonel, and so forth.

Now, the retired World War II hero and race relations pioneer has won another laurel: his fourth star. At a White House ceremony Dec. 9, President Clinton made Davis a four-star general in honorarium. He is only the third Air Force commander to be presented with this honor, the others being Lt. Gen. Ira C. Eaker and Lt. Gen. Jimmy Doolittle, who received their promotions in 1985.

Despite his distinguished Air Force career, Davis is best known for his role as a commander of the all-black Tuskegee Airmen during World War II. The son of an Army general, he had graduated near the top of his West Point class, despite the fact that none of the cadets in four years ever spoke to him except on official business.

When President Franklin D. Roosevelt ordered the creation of a black military flying group in 1940, Davis won his chance to train as a pilot. In 1942, he was named commander of the 99th Pursuit Squadron in Tuskegee, Ala. He led the 99th, and later the 332d Fighter Group, into battle as bomber escorts in Europe. His forces never lost a bomber to enemy fire.

"He was a straight arrow and really made a lot of guys toe the line, and they appreciate it today, even though they didn't appreciate it then," said Woodrow Crockett, who served with Davis on 149 World War II combat missions.

After the war, Davis served as commander of Lockbourne AAB, Ohio; helped form the Thunderbirds aerial demonstration team; and commanded 13th Air Force at Clark AB, Philippines, among other posts. He retired from active duty in 1970.

Tuskegee Airmen veterans, in conjunction with the Air Force Association and such Congressional allies as Sen. John McCain (R) of Arizona, lobbied successfully for Davis to receive this rare post-career promotion.

"General Davis richly deserves this honor," said Thomas J. McKee, AFA national president.

### US Sues Contractor Over USAF Housing Faults

The US Department of Justice has filed a \$45 million suit against the nation's largest builder of military family housing, alleging that more than half of the housing units it built at Ellsworth AFB, S.D., are so shoddy they are uninhabitable.

The suit charges that Hunt Building Corp. of El Paso, Texas, and its South Dakota subsidiary failed to design and construct the base's Centennial Estates 828-unit housing subdivision in compliance with applicable codes and did not have a comprehensive program to control unit construction quality. Among the houses' flaws, according to the government, are heating systems that leave lower-level bedrooms unheated, flimsy design that allows the units to twist and break apart in South Dakota's high, sustained winds, and pipes simply inserted into the ground to imitate mandatory sewer cleanouts.

Hasty construction may have been the basic cause of the problem, says DoJ. Hunt built Centennial Estates in less than 500 days, although its contract allowed up to 1,440 days before completion.

"No contractor should be able to get away with such shabby construction at taxpayer expense," said Karen Schreier, US attorney for South Dakota.

Under terms of the original contract, Hunt owns the housing and leases it back to the Air Force for around \$8 million per year. Since the Air Force occupied the first completed units in December 1990, it has paid Hunt some \$60 million in rent. Relocation costs for moving families out of the shoddy units already totals some \$7 million.

### Freedom One Retires

*Freedom One*, the Air Force C-137B that flew home from Rhein-Main AB, Germany, the 52 remaining American hostages released by Iran in January 1981, has quietly retired.

When it left to retrieve the captives at Rhein-Main, the airplane was named simply Aircraft #971. But upon its re-entry into American airspace a Boston air traffic controller radioed, "Welcome home, *Freedom One*." Crew members liked the name and painted it on the nose of the aircraft.

*Freedom One* played the same role again 10 years later, when it flew home 20 prisoners of war released by Iraq at the end of the



Persian Gulf conflict. A crowd of 8,000 greeted the aircraft and its passengers at Andrews AFB, Md., on March 19, 1991.

Ironically, Boeing originally was building Aircraft #971 for Cubana Airlines in 1958. But when Fidel Castro seized control of the country in February 1959, the US blocked delivery of the airplane and USAF took possession of it.

Unlike another recent service retiree, the famous Air Force One which carried President John F. Kennedy's body home from Dallas, *Freedom One* is not destined for a life as a tourist attraction at the US Air Force Museum, Wright-Patterson AFB, Ohio.

Instead, it was flown this fall to the Aerospace Maintenance and Regeneration Center at Davis-Monthan AFB, Ariz.—the Air Force boneyard.

### AFSPC Supports Space Station Construction

NASA's space shuttle may be doing the heavy lifting into orbit, but the Air Force space team is part of the US contribution to the construction of the multibillion dollar International Space Station, 240 miles above Earth.

The 5th Space Operations Squadron at Onizuka AS, Calif., provides data communications support for shuttle missions at some of their most critical moments. The recent mission of the shuttle *Endeavour*, in which it carried a Unity connecting node to attach to the orbiting Zarya control module launched by Russia, required 200 such SOPS supports, for instance.

"We're proud to be contributing to this international endeavor," said Capt. Chuck Spillar, 5th SOPS flight director for the *Endeavour* mission.

The squadron, in conjunction with the Air Force Satellite Control Network, is the primary source of data communications during a shuttle's launch and landing and during space walks.

During the *Endeavour* mission, the crew completed three space walks during which they connected power and data lines. The 5th SOPS provided links during all those walks.

The Air Force involvement in shuttle communications stems from the fact that the space vehicle cannot communicate entirely via NASA infrastructure when its Ku-band antenna is turned off or stowed away. It is stowed during takeoff and landing. It is turned off during space walks, since it emits radiation that could be harmful to astronauts.

Since space is a vacuum, the ra-



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USAF photo by SrA Johnny Saldívar



**Maj. Alan Zwick from the 9th Reconnaissance Wing, Beale AFB, Calif., broke a 19-year-old record Dec. 12 when he flew his U-2 and payload more than 12.5 miles above Earth. Zwick surpassed the previous record of 28,513 feet—set by a Czech pilot in a Yak-40—12 minutes into his one hour, 55 minute flight.**

diation is not diffused by air, and any area outside the shuttle is dangerous when the Ku band is turned on.

"We also provide support during docking to and undocking from the station," said Spillar.

**Line Officer Promotion Rate Moves Up**

The Air Force says it will increase its lieutenant colonel promotion rate—another sign that the age of the personnel drawdown is facing into history.

For the 1999 Line Lieutenant Colonels Board, set to meet April 19, the Air Force plans to promote at a 75 percent rate, up from the 70 percent rate that has been in effect since 1991.

The increase is part of a trend that has been building since 1996, when the promotion opportunity for line officers competing for major returned to the pre-drawdown rate of 90 percent.

Personnel officials also expect pin-on times to improve for all grades. The schedule of promotion boards will be pushed forward as a result.

The promotion board schedule for the second half of 1999 includes a colonels board in August instead of December, for instance, and a second lieutenant colonels board in December.

"These changes are a welcome reversal from rising pin-on times and lower promotion opportunities prevalent during recent drawdown years," said Lt. Gen. Donald L. Peterson, USAF's deputy chief of staff for personnel.

**Space Research Funds to Increase**

The Air Force plans to double its space research budget by the end of the current future years defense plan, says acting Air Force Secretary F. Whitten Peters.

The money will come out of the funds formerly devoted to research on air-breathing vehicles. The consolidation of research facilities under the Air Force Research Laboratory has made the shift possible, according to Peters.

The increase in research funds is just one part of a trend toward more national spending on the space industry, the acting Air Force chief said at a commercial space industry leaders conference Dec. 10. Another example of this is the Evolved Expendable Launch Vehicle, which has

received a billion dollars apiece from the Air Force, Lockheed Martin, and Boeing.

"The better Lockheed Martin and Boeing do commercially, the better off we are because it will reduce our cost of getting to space," he said.

Beginning in 1999, two Air Force space ranges—the Eastern Range at Patrick AFB, Fla., and the Western Range at Vandenberg AFB, Calif.—will have more commercial launches than military ones.

"Realistically they are both national ranges now," said Peters. "We are in an era where the ranges serve a very large commercial base."

As the center of gravity in space activities switches to the commercial side, the Air Force must make sure it retains the right space force and the right people.

"Whatever we do, first we need to make an assessment of what the space career field is ... and make sure we retain the assets we need to have a national defense space team," said Peters.

**News Notes**

■ An Air Force staff sergeant and two noncommissioned officers from the Japan Air Self Defense Force recently received the Air Force's highest peacetime medal for their efforts to save a downed F-16 pilot from a fiery July 1998 crash. SSgt. Miguel Perez of the 3d Space Surveillance Squadron, SMSgt. Hiroshi Nishihama of the JASDF's 3d Air Wing, and SSgt. Kenzo Koyama of the Airborne Early Warning Group received their Airman's Medals before a packed house at the Tohoku Enlisted Club, Misawa AB, Japan, Nov. 11.

■ Two air mobility leaders were inducted into the Airlift/Tanker Association Hall of Fame Dec. 3 at a Scott AFB, Ill., ceremony. Retired Gen.

**Index to Advertisers**

Boeing .....	Cover IV
Fairchild Defense .....	33
FMC .....	15
GEICO .....	19
Litton Data Systems .....	3
Northrop Grumman .....	11
Pratt & Whitney .....	Cover III
Rockwell Collins .....	Cover II
Textron .....	13
Tracker .....	17
AFA Long Term Care .....	61
AFA Watches .....	79



## Pay Raises in Offing

With Clinton Administration backing, the Pentagon is proposing the most sweeping military pay increases and retirement system changes since the Reagan buildup of the early 1980s.

The total pay package would cost \$30 billion over six years.

Under the plan, which must win Congressional approval, everyone in uniform would get at least a 4.4 percent raise on Jan. 1, 2000, plus 3.9 percent annual raises in fiscal years 2001 through 2005. In addition, targeted additional raises of up to 5.5 percent would go to those in positions where the Pentagon most wants to increase retention, particularly mid-career officers and noncommissioned officers.

Experience would count, as well as rank. A major with two years' experience would receive the base 4.4 percent increase, for instance, while a major with six years would get a total of 9.9 percent—5.5 percent more as part of the targeted pay reform.

"We want the best that we can attract," said Secretary of Defense William S. Cohen when announcing the proposal on Dec. 21. "We are working in an environment in which it's very hard to compete against a robust economy such as we have."

On the whole, however, the changes would reform the pay tables to make raises for promotion bigger than those for longevity.

Today, for instance, an individual in the E-6 pay grade with eight years of service may make the same or less than one of his subordinates, an E-5 with 14 years of service. The proposed pay change would alter this situation, without cutting anyone's salary.

"We're targeting that, and that's part of the retention concerns we have," said Army Gen. Hugh Shelton, Chairman of the Joint Chiefs of Staff.

The retirement pay changes would take the military back to the future. Personnel with 20 years' experience would be able to retire with retirement pay pegged at 50 percent of base pay. That is the basic formula that was in effect before 1986, when budget-cutters in Congress slashed prospective pensions for 20 years of service to only 40 percent of base salary.

"Today, in this uncertain time of high demand and smaller forces, the retirement change—popularly known as Redux—is undermining morale and it's hurting retention," said Cohen. "Therefore, we are committed to returning 20-year retirement to 50 percent of base pay."

Potential retirement pay is a large factor in many mid-career military career decisions. DoD's top leadership hopes the new package will help tip in their favor many stay-or-go questions for F-16 crew chiefs, radio technicians, and other key personnel.

William G. Moore Jr., a former commander of Military Airlift Command and a veteran of three wars, and retired Col. Joe M. Jackson, the only airlift pilot to receive the Medal of Honor, were the ATA honorees.

■ Amn. Reggie Jones, a fuels technician for the 97th Supply Squadron at Altus AFB, Okla., single-handedly put out a fire on a fuel truck Nov. 17. His quick use of a handy extinguisher prevented a possible explosion near the KC-135 he was refueling. A worn wire and safety circuit breaker switch were determined to be the fire's cause.

■ An F-16 from Luke AFB, Utah, crashed about 3:30 p.m. Dec. 15 about 40 miles west of Gila Bend, Ariz. The airplane was on a routine training mission. The pilot, Maj. Will Sparrow of the 61st Fighter Squadron, ejected safely.

■ The Department of Defense has published its first comprehensive history of the captivity of Vietnam-era prisoners of war. The book was produced by the Secretary of Defense's Historical Office and is titled *Honor Bound: The History of American Pris-*

*oners of War in Southeast Asia, 1961–1963.*

■ Outgoing House Speaker Rep. Newt Gingrich (R) of Georgia is joining a national security study commission he helped create while on Capitol Hill. He will be a member of the 21st Century National Security Study Group, which is charged with assessing the global security environment for early next century and crafting strategies for US forces to protect the nation's interests.

■ F-15D Eagle tail #80-0058 of the 33d Fighter Wing, Eglin AFB, Fla., reached a historical milestone by becoming the first USAF F-15 to reach 6,000 flying hours. While a notable accomplishment, the mark also highlights the age of the nearly 20-year-old aircraft design, said officials.

■ Sen. John W. Warner (R-Va.) was elected chairman of the Senate Armed Services Committee by his GOP panel colleagues Dec. 2. Warner is a former Navy Secretary. He succeeds Sen. Strom Thurmond of South Carolina.

■ The Airborne Laser program won



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a *Popular Science* magazine annual "Best of What's New" award Nov. 13. The program office accepted the award at ceremonies in New York's Central Park.

■ Rob DeJesus, a crew chief with the 309th Fighter Squadron, Luke AFB Ariz., and his partner, Tom Fuhrmann, an air traffic control officer at Sheppard AFB, Texas, won a National Racquetball Doubles Championship in Baltimore this fall. The pair beat several touring professionals and top-rated amateurs in the 25-and-older division to win the first national amateur raquetball title for the armed forces.

■ A1C Richard Beard, an air traffic controller at Pope AFB, N.C.; Allison Rupert, daughter of a retired Air Force ground safety member from the Pope area; and Charlene Stewart, daughter of Lt. Col. Barbara Stewart of Laughlin AFB, Texas, this fall became the first USAF people to win US Congressional Awards. The awards, for young people age 14 to 23, emphasize community service, physical fitness, and personal development.

■ Air Force Space Command's Space Battlelab recently tested an inexpensive commercial telescope and determined that it could save the Air Force up to \$1 million. The

## Aerospace World

16-inch telescope is smaller and cheaper than the current Space Surveillance Network and is capable of providing accurate deep-space tracking data that could augment the SSN.

■ US and North Korea have reached agreement on remains recovery operations for 1999. Joint teams will take part in an expanded scheduled of six such recovery operations, beginning in Kujang and Unsan, where previous teams have worked. During the past three years, joint teams have recovered the remains of 29 soldiers.

■ TSgt. Randall Stewart, engine quality assurance inspector at Hurlburt Field, Fla., has designed a simple foam and nylon plug that could save the Air Force hundreds of thousands of dollars. The new plug replaces an old metal one used to cover the engine intake of H-53 helicopters while on the flight line. The H-53 was the last air vehicle in the Air Force inventory to have metal plugs, which can

easily shed pieces that damage engines.

■ A civil engineer at Grand Forks AFB, N.D., recently earned a Federal Energy and Water Management award for a water heater replacement program in military family housing. The project, designed by 319th Civil Engineer Squadron electrical engineer Michael J. Anderson, will yield \$630,000 in annual savings.

■ Three US airmen based at RAF Lakenheath, UK, recently received the Airman's Medal. Maj. (Dr.) Michael Mann and Capt. (Dr.) Michael Kadmmas, both from the 48th Medical Operations Squadron, were honored for pulling injured crewmen from a burning Angolan cargo airplane during a deployment to Brazzaville, Congo. SrA. Jason Smith, 493d Fighter Squadron, was honored for helping to pull a drowning child from the Ceyhan River while on deployment in Turkey. ■

## Senior Staff Changes

**NOMINATIONS:** To be **Lieutenant General:** Eugene L. Tattini.

To be **Brigadier General:** James B. Armor Jr., Barbara C. Brannon, David M. Cannan, Richard J. Casey, Kelvin R. Coppock, Kenneth M. Decuir, Arthur F. Diehl III, Lloyd E. Dodd Jr., Bob D. Dulaney, Felix Dupre, Robert J. Elder Jr., Frank R. Faykes, Thomas J. Fiscus, Paul J. Fletcher, John H. Folkerts, William M. Fraser III, Stanley Gorenc, Michael C. Gould, Paul M. Hankins, Elizabeth A. Harrell, Peter J. Hennessey, William W. Hodges, Donald J. Hoffman, William J. Jabour, Thomas P. Kane, Claude R. Kehler, Frank G. Klotz, Robert H. Latiff, Michael G. Lee, Robert E. Mansfield Jr., Henry A. Obering III, Lorraine K. Potter, Neal T. Robinson, Robin E. Scott, Norman R. Seip, Bernard K. Skoch, Robert L. Smolen, Joseph P. Stein, Jerald D. Stubbs, Kevin J. Sullivan, James P. Totsch, Mark A. Volcheff, Mark A. Welsh III, Stephen G. Wood, Donald C. Wurster.

**CHANGES:** Brig. Gen. Michael M. Dunn, from Dir., P&P, PACAF, Hickam AFB, Hawaii, to DCS, UN Command/US Forces Korea, Yongsan, South Korea ... Brig. Gen. (sel.) Thomas J. Fiscus, from Staff Judge Advocate, PACAF, Hickam AFB, Hawaii, to Staff Judge Advocate, ACC, Langley AFB, Va. ... Brig. Gen. (sel.) Donald J. Hoffman, from Spec. Asst., Supreme Allied Cmdr. Europe, SHAPE, Belgium, to ACS, Ops., Allied Air Forces Northwest Europe, RAF High Wycombe, UK ... Brig. Gen. (sel.) Jerald D. Stubbs, from Cmdr., AF Legal Services Agency, Bolling AFB, D.C., to Staff Judge Advocate, AFMC, Wright-Patterson AFB, Ohio.

**SENIOR ENLISTED ADVISOR CHANGES:** CMSgt. Billy Blackburn to AFRC, Robins AFB, Ga. ... CMSgt. Raymond G. Carter to AFOSI, Andrews AFB, Md.

**SENIOR EXECUTIVE SERVICE RETIREMENT:** Robert D. Wolff.

**SES CHANGES:** Michael A. Aimone, to Dep. Civil Engineer, Office of the Civil Engineer, USAF, Pentagon ... Timothy A. Beyland, to Assoc. Dep. Asst. Secy., Contracting, Asst. SECAF, Acq., Pentagon ... Charles E. Browning, to Dir., Materials & Manufacturing Directorate, Air Force Research Lab, Wright-Patterson AFB, Ohio ... Joseph G. Diamond, to AFPEO, Weapons, Pentagon ... Timothy L. Dues, to Assoc. Dir., Manufacturing Tech. & Affordability, Air Force Research Lab, Wright-Patterson AFB, Ohio ... David Hamilton, to Dep. Dir., Test & Eval. Directorate, USAF, Pentagon ... Lawrence B. Henry Jr., to Dep. Admin. Asst., Office of the Administrative Asst., Pentagon ... Terry L. Neighbor, to Dir., P&P, Air Force Research Lab, Wright-Patterson AFB, Ohio ... Milton C. Ross, to Dep. Dir., Contracting, AFMC, Wright-Patterson AFB, Ohio ... John B. Salvatori, to Dir., Intel. Systems Spt. Office, Pentagon ... Judy A. Stokley, to Prgm. Dir., Air-to-Air Joint SPO, Eglin AFB, Fla. ... Marion L. Williams, to Technical Dir., AFOTEC, Kirtland AFB, N.M.



## Not All There

"I have great admiration for US Air Force friends whose P-47s, P-51s, F-80s, F-86s, and A-7s furnished much-appreciated close [air] support in three wars. I cheered the B-17s and B-24s that overflew my foxholes in 1944 and 1945. But I learned as a lieutenant that they were part-time soldiers, great when they were available, but not to be relied on routinely. They were never there at night, or in bad weather, or when 'priorities' sent them elsewhere. ... To my knowledge, it has not changed today, despite the additions of night vision, infrared sensors, and 'smart' bombs. The Army has paid a high price for the unfulfilled promises of airpower since World War II—between wars in budget battles and during wars in facing enemy capabilities with which we were unprepared to cope. ... Even with the wondrous capabilities of today's technology, airpower is still a part-time participant."

**Retired US Army Gen. Frederick J. Kroesen, former commander in chief of US Army Europe, writing in the January 1999 issue of Army.**

## Since September

"In September, I reported on the readiness condition of the United States Air Force and said it was very fragile. It is. Mission capability rates of our aircraft have declined over the past nine years by almost 10 percent; 1 percent of that has occurred since September. ...

"The top two readiness categories of the United States Air Force's units [have] declined 15 percent since 1986, and 3 percent of that has occurred since September. And our cannibalization rate has gone exceedingly high—78 percent higher than it was in 1995—and much of that has occurred very recently. ...

"This year will be the toughest year we've ever had in recruitment. It's becoming much, much more difficult. For the first time in the United States Air Force since 1981, we missed our retention goals in all three categories in this year, and we are going to struggle with it next year. ... Our pi-

lot retention continues on a [decline]. We are short 850 pilots today, and we predict that, by the year 2002, we will be 2,000 pilots short."

**Gen. Michael E. Ryan, USAF Chief of Staff, in Jan. 5, 1999, testimony to the Senate Armed Services Committee.**

## Limited Warfare

"Rather than put our pilots into harm's way, do you think it's time we took out the [Iraqi] airfields and the aircraft that are coming out and challenging our air assets, in direct violation of the [1991] cease-fire agreement? ... I don't think the event today was insignificant. I wouldn't think it was insignificant if I [were] in the cockpit of one of those aircraft, General, and I think it's unconscionable if you subject our pilots and crews to this kind of threat without taking it out. We've seen this once before, and I believe that it is mandatory if we are going to send these young people into harm's way we should remove the threat that exists to them as quickly as possible."

**Sen. John McCain (R-Ariz.), a Vietnam War veteran and POW, to Gen. Henry H. Shelton, JCS Chairman, in a Jan. 5, 1999, exchange about DoD's decision to enforce an Iraqi no-fly zone with "minimum force," even after Iraqi fighters tried to target USAF fighters.**

## Fighting Words

"We want to degrade Saddam Hussein's ability to make and to use weapons of mass destruction. We want to diminish his ability to wage war against his neighbors. And we want to demonstrate the consequences of flouting international obligations."

**Secretary of Defense William S. Cohen, in a Dec. 16, 1998, press statement at the outset of Operation Desert Fox.**

## Strategic Sandwich

"Operation Desert Fox repeats on a larger scale recent cruise missile attacks on Afghanistan and Sudan. These attacks can do nothing to impose change on a hostile regime.

Whatever the damage and degradation wreaked upon the Iraqi military capacity, the retribution is limited, the respite temporary. What looks like strength at the outset of the bombing campaigns dwindles at the conclusion to evident weakness. Mr. Clinton's failure either to act against Saddam earlier or to repudiate appeasement unreservedly condemned him to bomb Iraq at a time unpropitious to him, sandwiched grotesquely between his impeachment proceedings in Congress and Ramadan, of all factors to have to consider."

**David Pryce-Jones, author of The Closed Circle: An Interpretation of the Arabs, writing in the Dec. 21, 1998, Wall Street Journal.**

## Case Closed

"Never did I imagine that the Navy's leadership would allow the devastation that has now resulted in a 300-ship Navy. ... [Given current shipbuilding trends and plans] we will be headed for a 200-ship Navy. ... It was allowed to happen by leaders who were unable or unwilling to make the case for a larger Navy. ... They didn't fight at 600 ships. They didn't fight at 500. They didn't fight at 400. They're telling the world that 300 is fine and doable, while they're on the way to 200."

**James H. Webb Jr., Marine Vietnam veteran and former Secretary of the Navy, in a speech at the Naval War College, Newport, R.I., as quoted in the Nov. 25, 1998, Washington Times.**

## Prepare, But Don't Deploy

"What about weapons in space? ... It has always been the space policy of this Administration to prepare for future space threats but not to deploy [space weapons] at this point. So, there is no part of the armed forces [that] is really preparing to actually weaponize space. That is not part of the Administration's plan nor is it indeed part of anybody's budget."

**F. Whitten Peters, acting Secretary of the Air Force, in Dec. 17, 1998, remarks to the Defense Writers Group in Washington, D.C.**



By John L. Frisbee, Contributing Editor

## “That Others May Live”

A1C Bill Pitsenbarger knew the risks involved when he volunteered to drop into the midst of a jungle firefight.

**B**y April 1966, 21-year-old A1C William H. Pitsenbarger, then in the final months of his enlistment, had seen more action than many a 30-year veteran. Young Pitsenbarger had gone through long and arduous training for duty as a pararescue medic with the Aerospace Rescue and Recovery Service and had completed more than 300 rescue missions in Vietnam, many of them under heavy enemy fire. He wore the Air Medal with five oak leaf clusters; recommendations for four more were pending. A few days earlier, he had ridden a chopper winch line into a minefield to save a wounded ARVN soldier.

His service with the ARRS convinced Pitsenbarger that he wanted a career as a medical technician. He had applied to Arizona State University for admission in the fall. But that was months away. He had a job to do in Vietnam, and, as rescue pilot Capt. Dale Potter said, Pitsenbarger “was always willing to get into the thick of the action where he could be the most help.”

On April 11 at 3 p.m., while Pitsenbarger was off duty, a call for help came into his unit, Det. 6, 38th ARR Squadron, at Bien Hoa. Elements of the Army’s 1st Infantry Division were surrounded by enemy forces near Cam My, a few miles east of Saigon, in thick jungle with the tree canopies reaching up to 150 feet. The only way to get the wounded out was with hoist-equipped helicopters. Pitsenbarger asked to go with one of the two HH-43 Huskies scrambled on this hazardous mission.

Half an hour later, both choppers found an area where they could hover and lower a winch line to the surrounded troops. Pitsenbarger volunteered to go down the line, administer emergency treatment to the most seriously wounded, and explain

how to use the Stokes litter that would hoist casualties up to the chopper.

It was standard procedure for a pararescue medic to stay down only long enough to organize the rescue effort. Pitsenbarger decided, on his own, to remain with the wounded. In the next hour and a half, the HH-43s came in five times, evacuating nine wounded soldiers. On the sixth attempt, Pitsenbarger’s Huskie was hit hard. The crew was forced to cut the hoist line and pull out for an emergency landing at the nearest strip, leaving Pitsenbarger behind. Intense enemy fire and friendly artillery called in by the Army made it impossible for the second chopper to return.

Heavy automatic weapons and mortar fire was coming in on the Army defenders from all sides while Pitsenbarger continued to care for the wounded. In case one of the Huskies made it in again, he climbed a tree to recover the Stokes litter that his pilot had jettisoned. When the commander of C Company, the unit Pitsenbarger was with, decided to move to another area, Pitsenbarger cut saplings to make stretchers for the wounded. As they started to move out, the company was attacked and overrun by a large enemy formation.

By this time, the few Army troops able to return fire were running out of ammunition. Pitsenbarger gave his pistol to a soldier who was unable to hold a rifle. With complete disregard for his own safety, Pitsenbarger scrambled around the defended area, collecting rifles and ammunition from the dead and distributing them to the men still able to fight.

It had been about two hours since the HH-43s were driven off. Pitsenbarger had done all he could to treat the wounded, prepare for a retreat to safer ground, and rearm his Army comrades. He then gathered several magazines of ammunition, lay down beside wounded Army Sgt. Fred Navarro, one of the C Company survivors who later described

Pitsenbarger’s heroic actions, and began firing at the enemy. Fifteen minutes later, as an eerie darkness fell beneath the triple-canopy jungle, Pitsenbarger was hit and mortally wounded.

The next morning, when Army reinforcements reached the C Company survivors, a helicopter crew brought Pitsenbarger’s body out of the jungle. Of the 180 men with whom he fought his last battle, only 14 were uninjured.

William H. Pitsenbarger was the first airman to be awarded the Air Force Cross posthumously. The Air Force Sergeants Association presents an annual award for valor in his honor.

The Aerospace Rescue and Recovery Service was legendary for heroism in peace and war. No one better exemplified its motto, “That Others May Live,” than Bill Pitsenbarger. He descended voluntarily into the hell of a jungle firefight with valor as his only shield—and valor was his ep taph. ■

*First appeared in October 1983 issue.*



*Pitsenbarger in a lighter moment during the Vietnam War. He had already gained a reputation as a pararescue jumper always willing to get into the thick of the action.*





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This could turn out to be the successor to the Cold War concept of Containment.

# Strategic Control



**T**HE force structure and strategy that emerged from the 1997 Quadrennial Defense Review are in trouble. The Pentagon's program of readiness, personnel, and modernization will be short many billions of dollars over the next five years. And the prospect for appreciably closing the gap—either through savings or a significant infusion of funding—is highly uncertain.

By John A. Tirpak, Senior Editor









**How America fights will be forever changed by the ability to find, track, target, and destroy anything of significance on the surface of the Earth. Doing much of the mission from home base, like these GPS controllers, reduces US vulnerability.**

To live within its means, the US military probably will have to make painful changes, but so far the services have chosen to become smaller versions of their Cold War selves rather than set off in radically new directions. Various panels of experts have pressured DoD to get a new, coherent vision to rationalize forces and “transform” the military into something entirely new, but none have endorsed a truly original vision.

One is now emerging. Air Staff officials are developing a new concept, called “Strategic Control,” which offers a fresh, alternative framework for discussion of US military strategy and capabilities. It is congruent with real-world situations and with genuine American national interests. It offers a realistic means for weaving together the common threads of the various single-service doctrines.

In November, the Air Force sponsored a symposium on Strategic Control in Cambridge, Mass., working in concert with the Institute for Foreign Policy Analysis, Inc., and the Fletcher School of Law and Diplomacy at Tufts University. Participating were serving and retired military officers as well as national security scholars. The purpose of the conference was to promote awareness of the Strategic Control concept and stimulate debate about its benefits as a new overarching US national strategy.

This new concept—cast as neither

service-specific doctrine nor a budget bargaining chip—offers a guide to configuring the US military in such a way that it is relevant regardless of world conditions. It takes into account both the technological capabilities of US forces as well as the sensibilities and values of the American people. It offers a way to harmonize the various service-spe-

***The US military is not focused on conquest, but on getting aggressors to live peacefully among their neighbors. The ability to rapidly put dominant airpower over an enemy's territory—able to control airspace, conduct precision attacks, and stop whole armies on the march—can be a powerful tool of coercion on an aggressor. Fast-moving “packages” of land-based airpower, like these B-52s and F-15Es, will also play an increasingly important role in preventing crises from getting out of control.***



cific doctrines as well as a logical context in which to set priorities for spending.

### The Lion's Share

While meant to be a broad framework for thinking about proper roles and missions, Strategic Control confers much of the responsibility for future US military operations on aerospace forces—particularly land-based airpower. Since the most advanced systems, doctrine, and heritage associated with aerospace forces are resident in USAF, Strategic Control will likely receive a cool reception from the other services, who are principally occupied with surface conflict, rather than war in three dimensions.

In fact, opposition was evident almost from the time it appeared. Offered to the National Defense Panel by the Air Force, it was quickly—and permanently—tabled, on the basis that, after heated debate, no consensus could be reached to embrace it.

Nevertheless, USAF is devoting a strong effort to the exploration of Strategic Control, as a counterweight to the more narrow “visions” of the other services, which have enjoyed some success in getting their par-



ticular points of view before Congress and the public.

Described by some as more of a “movement” than a static proposal, Strategic Control could turn out to be a successor to Containment, which served the US well during the Cold War. Strategic Control builds on Parallel Warfare and Rapid Halt, two Air Force concepts that have grown in stature since the former succeeded in the Gulf War and the latter was embraced as a key to the QDR’s two-Major Theater War strategy.

Strategic Control can be explained by summing up its key elements: rapidly seizing the initiative in any military action, controlling the adversary’s ability to act, minimizing the use of violence as a political tool, and giving national leaders the greatest number of options for resolving conflict. It takes advantage of the Revolution in Military Affairs—technologies and concepts—to swiftly control an aggressor through precision strike rather than through the firepower and attrition of massed armies. It answers the question: After Rapid Halt, what next?

Rather than always “buying time” for a large land force to arrive in theater and mount a counteroffensive, the United States under Strategic Control would take advantage of the fact that aerospace capabilities alone sometimes can prevent an enemy from reaching his objectives, and with a minimal forward footprint.

### **Mere Survival**

Having the tables turned on him, the enemy must concentrate on defense and staying alive, rather than offense. His goals are lost, and the US has quickly regained the initiative. From that point on, the enemy will have lost the initiative to do anything of military significance. Strategic Control recognizes that the American public has a low tolerance for putting massed American follow-on forces within range of enemy weapons.

What makes Strategic Control possible is the unprecedented ability, at the turn of the century, for US aerospace forces to find, track, target, and engage anything of significance on the surface of the Earth. Combining this capability with bewildering speed and simultaneity of attack, precision munitions, and stealth makes for a situation where



*Strategic Control means the enemy’s options steadily narrow, as his assets are steadily destroyed or immobilized. Once crippled—and having lost his goals—the enemy’s choice will be to endure more punishment or give in.*

the enemy is left with fewer options by the minute, even as those for the US increase steadily.

While there has been much talk in the last few defense reviews about enemies who will seek to use asymmetric means to attack the US, Strategic Control represents America’s asymmetric advantage. No other nation possesses the ability to do it.

This concept doesn’t depend on a particular foe or scenario. It can be applied in peace or war and through all the gray areas in between. It will, however, require the recognition that some concepts of warfare still practiced by the US military may be outmoded and in eclipse and that some military capabilities will be disproportionately more useful than others in years ahead.

As a peacetime concept, Strategic Control offers a conventional deterrent against adventurism, especially if the armed forces become highly practiced at assembling and deploying forces on a moment’s notice. USAF Air Expeditionary Forces, in particular, are honing this concept with a never-ending effort to put hard combat forces forward and ready to fight in less than a day, with the smallest possible take-along support.

### **Salami Is Baloney**

At the Cambridge conference, Gen. Michael J. Dugan, a retired former Air Force Chief of Staff, charged that the various blue-ribbon panels and reviews tasked to overhaul the

military for the post-Cold War world have done little more than ask the services “to continue to do whatever they’ve been doing but with a little bit less.” This “salami-slicing” of the defense budget, he said, “exacerbates the issue of cost vs. value. ... It is much easier to establish the cost of a weapon ... than its value.”

The relative merits of various capabilities have not been fairly assessed, and Dugan reproached the “analyses” performed by these panels, charging that they “have been intentionally distorted to suppress outcomes that reveal that certain investments yield disproportionately greater military effects over a wide range of operational scenarios.”

He also railed against the fact that “attempts to remove Rapid Halt language from joint publications ... continue to occur. ... Joint modeling, analysis, and experimentation on the concept have been designed for failure.”

As a result, Dugan said, “The nation continues to make force structure and modernization trade-offs that discount high-value-added-capability systems.”

Dugan noted that Rapid Halt “is a joint concept.” He said that Army Chief of Staff Gen. Dennis J. Reimer “agrees,” though he uses a different term. “He says ‘Strategic Pre-Emption’ is the ability to halt or prevent a conflict, before it becomes debilitating or protracted, before it spreads out of control,” said Dugan. “He and



I are on the same frequency, but we have a different name for the tool.”

Noting that US aerospace forces have an enviable track record of success from the Gulf War to the present, Dugan chafed at the fact that, even though “aerospace power has forever changed the conduct of modern war, that change is not reflected in our joint doctrine, our acquisition priorities, our basic war plans, or resources that support the forces.” The time has come, he said, to “change our thinking about that.” Strategic Control requires new thinking “about what constitutes military victory.”

That view was seconded by retired Air Force Maj. Gen. Charles D. Link, who led USAF’s preparation for the QDR and the National Defense Panel, which Congress created to scrutinize the QDR’s results. America is “not about conquest,” said Link. The world would scarcely tolerate America as the sole military superpower if there were genuine concern that the US would use its capabilities for conquest, Link argued.

“This construct that we are calling Strategic Control proceeds from the realization that our ... disputes are defensive in nature,” Link said in addressing the symposium.

America’s wars “are not about acquiring our adversary’s territory or resources, not about enslaving or taxing his people,” Link observed. “It assumes that our disputes are about our adversary’s behavior. We

will wish to control his behavior at the strategic level.”

Link added that the term “strategic” must take on a new meaning. In the “inherited construct” of American military thinking, he said, strategic success has typically been gained through “an accumulation of tactical successes.” In Strategic Control, the term applies to settling things at the highest levels. Mindful that some nations might misread American intentions from the term “Strategic Control,” he expressed his hope that a better name for the concept will emerge from debate.

### Ancient Idea

It is time, Link said, in an interview with *Air Force Magazine*, to abandon the “ancient idea of conquest, which assumes that, to win, you must close with and destroy the enemy.” America is “no longer excited about ... getting as many young people as we can within range of the enemy’s guns.” Moreover, “as it turns out, we don’t want to kill hardly anybody,” as the “CNN factor ... has created an unprecedented intimacy” with the grim realities of war. The low tolerance of the American people for casualties means that wars must be fought more quickly and won by decisive, though not necessarily overwhelming, force, Link asserted, especially in the absence of a direct, obvious threat to the homeland.

At the same time, Americans do

not want to retreat into isolationism, he said.

“We as a nation find it hard to sit by and watch other people’s suffering,” he pointed out. The heavy load of interventions in the past seven years may be a taste of things to come, but he was quick to point out that “even though [Smaller-Scale Contingencies] may be more common, that doesn’t make them any more vital to our national security interests.” It is important for the nation to keep its eye on the big picture and in relating the military’s configuration to, directly or indirectly, defending the nation.

Aerospace power permits the US to project its military influence “without projecting vulnerabilities,” according to Link. Precision weapons and strict rules of engagement also serve to sharply curb collateral damage. In this way, Strategic Control harmonizes with American values.

Dugan echoed Link’s remarks, asserting that “the nature of conflict has changed. Napoleonic warfare ... massed armies attriting massed armies in battle, seeking to control territories and populations, is no longer a synonym for war itself.” Rather than “the” paradigm of war, this notion is now “a” paradigm of war [which] will not always apply across the spectrum of 21st century conflicts.”

The pace of conflict, Dugan said, has also sharply accelerated, “partly due to military capabilities, partly due to political reality.” Advances in sensors, information processing and dissemination, stealth, range, and precision weapons “are the backbone of new military capabilities.” The political realities, he said, are “driven by ... 24-hour news channels.”

### Time and Space

At the same time, the “mutually reinforcing notions of awareness, knowledge, and force has changed the relationship between time and space,” Dugan said.

In “the new American way of war, the value of time may be more important than the value of space.” Commanders around the world may soon be on a “universal time” in which all “may experience the same reality at essentially the same time, even if they are hundreds or thousands of miles apart. The potential benefits of this degree of situational awareness should be obvious.”



**Future crises may not offer the luxury of months to move massed troops and vehicles into position for a large ground war. Such strategies also serve the enemy’s purpose by putting American troops at risk.**



If indeed "manipulating time is in principle more important than manipulating space, seizing the initiative from the opponent becomes *the* goal of military operations," Dugan said.

"Rapid, decisive operations conducted by effective but underwhelming forces will be the order of the day. The goal will no longer be to secure key areas by destroying or attriting an adversary through traditional means. Instead, the goal is now to pursue objectives directly and at a level of conflict that can have the most immediate impact. Some call it Dominant Maneuver, some call it Strategic Pre-Emption, some call it Strategic Control."

These ideas, Dugan maintained, are "continuing to coalesce and mature into overall joint concepts. ... They are beginning to make their way into draft service documents." The Army's Strategic Pre-Emption, he noted, makes much of keeping crises from spinning out of control.

"We're on the same wavelength," Dugan asserted, noting that many of the service-specific doctrines that have come out since the early 1990s have jabbed at the same kind of from-a-distance stamping out of problems before they become full-blown crises.

"Each of the services [has] seized on the ... payoffs devolving from the so-called Revolution in Military Affairs," Dugan noted.

In these doctrines, "there's consistency without congruence, there's convergence without cooperation. ... We need to build the basis for some of that."

All the services, Dugan maintained, "seem to agree that the nature of conflict is undergoing a profound change." Now the only issue regarding the Revolution in Military Affairs is "whether to delay its onset, accept it routinely, or to embrace and accelerate its maturation."

If the way is to go forward, he said, it requires more than "doing the traditional military task better, smarter, faster. Change involves reinventing the tasks in light of new capabilities. We are not in the mold of doing more with less. We need to reinvent ourselves. We need to be true to our values but flexible in our methods. Notions of speed, effectiveness, responsiveness, survivability, precision, and the use of violence are becoming



**As this Desert Fox image shows, there's little question that US airpower will hit what it aims at. In Strategic Control, emphasis is added to picking the targets that will most rapidly collapse the enemy's willingness to fight on.**

universal criteria for the new American way of war."

### The New Goals

These criteria, he added, "say little about the tough decisions on how to allocate resources. Yet there is an emerging appreciation for smaller footprints, leaner logistics. More emphasis on effectiveness, less on mass. More consideration for parallel [operations], less for serial operations. More knowledge-based [force], less brute force. More reliance on high standards, less on filling the ranks. More emphasis on skill, less on sheer numbers. More focus on output and less on input." All the services, he asserted, "seem to appreciate ... the quality revolution."

Dugan also argued that the time has come to abandon the "history shows us ..." arguments against what Strategic Control offers.

He dismissed the Army's insistence that wars can't be won without physical occupation of an enemy's territory. "The value of seizing and holding territory has not been historically constant," Dugan said, noting Gen. Douglas A. MacArthur's island-hopping campaign in World War II. MacArthur, he said, "essentially neutralized seven Japanese divisions without having to seize and hold territory."

Dugan also voiced support for a notion of Gen. Charles C. Krulak, the commandant of the Marine Corps, that "jointness as originally con-

ceived by [recent legislation] means using 'the right capabilities, under the right circumstances, at the right time.' It does not mean 'little league' rules where everyone gets to play. It does not mean vanguard forces where units of all four services are inextricably woven together. And it certainly does not mean creating a climate of intolerance where honestly highlighting the relevant strengths of several service options, is, by definition, 'unjoint.'"

He scoffed at critics who contend that airpower "has a history of overpromising what it can do" and who say that since airpower has not lived up to expectations in the past, they "expect that trend to continue forever." There's not much question anymore that, with highly precise navigation, targeting, and precision weapons, that ordnance will hit "the planned target," Dugan said.

"The issue for Strategic Control ... [and] for national security in the future ... [is] the intellectual challenge of identifying the right target." Those choices should be made well before the conflict starts, he asserted.

"The key will be [knowing that the targets] are strategic, knowing that through the eyes of your enemy, this will have a great impact on his strategic ability to continue the combat." There should be "more joint energy" expended on "[picking] out those key nodes that do make a difference."





**Speed is a hallmark of the Revolution in Military Affairs, and fast-moving Air Expeditionary Forces are a linchpin of Strategic Control. AEFs can be deployed, used, and turn for home in a matter of days.**

Strategic Control probably should have appeared prominently in the report of the National Defense Panel, convened in 1997 to review and critique the QDR and tell Congress whether the QDR's findings made sense. Unlike the QDR, which put Rapid Halt as a fundamental enabler of the two-war strategy, the NDP did not even mention Rapid Halt or the Halt Phase, even though the concept was by then maturing with the convergence of Parallel Warfare and the Revolution in Military Affairs.

### Shouted Down

As Dugan noted, Strategic Control was shouted down in the NDP by representatives emeriti of the other services. They saw too much opportunity in the concept for the reduction of the Army in favor of the Air Force. However, the concept of Strategic Control did turn up in NDP statements having to do not with the strategy of US forces but of operations.

"Power projection operations would focus on disabling the enemy's strategic center of gravity (including his warmaking potential and military forces) and occupying key terrain," the NDP found.

"In general, we must be able to rapidly target and access whatever an adversary values most, the loss of which would render him either unable or unwilling to continue his hostilities. ... Toward that end, we should try, as far as possible, to stop aggression through our own strategic initia-

tive and control of the battlespace. Accomplishing this would likely require simultaneous execution of a range of operations, conducting extended-range precision strikes, seizing control of space and information superiority, exercising ground and sea control, and providing missile defense."

Brig. Gen. David A. Deptula, who

played a key role in designing the 1991 Desert Storm air war and originated the concept of Parallel Warfare, was also a key figure in assisting the NDP with Air Force issues. In remarks he prepared for the symposium—delivered on his behalf by Link—Deptula said that the Gulf War signaled a transition point from the construct of conquest to that of achieving strategic ends through other means.

This transition point "calls on our national security institutions to either pursue change to fully develop this new capacity—to transform our legacy construct—or, at the nation's peril, ignore it."

The disappearance of a peer competitor to the US demands "rethinking the cost-benefit ratios" of massed armies sent in harm's way, Deptula said. He paraphrased Sun Tzu's dictum that "those skilled in war subdue the enemy's army without battle."

Strategic Control, he said, offers the most useful codification of that idea in modern military terms—the potential of "resolving conflict before it occurs, or if it does, resolving it quickly."

Anticipating Dugan's question about picking the right targets, Deptula offered a formula. Strategic

***With aerial tanking, range is only limited by the endurance of the crew. Operating outside the range of enemy weapons—especially ballistic missiles and other weapons of mass destruction—will be a vital goal in the future.***





Control seeks simply to “exert influence” on the systems that the enemy relies on to conduct operations, “not necessarily to destroy those systems but to prevent them from use as the enemy wants.”

### Soft Kill

This may sometimes involve what has become known as the “soft kill,” a concept Dugan said he has long favored. In any event, the goal is to render those systems impotent, in such a way that they leave the enemy “only those options of which we approve.” To destroy is “not necessarily a kinetic effect, nor ... always desirable,” Deptula said.

Aerospace power offers exactly the capabilities that are needed for Strategic Control: “speed, range, versatility, precision, and lethality,” Deptula said. Aerospace power will remain “a principal means for conducting Strategic Control during international disputes and conflicts.”

The new tools of aerospace power—stealth and precision weapons—have “redefined the concept of mass” since the Gulf War. A huge force is no longer necessary “to achieve a devastating effect upon a system of forces, infrastructure, government, or industry.”

Deptula hastened to emphasize, though, that surface forces “are an essential part of Strategic Control, particularly our [Special Operations Force] diplomat warriors.” But massed forces are no longer needed to exert strategic influence, as demonstrated in Operation Deliberate Force in Bosnia.

“The application of precision aerospace power,” Deptula said, “led directly to the Dayton peace accords without introduction of large numbers of US ground forces into a hostile environment.”

While not always a perfect solution, aerospace power has demonstrated in this recent, clearly understood way its ability to “control and reduce the level of violence.”

America has not used this tool in such a way very much yet, and “we are still learning how to use it,” Deptula said, but it has “tremendous potential in achieving political and military objectives when applying the art of war and the art of diplomacy.”

He encouraged embracing this construct quickly, “before someone else does.”



*The F-22 epitomizes the speed, stealth, range, and precision required of all US systems—land- and sea-based alike—if Strategic Control is to succeed.*

Dugan observed that the United States today is “the only full-complement, full-dimensional aerospace power. It’s a status for the United States to keep or lose as a matter of choice.” The continued pre-eminence of the US in strategic aerospace capabilities is “not a given. And of course, it’s not free.”

The “great joint staff” at the Pentagon has gone too far, sometimes, in trying to equalize the capabilities and resources of each service, Dugan said, adding that there is less interplay of ideas and “good debate” with the group’s dampening effect on controversy.

“Rapid Halt, in my view, is a subset of strategic control,” Dugan said. “The joint team must not be allowed to let Rapid Halt die. Or more accurately, the joint team ought not strangle Rapid Halt.”

The national security establishment doesn’t enjoy the luxury of time to gradually become accustomed to Strategic Control or whatever concept is ultimately chosen to guide the reshaping of the military. The urgency of the need for a new concept soon was highlighted by Adm. William A. Owens (Ret.), former vice chairman of the Joint Chiefs of Staff, who noted that defense procurement has fallen 65 percent in the last decade.

### Mortgage Payments

“We are mortgaging our future,” Owens asserted. If there is no sharp

realignment of the US military very soon, basic unaffordability will mean that “in 15 years ... we will have 170 ships, six Army divisions, and 12 to 13 tactical fighter wings, with 48 planes in each one.” With such a reduction will have to come harder choices about whether the US can become involved in any given crisis.

An overhaul is needed, “and we must do it,” Owens asserted.

“Why not us? Why not now? ... Our military is going away before our eyes.”

Owens also praised the Air Force for being, among the services, the most “out in front” in recognizing and thinking about the Revolution in Military Affairs and what it can mean to future conflict.

Another voice for rapid adoption of Strategic Control is Gen. James P. McCarthy (USAF, Ret.), who served on the NDP to provide an Air Force perspective.

Asked what it will take to actually get the services in step with each other and reshape for the 21st century, McCarthy said he expects there will be “some significant dollar shortfall” that brings the defense fiscal crisis into focus.

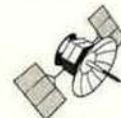
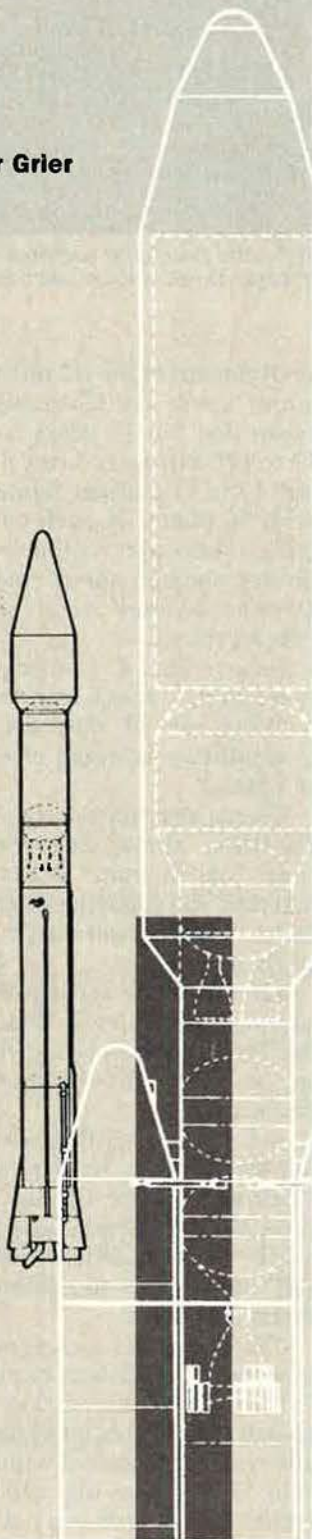
“There will be a recognition that modernization dollars are not going in the right places, and they won’t be able to get enough money [from force structure cuts] to deal with that,” he said. “In my view, that will, unfortunately, be the wake-up call.” ■



The future of space will be a joint venture by the armed forces, the civil sector, and industry.

# Partners in Space

By Peter Grier



## F. Whitten Peters Acting SECAF

IN the early 1970s, Gen. Carl A. Spaatz, first Air Force Chief of Staff, sent a note to an airpower symposium that he was unable to attend. The message read: "Tell everybody that we are getting out of flying too soon and into space too late."

That sentiment is as apropos today as it was then, in the view of acting Secretary of the Air Force F. Whitten Peters.

At an Air Force Association National Symposium held last Nov. 13 in Los Angeles, Peters said that today the Air Force is getting out of flying too soon because it has aging aircraft it cannot afford to repair or replace. At the same time, it is getting into space too late because it lacks the resources needed to maintain readiness and to modernize forces at the same time.

In essence, warned Peters, there is not enough money in the budget to allow a graceful transition to a true aerospace force.

"We have essentially little to no flexibility in how we spend the Air Force budget, particularly when we try to find room for expensive, yet essential, new initiatives like space systems," said Peters.

There are just too many demands on the money. Military pay needs boosting, infrastructure needs refurbishing, and readiness needs to be improved. Even when the Air Force makes hard budget cuts, Congress may well just stick the program back in, Peters said.

Such Congressional blowback can even occur in the area of space itself. The USAF official noted one: "Under legislation, the Air Force budget continues to subsidize the



costs of commercial launches from our ranges."

With such fiscal constraints in mind, the Air Force has moved out on several efforts to find the best targets for investment in basic space-related technology, so that it can be prepared to move forward on space systems at some point in the future.

"Do-Able Space"—a study produced by Air Force Chief Scientist Daniel E. Hastings—and a follow-on report by the Air Force Scientific Advisory Board have helped identify key technology drivers that must be funded if the space effort is to move forward. Guided by this and other efforts, the Air Force Research Laboratory has changed its space plan and moved to double the amount it will spend on space research over the next few years.

"Partnering" is a key concept that has emerged from the Do-Able Space effort, said Peters. Air Force Research Laboratory, NASA, Defense Advanced Research Projects Agency, and other government entities have long coordinated their efforts to get the most bang for their research buck, but the challenge now is to expand the links between classified and unclassified space programs and between the military, civil, and private sectors.

Coordination between classified "black" and unclassified "white" efforts is exemplified by the Discoverer II radar satellite demonstrator, said Peters.

Discoverer II is a partnership between the Air Force, the National Reconnaissance Office, and DARPA, one that aims to demonstrate mobile target tracking from space by 2004. If all goes as planned, USAF will learn valuable lessons for an initiative known as F<sup>2</sup>T<sup>2</sup>E (find, fix, track, target, and engage), DARPA will further its drive to build smaller, cheaper satellites, and the NRO will get an excellent synthetic aperture radar platform.

Equally important, the three-way joint program office established for Discoverer II holds promise as a model for the integration of national security space activities, said Peters.

Meanwhile, the Evolved Expendable Launch Vehicle program is perhaps the pre-eminent current example of partnering between the Air Force and the private sector.

Boeing, Lockheed Martin, and the Air Force have each invested \$1 billion in EELV development, Peters noted. The effort will ensure that the next generation of US commercial launch rockets will be able to meet the requirements necessary for government payloads and should reduce by \$6 billion the cost of DoD's planned launches between 2002 and 2020.

"The Air Force needs to move out on partnering," said Peters.

### Gen. Richard B. Myers

Quick to take up the Peters assertion was Gen. Richard B. Myers, commander in chief of NORAD and US Space Command and commander of Air Force Space Command.

Myers said that the service cannot hope to achieve the full promise of space without building trust and confidence between the US government, industry, and allies.

"Space is too expensive, too interdependent, too complex, too important to go it alone," he said.

Integration is the key task facing space planners, according to Myers. The term comprises efforts to partner with industry, efforts to operate across the military services, and efforts to fit into the larger context of the modern economy.

"Integration acknowledges the growing networks and connections throughout all levels of society as space fuels the evolving information age," said Myers.

This new era will be unpredictable. Right now, the US does not face any threats at the strategic level. No one now threatens the very existence of the nation.

However, all agree that the world remains dangerous—as witness Bosnia and Iraq. And the nation's overwhelming military superiority could be eroded in the future if our adversaries surpass the United States in understanding how to use bits and bytes. "Information-based technological advances have the potential to level the playing field," said Myers.

As to space priorities, the first task must be resolving the pressing concerns of the service's people, according to the space CINC. Pilots are not the only specialty being drawn out of the Air Force by opportunities in the private sector.

"In space ops, for instance, we're already seeing problems retaining

### Gen. Ralph E. Eberhart

Sixty years from now, the leadership of the Air Force will undoubtedly look back on the current era and see it as one of revolution by evolution. Each new system, from the Airborne Laser to the Space Based Infrared System to the reusable space plane, could well be seen in the future as small individual parts of a larger change.

Such is the view of Gen. Ralph E. Eberhart, the vice chief of staff of the Air Force.

Looking forward, he said, the path ahead is not obvious. That is particularly true for budgeteers.

"What is not ... clear to me is how we come to grips with the financial issues associated with what we need to do and what we plan on doing in terms of space," said Eberhart.

The investment necessary will be comparable to that needed to produce the nuclear capability which helped win the Cold War. It will take that kind of money to make sure the US has no peer in space matters in coming decades.

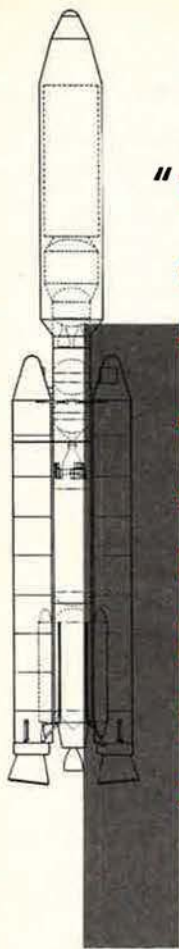
"I think we will step up to that table—not this year or next but during our lifetime," said the vice chief.

USAF is an "aerospace" force—a term used by the Air Force since the 1950s. Space will clearly become a larger and larger part of that equation in the years ahead, as Eberhart sees it, though that does not mean that "air" will become less important than "space."

Moreover, Eberhart told the AFA audience, the Air Force has to be careful to not just think about applying and exploiting space solely through Air Force systems and units. "We should view space through the joint warfighters' eyes," he said. "[That is how] warfighters will benefit from what we are doing. ... We ought not [to] view it as a zero sum game. We ought to view it as getting better as an aerospace team," said Eberhart.







**"We're dedicated to recapturing our lost share of the launch business for the United States."**

our enlisted troops after their first term because the explosion in commercial space makes their skills so highly valued," said Myers.

Air Force people need breathing space in which to handle today's missions while they transition to tomorrow's vision. That means higher pay, better benefits, improved quality of life, and relief from force reductions until the 2010 concept of the Air Force of the future is in place.

Modernization is Air Force task two. There, senior leaders should be concerned not so much about a hollow force as what Myers calls a "dead-end" force—something that may have high readiness ratings but consists of obsolete weapons and systems.

The Space Based Infrared System is the military space community's No. 1 modernization priority, according to Myers. "SBIRS is a system of systems, each part of which is a must have," he said. "It's the future of our early warning mission, and it's vital to national and theater missile defense."

Space control is another mission area that is growing rapidly. Force application is also an important mis-

sion where demonstration projects and R&D efforts now in the works may help the Air Force understand what is possible, even as national leaders debate what might be desirable in this area.

The Air Force is looking at programs that cut across all mission areas, one of which is the space operations vehicle. USAF is committed to modernizing the Navstar Global Positioning System satellite constellation.

"We're also dedicated to recapturing our lost share of the launch business for the United States," said Myers. "Key to that effort is upgrading our range infrastructure."

Important policy issues need to be resolved if the US is to take full advantage of the potential of space. How best can the nation protect its space-based assets and interests—by weapons or treaties? Where is the launch business going, and should the US subsidize commercial launches or not? What does the term "information operations" mean, in a military context?

Finally, the Air Force needs to be correctly organized for this new future.

"It's been clear in recent exercises and wargames that we must consider assigning a single operational CINC the task of focusing on information network operations for the warfighter," said Myers. "Given the clear linkage between space and information networks, there is a strong case to be made that those responsibilities should fall to us at US Space Command."

#### **Gen. George T. Babbitt Jr.**

Many speakers at the symposium discussed the nature of, and the need for, military-industry partnerships. On the military side, more than talk is now required, said Gen. George T. Babbitt Jr., commander of Air Force Materiel Command. The explosive growth in space technologies is simply offering too many great opportunities.

"Rhetoric alone will no longer suffice to move us along the path from airpower to aerospace power," he said. "Real action, real change is required."

Space today is a business. The federal government proved in the 1960s that "we could gain access to space"; today, industry has used the

leverage of "that access to increase our field of view and ability to globally communicate." Over the next five years, 80 percent of space launches will be commercial, according to some experts. The space industry itself estimates that its revenues will grow from \$79 billion in 1997 to more than \$117 billion by 2001.

As private industry becomes dominant in space, its leaders worry about launch costs and on-orbit costs—far more than has been the case in the military in times past.

"Therein lies the need for change on the military side of this partnership," said Babbitt. "If we in the military are to be good partners with an industry driven by the pressure of business, then we must become better businessmen."

Partnerships that take advantage of complementary skills and make efficient use of financial resources are likely to offer an effective means for managing this transition. However, the glib way these marriages are discussed can hide the fact that the business approach to partnering is an unfamiliar one to many in the armed forces. Effective teamwork means the Air Force will have to spend some time learning to get things right.

The most widely known kind of partnership—that in which partners are individually and jointly liable for the actions of each other—probably does not have much utility in the space business, said Babbitt.

Joint ventures, in which partners pool their resources and share proportionately in the benefits, have some promise. The EELV is an example of how there is some movement in this direction.

"The Air Force's contribution ensures that its requirement for military launch is adequately considered in the design. ... Pressure from commercial customers will continue to ensure that launch costs are kept as low as possible," said Babbitt.

"Partnership" can also refer to a more open relationship between government and industry, in which information flows more easily and fewer misunderstandings occur. This is the stuff of acquisition reform, and the AFMC chief said he believed some progress has been made in this area.

Future partnerships may reflect the reality that true savings and perfor-



mance improvement come when the military just states requirements and stays away from telling industry how to do its job.

"In the future we need to buy services and not hardware," said Babbitt.

At AFMC officials have been focusing their attention on understanding and measuring the outputs of their efforts. As they do, they discover ways to become more efficient—better businessmen—themselves.

Understanding the value of capital assets is an area of particular interest. "For example, we are looking closely at our real property assets and the many major equipment assets that support our depot maintenance, test and evaluation, and research laboratory missions," said Babbitt.

The hard part comes when AFMC finds excess capacity. Getting rid of unneeded infrastructure is more difficult for government than it is for industry.

Good partnerships require the partners to be equals. The interests of each party must be understood by all.

"We on the military side must learn to think like businessmen," said Babbitt. "Those of you on the industry side will have to learn to deal with us in a different way once we've learned these new skills."

### James F. Albaugh

The mere fact that industry representatives and military officers are sitting down together and talking about partnerships represents a major change in the way the Pentagon spends money, pointed out James F. Albaugh, president of Boeing Space and Communications Group.

Five or 10 years ago, when competition was the acquisition watchword, "all the watchdogs would have gotten very twitchy and I'm sure we'd have '60 Minutes' come barreling through the doors" at a meeting such as the AFA symposium, said Albaugh.

The bad old days saw a huge increase in government rules and regulations designed to protect taxpayers from waste, fraud, and abuse. It created a spiraling cycle of distrust.

Today, many of those rules and procedures are being torn down, and trust is being built up.

"Just as DoD and the services are changing, the industry is changing as well," said Albaugh.

Acquisition reform efforts are already paying off on the bottom line, the Boeing representative insisted. The changes mean the Airborne Laser will come to fruition in six years, instead of its original goal of 12.

In the GPS program, the customer went from giving Boeing a statement of work to providing only a statement of objectives. That helped send costs down from \$43 million to \$28 million per satellite. On-orbit lifetime has increased from six to 13 years.

EELV is a classic case of successful military-industry partnering, said Albaugh. Due to the flexible approach of the program, the new Atlas and the new Delta rockets will be developed in four years.

"I was just reading the other day that it took Burger King two years to develop the new french fry. If we can do rocket science in four years and they develop french fries in two years, I think we are on the right track," said Albaugh.

Some EELV goals, such as a 25 percent reduction in the cost of payloads to orbit, were challenging, but the flexibility of the partnering approach allowed Rocketdyne to derive its EELV engine from the space shuttle main engine without having to introduce new technologies.

"So now what we have is an engine that we are going to develop not in 10 years but two and one-half years. And we are going to have an engine with 50 percent more thrust than the space shuttle main engine and we are going to build it for a fraction of the cost," said Albaugh.

On the question of the use of an important national asset—space launch ranges—Albaugh of Boeing challenged the thinking of his audience, however.

The current space launch policy allows industry to use excess launch capacity at government-built launch pads on a noninterfering basis. A major thrust of current discussion is "about how to share costs more equitably," said Albaugh. That would mean industry would have to pay more.

However, foreign launch ranges are universally—and heavily—subsidized by their governments. If US

## Lt. Gen. Lester L. Lyles

*The following is excerpted from a speech by Lt. Gen. Lester L. Lyles, director of the Pentagon's Ballistic Missile Defense Organization, to the AFA symposium.*

"Thirty years ago [I was] a brand-new second lieutenant, right out of graduate school, a mechanical engineer, coming out here at Space and Missile Systems Organization—the old name for SMC. ... If we at that time had ... looked up the word 'commercial,' what we would have seen is something that said, '60-second pause that will allow you to get a beer during a football game.' ...

"Ten years ago, when I came back here as a brand-new young colonel in charge, working for Lt. Gen. Don Cromer and Maj. Gen. Bob Rankin, in charge of the space launch directorate out here, things did change drastically. The Commercial Space Launch Act ... was in its infancy. ... We were just beginning to figure out what that really meant. The big challenge at the time for us was trying to figure out one of the major programs, the development of the Atlas II. It was going to be our first real entity in terms of the Commercial Space Launch Act. General Dynamics down in San Diego at the time was going to develop the Atlas II. We were going to marry that military requirement that we had with their commercial requirements, marry a very robust, as we called it at the time, military space launch manifest against their commercial launch manifest. In all honesty we weren't quite sure how it was going to work out. ...

"Four years ago, I came back here, this time as commander of SMC and things had changed drastically. Desert Storm had happened three years prior to that. Desert Storm was our first real space war. We really learned that commercialization of space had already taken place.

"[C]ommercial space launch activity had grown exponentially. We found that we were no longer dominant in terms of that particular venue. Other venues had started to change, too. Space communications had already started to get very commercial. ... In the areas of navigation and surveillance, things had changed again and we were no longer the No. 1 power—we being the military. ... Space dominance had changed in terms of its definition. We were no longer the dominant force. The dominant force was commercialization.

"From that historical perspective—30 years, 10 years, and four years ago—things have drastically changed. Today I will say that no longer—when we talk about the necessity of partnership—no longer is it a politically correct term or a nice thing to do. It is absolutely a necessity."



costs go too high, then the commercial launch business could end up overseas, and once again the government could be stuck with all range costs.

"I don't have the answer, but I think it is a bigger issue than Boeing or Lockheed Martin or the Air Force," said Albaugh. "It really is all about national space policy, and we need to work together to come up with the right answer."

### **K. Michael Henshaw**

Already, acquisition reforms driven by partnering have indeed begun to bear fruit, said K. Michael Henshaw, president of Lockheed Martin Missiles and Space.

However, they need to be carried further—into military satellite communications, remote sensing, and launch vehicles. There are major business tenets that the military still needs to embrace, said Henshaw. "One is the exploitation of common product to multiple use," he said.

Except for very specialized items, the days of one item, one use are almost over in military space. Launch vehicles will be commodities in four years. "Between four and 10 years

from now, spacecraft buses must be commodities—things you buy off the shelf," said the Lockheed space chief.

A second tenet is that the military should acquire, or think about acquiring, full systems of systems. Terminals might be purchased along with satellites, for instance.

Thirdly, the military needs to employ business terms.

"We are going to see, in our lifetime, liquidated damages from a government launch that is not launched on time," said Henshaw.

In general, further acquisition reforms should focus on standards, partnership, harmonizing of requirements, and the use of long-term commitments to gain production economies, according to Henshaw.

Lockheed has been the Navy's fleet ballistic missile contractor for over 42 years. The long relationship has allowed the firm to work hard every day at bringing costs down, said the Lockheed official.

"Am I saying, get rid of competition?" said Henshaw. "No, but industry's way of reducing price is long-term agreement. Sometimes, government's way is too much competition and not enough long-term involvement."

### **Lt. Gen. Ronald T. Kadish**

In the military's view, acquisition reform is easier said than done. Take the setting of requirements for information and communication systems.

"A lot of our problems with requirements—from an acquisition viewpoint—is that we really don't know what we want in this brave new age of information and space until we see what we have," said Lt. Gen. Ronald T. Kadish, the commander of Electronic Systems Center. "The timing gets screwed up."

Technological change is accelerating at a pace that makes both the military and industry uncomfortable. "Imagine a future—and I am not so sure it is all that much [in the] future—where some soldier engaged in heavy combat on a battlefield can call home and talk to his wife," said Kadish.

Meanwhile, real military needs are very difficult to determine. Already, military infrastructure, from satellites to Joint STARS to JTIDS (Joint Tactical Information Distribution System), can provide warfighters so

much information that it becomes an overload.

The military has only begun to understand what "systems of systems" means for its users, according to Kadish. So much procurement in the past has focused simply on platforms. But the integration and interoperability of these platforms is becoming extremely important, to the point where it will be its own weapon on the future battlefield.

"We have a very difficult problem turning that vision into actual execution and it is easier to build the network than it is to figure out how to use it," said Kadish.

### **Maj. Gen. Eugene L. Tattini**

Space is clearly a revolution in progress, said Maj. Gen. Eugene L. Tattini, commander of Space and Missile Systems Center. Anyone, or almost anyone, will be able to buy one-meter-accurate images taken from space and have them delivered overnight. Commercial launch has exploded beyond expectations, with more than 30 space ports proposed or actually in development. One system—GPS—is "now becoming a public utility internationally," said Tattini.

To help bring all this together, the Air Force senior leadership has asked space and missile systems to do an extensive and comprehensive look at commercially available space alternatives, in light of current Air Force-based missions. Commercial input will be key, said Tattini.

The effort is organized into five study areas: launch capabilities; communications; remote sensing, surveillance, and meteorology; navigation; and range and satellite command and control.

Recommendations from the study could find their way into policy as early as the 2002 budget. But "in order for any kind of military use of commercialized space to be relevant, it is going to have to help us execute the military mission," said Tattini. ■

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*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 article, "The New Doctor Is In," appeared in the January 1999 issue.*



**"Government's way is too much competition and not enough long-term involvement."**





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Fighter crews from the German Luftwaffe stretch their wings in the skies over the New Mexico desert.

# High Plains Luftwaffe

Photography by Ted Carlson







*Two German air force Tornados and two F-4Fs fly over the southwest US. They are part of the German air force's Tactical Training Center, established as a tenant at Holloman AFB, N.M., in 1996 in a unique 10-year lease arrangement with the German government.*





**G**erman air force F-4Fs and Tornados, such as the one at left, have flown over the southwest US for the past three years. This year, the German Tactical Training Center, which officially opened at Holloman AFB, N.M., May 1, 1996, plans to expand its operations. As part of the original \$48 million Foreign Military Sales program, the German government signed a 10-year lease to operate the center at Holloman and invested \$42 million to build an aircraft maintenance hangar, six aircraft parking hangars, an engine testing "hush" house, and smaller buildings for supplies, storage, and administration. By the end of 1999, the Germans expect to spend an additional \$125 million for more infrastructure.

The expansion will increase the number of Tornados from the current 12 to 42. The number of German military personnel will grow from 300 to nearly 1,000. According to TTC officials, the Holloman area is ideal for its sunny weather and vast training spaces, plus it's close to the German air base ground defense school, just 90 miles south at Ft. Bliss, Texas. The locale—lacking Germany's often inclement weather and the altitude restrictions necessitated by its population density—enables the Luftwaffe to trim six months from its normal 24-month Tornado training regimen.



Although the TTC is the first military aircrew training facility leased by a foreign government in the US, NATO aircrews have been trained in this country for 30 years. That training is conducted using American facilities and aircraft and, for the most part, American instructors. While the TTC's F-4F training uses a combination of US and German instructors, the Tornado Training Squadron is 100 percent Luftwaffe. The Tornado Interdictor Strike fighter, which first entered service in the late 1970s, is flown by the UK and Italy as well as Germany. The all-weather Tornados feature two engines, short takeoff and landing ability, fly-by-wire controls, automatic terrain following, and an autonomous navigation system.





Above, two F-4s head out to a nearby range. The 24 F-4Fs now at Holloman are owned by the German air force but fall under the operational control of Air Combat Command's 49th Fighter Wing, through the wing's 20th Fighter Squadron. About 20 USAF Instructor Pilots and nine instructor Weapon Systems Officers from the 20th, along with three German IPs and one WSO, train some 30 German crew members annually. (Germany, Greece, and Turkey still fly F-4s in air defense and attack roles.) The squadron, known as the Silver Lobos, provides both basic instruction for new F-4 crews and fighter weapons instruction for experienced crews. It is a Foreign Military Sales-dedicated squadron and moved to Holloman from George AFB, Calif., in mid-1992. Initially, the 20th trained the German crews in the F-4E, which it brought with it from George. The unit completed conversion to F models in 1998—enabling the German crews to train in the same model they will fly operationally.



At middle right, a pilot and WSO taxi the huge fighter back to the line. Below right, some of the newly arrived F-4s still carry a Luftwaffe tactical paint scheme.







At left, an outbound Tornado crew makes a check of their refueling probe before a mission. During 1999, as the additional Tornados arrive at their desert home, so will additional military personnel and their families. Like many US service members and their families who served tours in Germany, the Germans are living largely on the local economy. Local officials consider the venture an economic boom. The "willkommen" sign is out.

The first TTC commander, Col. Eckhard Sowada, who learned to pilot the F-104 at Luke AFB, Ariz., in 1970, noted that more than five times the number of personnel needed to establish and run the center at Holloman volunteered to come to the US. The weather and the wide open spaces—New Mexico and Germany are roughly the same size, but New Mexico has only 1.7 million people compared to Germany's 84 million—make training easier. Additionally, the Germans, like their American counterparts in Europe, take the opportunity to travel.

However, establishing the training regimen was no snap. It required a new syllabus and learning the ranges and how to fly in the hotter, high altitude environment. It took three to four months of preparation before the TTC could hold its first Tornado fighter weapons instructor course.



At left, Lt. Col. Frank Feldhausen uses a couple of visual aids to get his point across to his students. Center commander Sowada noted that "the training is very sound, technical, and the students benefit greatly." The crews receive intense air-to-air and air-to-ground training in 3.5-week-long courses, while others attend the six-month fighter weapons school. He called the training at Holloman efficient, adding, "Tactically it is also important to be shoulder to shoulder and train here with our allies, especially since the US has pulled out of many places in Germany."





Above, a Tornado roars along on the way to a nearby range. A typical Tornado sortie at Holloman is a four-ship formation, with a low-level refueling before tackling either a live-ordnance or non-live range. The length of a sortie extends from just over an hour up to three hours. At right, the day's sortie done, a pilot and WSO go to debrief. The students go to a technical and maintenance debrief and write up any problems. It takes another hour or so to gather the weapons data. An entire debrief may last from one to four hours, depending on the complexity of the sortie.

Pentagon officials called the training initiative "an important step forward in a very mature and productive alliance." According to Sowada, the Germans' reception in the local area was "overwhelming." He commended the 49th FW staff and Alamogordo community. "We are also strengthening our bonds as allies and learning to fly and fight as a team." ■





**Robert Bell of the  
National Security Council  
staff talks about the  
complex, politically charged  
effort to protect  
US interests in space**

# Bell at the White House

By Stewart M. Powell

**R**OBERT G. Bell often admires a dramatic White House photo of space shuttle *Discovery* blasting off and soaring heavenward with astronaut John Glenn on board. The special assistant to the President for national security affairs sees *Discovery's* ascent as a vivid symbol of triumph in space—the antithesis of the haunting image of the 1986 explosion of *Challenger*.

“We’re so used to seeing that footage of the *Challenger's* contrail, with the parts breaking off,” said Bell. “Perhaps this [image of *Discovery*] will help replace that.”

Bell, a former Air Force officer and a leading civilian defense analyst, has more than a sentimental interest in space, of course. He has begun casting his own gaze more and more toward the politically charged, technologically complex effort to defend the interests of the United States in space in coming years.

From his elegant suite in the Old Executive Office Building adjacent to the White House, Bell handles a variety of duties for the National Security Council. Military person-

nel policies, nominations, base closings, and weapon acquisition issues land on his desk. He manages nominations for the Medal of Honor.

Bell for years had monitored Iraqi compliance or noncompliance with UN-mandated inspections to thwart Saddam Hussein’s reconstitution of weapons of mass destruction and the missiles to deliver them. He tracks North Korea’s launches of its 3,300-mile-range Taepo Dong 2 missile. He works with Russia’s government to try to bring about ratification of the long-delayed START II agreement.

For Bell, though, the subject of space is big and getting bigger—especially when it comes to controversial issues of providing for protection of US interests in space and denying space access to adversaries. Both the White House and members of Congress look to Bell to serve as a pragmatic mediator on one of the most important, rapidly evolving national security challenges facing the nation.

## **Black and White**

“The debates have become much



more partisan, and the choices tend to be articulated in much more extreme black or white terms than I think the truth supports," Bell said. "Usually the decisions are quite tough and there is merit on both sides. The challenge is to get it right in a way that balances competing interests."

The challenges are all the greater because the stakes are so great.

The world's spacefaring nations, led by the United States, are dispatching more and more commercial and military capabilities into orbit. Today, some 30 nations operate roughly 550 satellites in Earth orbit. Another 1,000 to 1,500 satellites—worth \$500 billion—are expected to go into orbit over the next five years.

A space industry study anticipates that worldwide revenues from space will reach \$121 billion by 2000—a 57 percent increase over the \$77 billion reaped in 1996. Step-by-step construction of the multibillion dollar International Space Station will only underscore nations' growing reliance on space.

The effort produces unquestioned benefits, but the benefits bring potential vulnerabilities. Millions of Americans witnessed the dependence and vulnerability firsthand on May 19, 1998, when a single Galaxy IV commercial communications satellite malfunctioned as it orbited 22,500 miles over Kansas. The mishap disrupted communications with 35 million personal pagers and thousands of enterprises for hours before ground stations overcame the internal technical problem.

The episode drove home a point articulated barely a month earlier by Air Force Gen. Howell M. Estes III, the commander in chief of US Space Command. In his landmark space development plan for US Space Command, Estes said that, by 2005, the United States will need to add "space" to a list of "vital national interests" alongside Europe, the Persian Gulf, and the like. "Our nation's increasing dependence upon space capabilities ... produces a related vulnerability that will not go unnoticed by adversaries," Estes cautioned.

Yet critics contend that US preparations for defense of space have lagged. While the Clinton Administration is publicly committed to the concept of space control to enable

the United States and its allies to reach space and operate freely there, the critics argue that in reality US military forces do not at this time have any recognizable capability to back up the concept.

### "Clearly Established"

A number of policies, treaties, and agreements restrict military operations in space, and the military has no charter to conduct offensive operations, if necessary, in defense of space.

Bell disputes critics of the Administration that he serves. "The requirement for space control capabilities has been clearly established at the highest levels of the US government," he told the Air Force Association's National Convention last September. The Clinton Administration approved a national space policy in 1996 that commits the United States to maintaining American leadership in space, Bell emphasized.

"Central to this leadership role is ensuring our ability to exploit space and, if required, to prevent adversaries from using space for purposes hostile to American national security interests," Bell added. "Our space policy requirements include deterring threats to our interests in space and defeating hostile efforts against US space assets, if deterrence fails. We believe we have programs and capabilities in place or under development to support these policy objectives."

For much of the past two years, however, White House officials and key Republicans in Congress have struggled over the entwined issues of space control and space-based missile defense. The effort to forge a consensus for US defenses in space already has spanned a generation—dating back to the Anti-Ballistic Missile Treaty in 1972 and the subsequent political furor over President Ronald Reagan's ambitious Strategic Defense Initiative. Some liken the effort to the years after World War II when it took painful trial and error before the Truman Administration and Republican Congress settled on a policy of containment to check Soviet expansion.

Bell concedes that it has been a tough balancing act for Clinton officials to, on one hand, allay Congressional concerns over White House priorities with fresh initiatives to

protect US interests in space while, on the other hand, reassure the Kremlin that the United States is not taking steps to prepare for pre-emptive attacks with space-based systems.

For example, the Administration throughout 1997 negotiated an agreement with Russia that cleared the way for US testing of theater missile defenses in ways both sides agreed would not run afoul of the 1972 ABM Treaty. The two sides signed a formal accord in September 1997 specifying details of a so-called "demarkation" agreement. It set out specific ways in which the two sides could differentiate between theater and national missile defense activities.

Then, within weeks, Russian leader Boris Yeltsin greatly complicated Clinton's dealings with Congress by proposing a change in US-Russian relations that would go to the heart of the space control issue. Yeltsin called on Clinton to commit the United States in a follow-up agreement to a formal ban on Anti-Satellite weapons.

Though Clinton had made an earlier commitment to develop viable options for space control, defense-minded Republicans in Congress suspected that he might prove vulnerable to Kremlin appeals and renege on his commitment.

### Backtracking?

Republican lawmakers quickly spied what they viewed as solid evidence of backtracking by Clinton. They saw Clinton use his line-item veto to eliminate Fiscal 1998 funding for three space control-related programs of great importance to them. Clinton struck out \$37.5 million earmarked to develop and demonstrate feasibility of a defensive, ground-based Kinetic Energy Anti-Satellite (KE-ASAT) weapon system. He cut \$30 million for the Clementine 2 program to track and intercept asteroids. Finally, he vetoed \$10 million for the study of a spaceplane being developed by the Air Force.

The Clinton Administration expressed confidence that the United States could defeat any adversary's use of satellites during a conflict through US dominance of electronic warfare to interfere with the adversary's communications with its satellites.

"We need to not be victim to 'old



think,'” said Bell. “The old think Cold War mentality was that we envisioned space control as ASAT, and we equated ASAT with a dedicated system that went up and destroyed something.” Bell emphasized that “revolutionary advances in technology, particularly in the area of information operations, are so phenomenal that ... we just need to widen our horizon” beyond reliance on ASAT systems to protect US interests in space.

In a speech to the United States Space Foundation last year, Bell stated, “There are a range of alternatives being explored or under consideration ... and that are fielded and available, including options for destroying or jamming the links between an adversary’s satellite and the Earth. If we were in classified session I could say more, but I can’t.”

However, Clinton’s use of the veto to target space-oriented technology fanned GOP concerns that the President was backing away from commitments to pursue technology development to give the United States the option of developing weapons capable of controlling the high ground of space.

As Frank J. Gaffney Jr., an ardent Administration critic and head of the conservative Center for Security Policy, put it: “The White House has showcased its belief that arms control agreements can protect American spacecraft.”

Clinton’s vetoes drew a powerful response. In January 1998, 43 retired senior military leaders sent Clinton an open letter that expressed their deepening concern about the course of events regarding space. Signatories included Gen. Thomas S. Moorman Jr., former Air Force vice chief of staff; Air Force Gens. Charles A. Horner and John L. Piotrowski, former commanders in chief, US Space Command; Gen. Russell E. Dougherty, former commander of Strategic Air Command; Air Force Gen. John A. Shaud, former chief of staff, Supreme Headquarters Allied Powers Europe; Air Force Lt. Gen. James A. Abrahamson, former director of the Strategic Defense Initiative Organization; and Army Lt. Gen. Malcolm R. O’Neill, former director of the Ballistic Missile Defense Organization.

These military leaders warned that few challenges posed “a greater dan-

ger to our future security posture than that of adversaries seeking to make hostile use of space or to deny us the ability to dominate that theater of operations.” Operation Desert Storm showed the stakes with space control, they said, adding: “What was true in 1991 will be even more so in the years ahead.”

Concerns mounted on Capitol Hill as Clinton headed to a Moscow summit with Yeltsin in September 1998 amid reports that the US was prepared to finalize a secretly negotiated deal with Russia that would ban anti-satellite weapons.

**“To me this was a success story...It suggests, I hope, that we have moved past suspicion and distrust to a point where we’ve all sat down and calmly and very clearly agreed on a solution.”**

Secretary of Defense William S. Cohen attempted to reassure lawmakers.

“Our approach does not constrain the US right to counter [threatening] space systems that are being used for purposes hostile to US national security interests,” Cohen declared. “Our intention is that these discussions [with Russian officials] not lead to arrangements that would impede US capabilities we determine are necessary for space control.”

#### “Ground Truth”

The reported deal never materialized. But the claim of a secret deal

only lent new impetus to the dispute between Democrats and Republicans over US preparedness in space. Both the White House and Republicans in Congress turned to Bell, a veteran defense analyst with a penchant for finding what he likes to call “ground truth” in any policy dispute.

Bell helped forge a compromise over US spending on space control to allay Congressional concerns. The deal led to passage of the most recent piece of defense legislation. The White House promised to “examine potential space control-related research, development, and acquisition options.”

For their part, Republican lawmakers agreed to give the Clinton Administration more leeway in pursuing this goal. Congress called for the Administration to submit a blueprint to Congressional defense committees early this year.

Moreover, Congress ordered the Pentagon to “obligate promptly” the contested \$37.5 million in funds for a KE-ASAT weapon, but it gave the Pentagon leeway to apply the funds to “other space control-development activities” if warranted. The compromise called for spending \$10 million on development of the microsatellite technology within the Clementine 2 program without supporting the certain defense facets of the program that had alarmed the White House. Finally, House-Senate conferees agreed not to authorize an increase in funds for development of the spaceplane in Fiscal 1999 but agreed to apply the \$10 million in Fiscal 1998 funds to help underwrite the program.

“To me this was a success story,” said Bell. “It suggests, I hope, that we have moved past suspicion and distrust to a point where we’ve all sat down and calmly and very clearly agreed on a solution.”

The outcome was the kind of compromise that Bell has fashioned throughout his career. The son of a highly decorated World War II combat pilot, the 51-year-old native of Birmingham, Ala., graduated with honors in 1969 from the US Air Force Academy in Colorado Springs, Colo. A year later, Bell took a master’s degree in international security studies from the Fletcher School of Law and Diplomacy at Tufts University. Bell then served mainly in communications assign-



ments, before he resigned his commission in 1975.

He immediately launched a second career, becoming a defense analyst with the Congressional Research Service in the Library of Congress. Then Bell in 1979 won a temporary assignment at NATO headquarters in Brussels, Belgium, where he served as staff director of the military committee of the North Atlantic Assembly. Cold War tensions were high; Soviet forces had invaded Afghanistan, and Moscow was installing mobile SS-20 missiles aimed at Western Europe. The NATO Allies were laying groundwork to deploy mobile Pershing 2 intermediate-range ballistic missiles and ground-launched cruise missiles in West Germany, Italy, Holland, and the United Kingdom.

### Broad-Minded

When he returned to Washington, Bell briefly resumed his duties with the CRS but soon joined the staff of Sen. Charles H. Percy (R-Ill.), who at the time served as chairman of the Senate Foreign Relations Committee. For years, Bell was Percy's top aide for issues of defense and arms control. When Percy lost his seat to Democrat Paul Simon in 1984, Bell joined the staff of Senate Armed Services Committee Chairman Sam Nunn (D-Ga.), a post he held for eight years. In that post, he helped Nunn write the Missile Defense Act of 1991, which called for erecting a national missile defense by 1996.

Bell earned a reputation on Capitol Hill for being a can-do, non-ideological analyst able to bridge partisan differences. President Clinton's first national security advisor, Anthony Lake, invited Bell to join the Administration in January 1993 as the head of defense policy and arms control issues on the National Security Council.

"By the time I got to the White House, I'd had 14 or 15 years of trying to approach defense policy without making it political," Bell said.

Bell said the Clinton Administration and the GOP-led Congress have been able to strike compromises on space control by cutting through the rhetoric and distrust. "A lot of the near hysteria about the President's line-item vetoes was being driven by this [press] accusation that we

## To Control Space

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

Space control is the means by which space superiority is gained and maintained to assure friendly forces can use the space environment while denying its use to the enemy. To accomplish this, space forces must survey space, protect the ability to use space, prevent adversaries from exploiting US or allied space services, and negate the ability for adversaries to exploit their space forces.

Counterspace is the mission carried out to achieve space control objectives by gaining and maintaining control of activities conducted in or through the space environment. Counterspace involves activities conducted by land, sea, air, space, information, and/or special operations forces. Counterspace includes offensive and defensive operations.

Offensive counterspace operations destroy or neutralize an adversary's space systems or the information they provide at a time and place of our choosing through attacks on the space, terrestrial, or link elements of space systems. The principal means of conducting offensive counterspace operations is through the use of terrestrial-based forces such as air attacks against space system ground nodes or supporting infrastructure.

As the use of and investment in space increases, protecting resources is critical. Because such protection introduces the possibility of Earth-to-space, space-to-space, and space-to-Earth operations, it is in the national interest to be prepared to develop the capability to support multipurpose operations in the space medium and employ such systems as national policy dictates.

Offensive counterspace operations use lethal or nonlethal means to achieve five major purposes: deception, disruption, denial, degradation, and destruction of space assets or capabilities. ...

Defensive counterspace operations consist of active and passive actions to protect US space-related capabilities from enemy attack or interference. ...

**Contributing Capabilities.** Three capabilities are critical to the successful conduct of offensive and defensive counterspace operations: surveillance and reconnaissance of space, ballistic missile warnings, and understanding how the space environment may affect systems operating through or in space.

had a secret plan to negotiate an ASAT treaty with the Russians," Bell recalled. "It was the dog that didn't bite at the summit. It didn't happen."

The compromise over space control was reflected in the budget decisions made by Clinton in the late fall of 1998 for Fiscal 2000 budget, which will go into effect this Oct. 1. The President approved funds to "carry forward the master plan that was sketched out in [a] classified report to Congress," Bell said. "We're not negligent in any way in terms of what I call a robust enhanced technology exploration. We're doing a lot of work looking into these technologies."

### No Alternative

The Persian Gulf War underscored the undisputed need to pursue space control, Bell emphasized, given the heavy space dependence of US military forces in that conflict.

"We don't have the option of turn-

ing the clock back and going off and negotiating some arms control treaty with Russia that prohibits the development testing or deployment of space control capabilities," Bell said. "We've got to have them."

Bell noted that Clinton has stipulated in his annual renditions of US national security strategy that the US remains "committed to maintaining our leadership in space" with "development of the full range of space-based capabilities" to enable the United States to "deter threats to our interests in space, and if deterrence fails, [to] defeat hostile efforts against US access to and use of space." It remains to be seen whether continued US assurances will ease Russian fears as the White House works with Congress on the next phase of space defense development.

"I can't claim that our efforts have removed all of their concerns," Bell said. "That, I think, is a discussion that will go on." ■

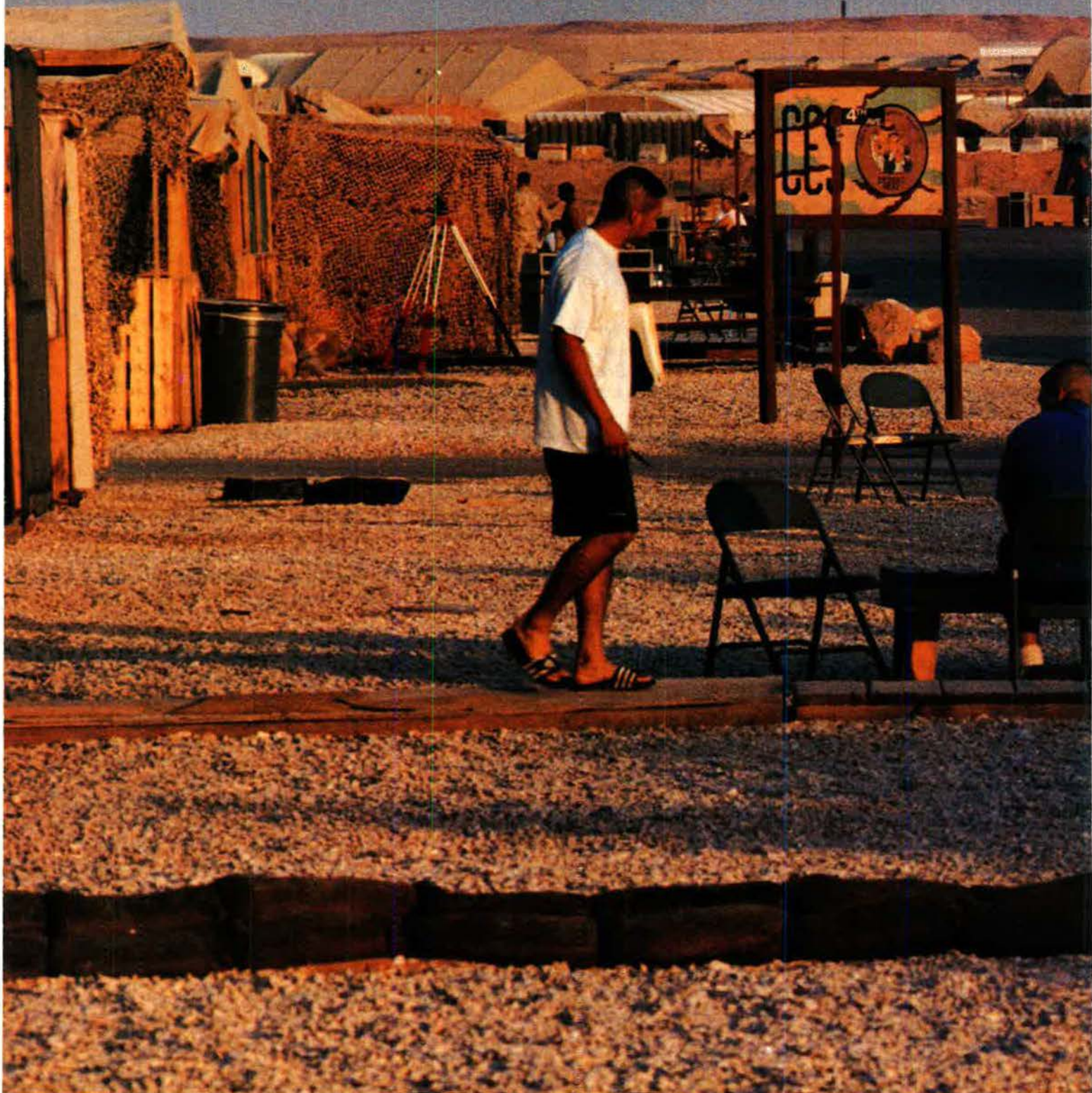
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*Stewart M. Powell, White House correspondent for Hearst Newspapers, has covered national and international affairs in the United States and overseas since 1970. His last article for Air Force Magazine, "Reading, Writing, and Aerospace," appeared in the January 1999 issue.*



Prince Sultan AB features miles of fenced desert, scores of barriers, hundreds of security forces, special motion sensors, razor wire, bomb-sniffing dogs, and lots of clenched jaws.

# DESERT STRONGHOLD





By William H. McMichael

**A Republic of Sand and Razor Wire**

In the distance, the bright lights of Prince Sultan AB, Saudi Arabia, create a fiery nighttime glow, but they don't reach the lonely wooden guard shack tucked behind a knoll a few hundred yards inside the desert outpost's chain-link perimeter. There, all is in darkness.

Under the brown camouflage netting draped over the shack, an Air Force security forces specialist studies a large TV screen that projects a vivid orange-

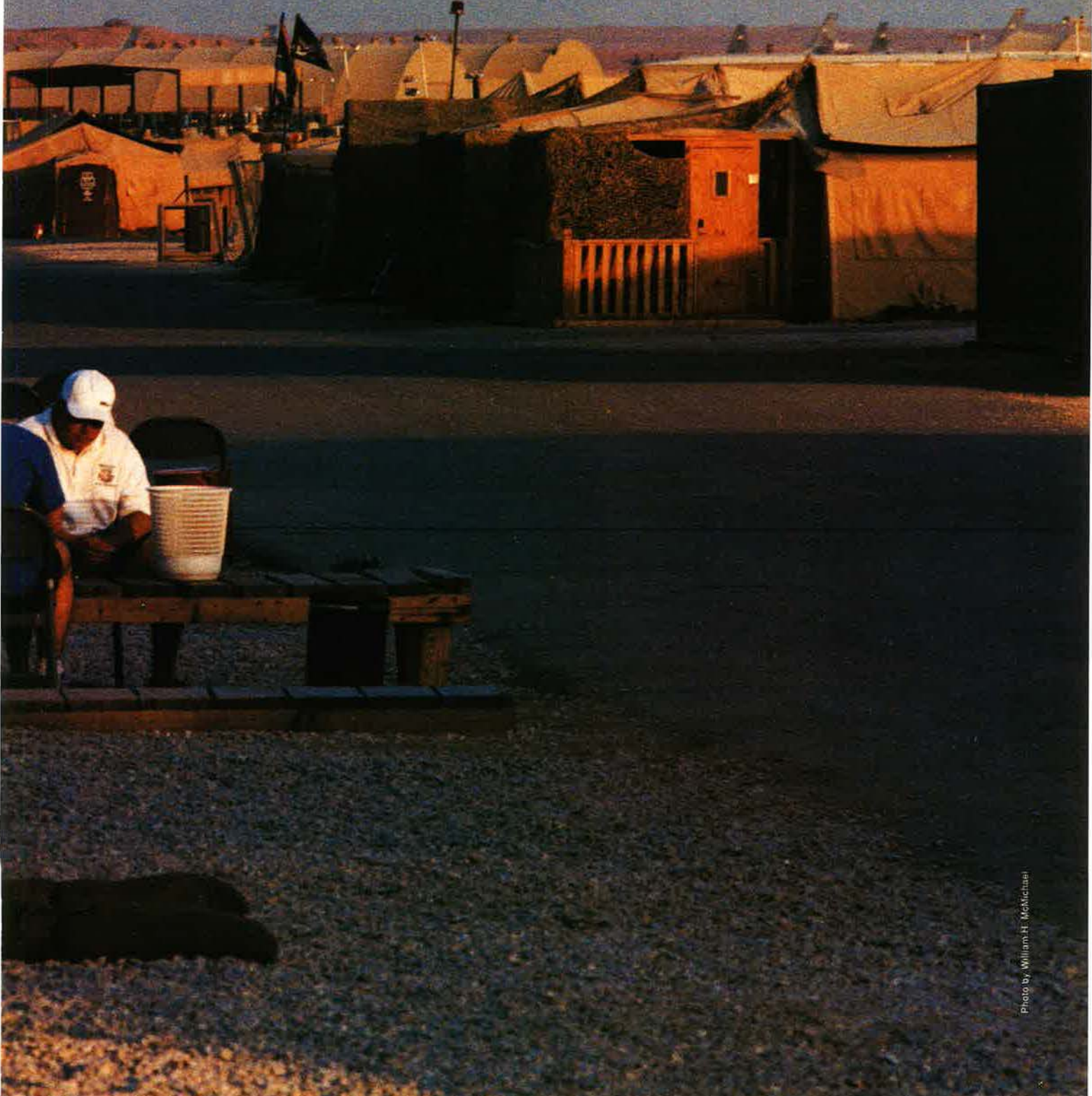


Photo by William H. McMichael



and-yellow thermal image of everything a nearby electronic camera can spot for miles around.

Out front, standing behind sandbags and facing the perimeter, his partner scans the darkness with a night vision scope bolted to an M-60 machine gun. It's a quiet night.

"You sit out here for 12 hours and nothing happens," said the machine gunner, Amn. Elisha Brackett, of York, S.C., "but today might be the day. You have to be ready."

Not long ago, only a few yards separated most Saudi-based US airmen from terrorist attack. That all changed on June 25, 1996, the day that a terrorist truck bomb blew up next to a high-rise apartment building in the Khobar Towers complex in Dhahran, Saudi Arabia, killing 19 airmen and wounding some 500 others.

The US commitment to enforcing United Nations sanctions against Iraq continued, however, and American troops were moved to the more isolated location of Al Kharj, a desolate area 50 miles southeast of the Saudi capital of Riyadh.

Now, military personnel stationed at this remote Saudi air base are protected by miles of fenced desert, scores of barriers, and hundreds of

uniformed security forces authorized to shoot to kill. Airmen call it the "Sandbox."

Special motion sensors dot the desert. Along the roads that crisscross the base, drivers slowly snake through multiple check points buttressed by concrete barriers and razor wire.

With ID checks mandatory at each checkpoint, the going is slow. Security forces and bomb-sniffing dogs search incoming vehicles, especially those of the third-country nationals who come on base to prepare meals, dig ditches, and clean latrines. The workers, kept in partitioned areas during the search process, endure painstaking security checks to obtain the special passes that officials require.

Security forces make up 10 percent of the 4,200-odd personnel on the US side of the base, which is divided into Saudi and US sectors. There are only two gates into the interior of the base: one for normal traffic and one for contractors working on roads and a new Saudi air control tower. Both gates are heavily guarded. Everywhere one looks, one finds a pair of security forces specialists in a guard shack or on patrol, checking, questioning, and watching.

The facility very likely is the most heavily guarded operational installation used by the US military. This, clearly, is what retired Army Gen. Wayne A. Downing had in mind when in 1996 he released a report criticizing security at Khobar Towers and recommending more extensive force protection measures.

US officials at Prince Sultan call the concept "layered" security, and the layers are thick. Lt. Col. Cease Middleton, a Grafton, Va., native and commander of security forces at the base, calls Prince Sultan a "fortress." He and other officials express confidence that the chances a truck bomber could get through the base's defenses are dim.

"We present a hard target for a terrorist," said Col. Terry Thompson, until recently the vice commander of the 4404th Wing (Provisional), the unit that occupies Prince Sultan—or P-SAB, as the troops say. "We have good force protection against a truck bomb-type setup. This is a very secure environment."

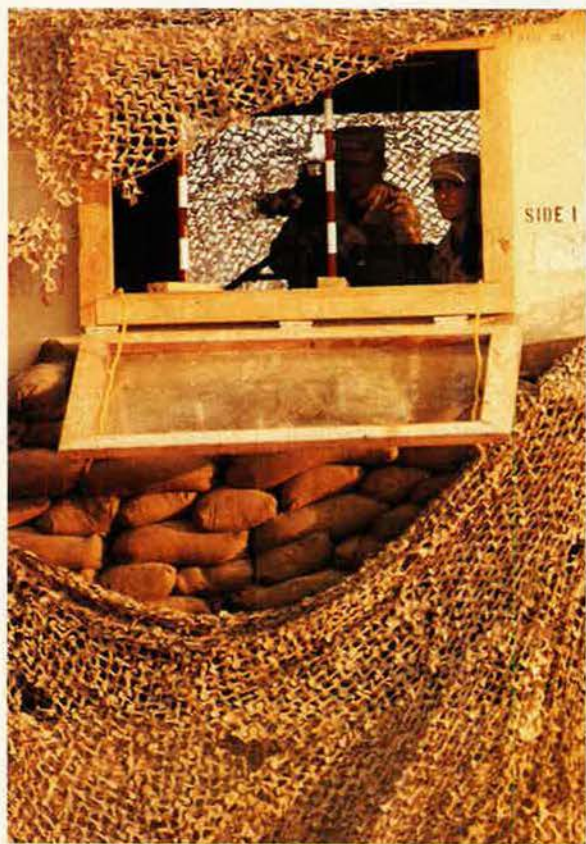
These days, officials have different concerns, such as terrorists wielding a portable missile that could shoot down one of the base's aircraft. Another concern: chemical attack, possibly delivered via long-range missile, by a nearby nation that seeks to drive the US presence from the Gulf region.

Defenses against medium-range missiles include the base's multitude of radars and a battery of Army Patriot missiles. It is the short-range missile threat, however, that provokes greatest fear. Officials are understandably vague when asked about the precise measures being taken to secure the area around the huge Saudi base, where terrorists armed with portable missiles could wreak havoc. But several factors and standard practices, they said, help to minimize the risk.

One factor is the base's size and remoteness. The 225-square-mile installation is surrounded by miles of empty desert, and US forces work inside a double-fenced area at its center.

"There is a vast amount of area out there," said MSgt. Jeff Straut, a security forces supervisor from McConnell AFB, Kan. "We put people out there doing look-sees."

Inside the fences, the US area is dotted with bunkers where person-



*Under brown camouflage netting, security forces personnel Amn. Steven Freeman (left) of Davis-Monthan AFB, Ariz., and SrA. Sharon Henry of Malmstrom AFB, Mont., keep watch at Prince Sultan AB, Saudi Arabia.*

Photo by William H. McMichael





guarded inner perimeter. But the US project officer insists that US airmen will be safe.

"You not only have to get on the base, but you have to pass two or three checkpoints before you can enter" the new barracks complex, said Maj. Tom Laffey, a civil engineer normally stationed at Langley. "And then there are additional security measures."

The \$150 million project, paid for by the Saudis, was managed by the Saudi equivalent of the US Army Corps of Engineers in cooperation with US planners. The Saudis, Laffey said, "have designed this facility in cooperation with our own security experts and have incorporated our suggested design requirements."

nel would flock in the event of an attack. Aircraft crews employ tactical takeoff and landing techniques to minimize their low-altitude exposure near the base.

While the job is long on responsibility, it is slow on action. Day in and day out, the work of military cops features a mind-numbing repetitiveness under harsh conditions that challenge even the most motivated troop. "We had a six-hour sandstorm the other day," said SSgt. Chuck Hawkins of Lakeland, Fla. "It almost takes your breath. It's tough duty."

Security forces have a trick for staying awake on 12-hour guard shifts. They get fruit juice concentrate from a mess hall, pour an inch's worth into a half-liter water bottle, and fill the rest with water to make an incredibly sugar-rich drink. "They call it 'Saudi crack,'" joked one airman. "Keeps 'em awake for four hours."

Particularly dangerous is the work of the security forces at the search areas near the entrance gates, especially those who control the bomb-sniffing dogs. These dogs are trained to sit up when they detect a suspicious odor, to avoid possibly setting off an explosive device. Still, the specialists know that if a well-hidden bomb were to be triggered, it likely would happen during a search.

"You think about that just about every day," said SrA. Craig Fagan of Pittsburgh, who controls Pete, a powerful-looking Belgian Malinois. Fagan, normally stationed at Langley



*Thermal images picked up by an electronic camera are part of security forces routines in place at what may be the most heavily guarded US military installation. Just as important are mandatory ID checks.*

AFB, Va., said he takes proper precautions. "I make sure my dog clears that door before I open it."

Despite the hazards, he said, "I volunteered for this job. I'm willing to take those risks."

Added SrA. Brian Sartori, another Langley-based dog handler, "Someone's got to do it because [there're] 4,000 people on P-SAB. Someone's got to protect them."

Plans for early 1999 called for troops who were living in tents inside the US part of the base to move to a new barracks complex 6.5 miles away. The move figured to present new security challenges because the complex lies outside the heavily

In a supreme irony, the complex was built by the giant contractor, Saudi bin Laden Group—owned by the same family that produced international terrorist Osama bin Laden, now an outcast in his homeland.

Laffey said all due precautions have been taken.

The Air Force, he said, has arranged for "two separate, thorough, and intensive security sweeps" prior to actual occupancy. One "complete search" will be conducted when the facility is inspected and another complete search after furniture is delivered and before troops move in.

All told, the 160-building compound has "the highest state-of-the-



art security design," Laffey said. "We believe this is the best security system to keep our people safe."

### Camel Spiders and "Groundhog Day"

Troops who balk at a difficult task are often bluntly told to "deal with it." At P-SAB, they do. And the ways that troops cope are readily apparent. One sees nose-to-the-grindstone work ethic. Meticulous time management. Steely-eyed cynicism. Shoulder-slumping resignation. Escapism. And—in a few—even unremitting cheerfulness.

At P-SAB, it's hot. The terrain is practically featureless. Natural ver-

One airman likened the P-SAB experience to serving a sentence in a minimum security prison.

Many troops come here annually, some twice a year—and the plan to ease the deployment pace won't be in place until January 2000.

For most, each day is the same—just like in the movie "Groundhog Day," nearly everyone notes. They waken. They run laps. They walk to the showers and latrines. They eat. They catch a bus to work. They eat. They come "home." They eat. They work out/swim/read/watch TV/go to a movie/chew the fat. They have a snack—even, perhaps, an alcohol-free beer, because alcoholic bever-

ages are forbidden within the borders of Saudi Arabia, a strictly Islamic society.

They go to bed.

Stop the average troop on the "street" and ask the day. Often, one draws only a blank stare in return. "I'm not sure," is a typical response.

Base officials have done their best to provide diversions, and there are plenty: fitness centers and organized sports areas, four swimming pools, a recreation center, free video rentals, fast-food vendors, biweekly movies, and monthly "birthday bashes" at which senior leaders ladle and serve dinner for the honorees. Airmen are allowed two 10-minute calls home a week. E-mail is available to everyone.

The accommodations in no way resemble regular military barracks, but living conditions could be worse, most airmen admit. Each tent has its own central air conditioning, heating unit, and wooden floor. Each has a refrigerator, TV with 10 cable channels, and a video player. Each resident has his own "space," with a bed, wall locker, and nightstand. Command tents have their own telephones.

Now for the negatives.

After a typically hot day—daytime summer temperatures can reach 125 degrees—the tents don't cool off until night falls. That's tough for those working the overnight shifts who are then forced to try to sleep in



min include scorpions and poisonous snakes. It stands a long 50 miles from Riyadh and much farther from anywhere else. P-SAB redefines the expression "middle of nowhere."

In Riyadh, there is civilization and shopping. But with the terrorist threat so high, most of the troops stationed at Prince Sultan—mostly Air Force, with a few hundred Army, Navy, and British and French personnel—cannot leave the base.

Instead, they have resigned themselves to living in a 2.5-square-mile city of sand, in one of the 750 tents that dot the US section of this massive Saudi base. Here they stay for tours that last from 45 to 120 days. Forty-five supervisors and commanders spend a year at Prince Sultan, although each receives 30 days of leave during that period.



Camel spiders, F-15s, tankers, Rivet Joint, and AWACS aircraft are part of the P-SAB landscape. USAF airmen spend 45 to 120 days here, in some specialties as many as 180 days. Some commanders and supervisors are here for a year.

Photos by William H. McMichael



broiling heat. The latrines and showers are in large tents and trailers that are in some cases several hundred feet from the troop tents.

Most of the year, shower water is heated by the sun, so it's scalding hot during the day and cold by morning. The bathrooms stink perpetually. Chow hall food is not universally loved.

Heat stress is a common problem for newcomers unaccustomed to the temperature and dryness—and the need to drink more than two gallons of water daily. That's bottled water only, used even when brushing one's teeth. Any lapse in personal hygiene can bring about a quick case of diarrhea. Rashes are common. So are sports injuries. Lots of folks break their teeth on hard candy, a staple at work stations everywhere.

All this serves to make the days pass slowly. After a while, the annual, sometimes semiannual, visits to the desert start to become a blur.

The frequent and often lengthy deployments produce the No. 1 negative for those assigned to P-SAB: family separation.

The flying squadrons that enforce the UN-mandated no-fly zone over southern Iraq come to Prince Sultan for 45 days at a stretch. That's well short of the 120 days most others spend here in the desert. On the other hand, the fliers come back every five months. Especially in demand are the crews of the E-3 Airborne Warning and Control System radar aircraft and the supersecret RC-135 Rivet Joint electronic reconnaissance aircraft that come to P-SAB at least twice a year. Most of those who work with the RC-135, based at Offutt AFB, Neb., serve about 120 days a year in Saudi Arabia, but some pull as many as 180 days. One crew chief, TSgt. Ken Haggett, has been in the Middle East 792 days on a variety of Air Force missions since the Gulf War ended in 1991.

"It's something you've got to deal with," said Haggett, of Marblehead, Mass. "It depends on how strong your relationship is with your wife. You don't have an option. You have to go."

Two Rivet Joints remain at Prince Sultan at all times. In late 1998, the Rivet Joint fleet passed the milestone of 3,000 days of continuous deployment in the region, officials said.

Some airmen survive by immers-

***Remote, hot, and noisy, life at P-SAB will improve as airmen begin to move into the newly completed 4,257-bed dormitory complex. Airmen have been living eight to a tent, walking to other tents for meals and bathroom facilities.***

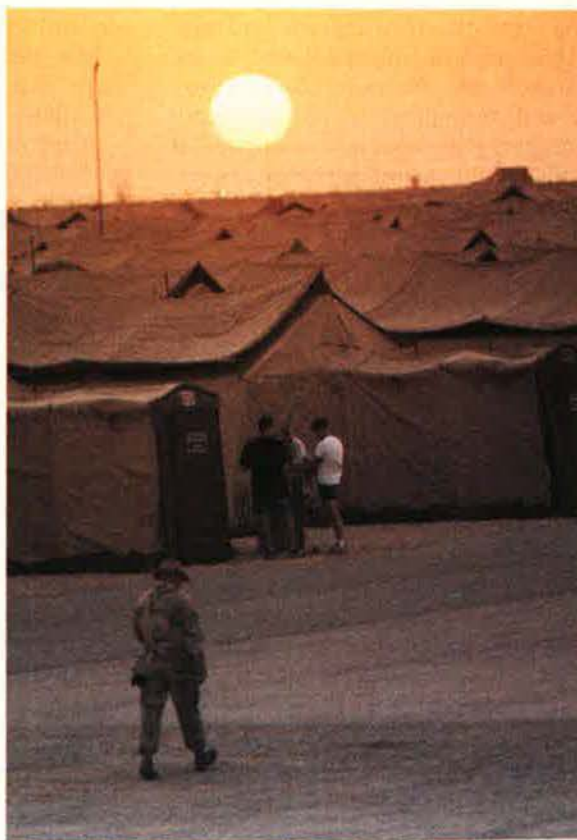


Photo by William H. McMichael

ing themselves in work, pulling six- and seven-day work weeks just to keep their minds occupied. That's not always smart, though, one medical officer said.

"One of the biggest issues around here is fatigue," said Maj. Jim Carroll, a physiologist from Langley attached to the P-SAB field hospital. Those who work nights, he maintained, are especially susceptible. "People who try to sleep during the day can't sleep because of the heat, light, and noise," he said. "They become dangerous to people around them."

Even so, most airmen seem able to cope. Many immerse themselves in team sports, such as the spirited volleyball games frequently played under the lights.

Others lift weights in one of the fitness centers, swim, or run or glide on in-line roller skates around the tent city in 1.36-mile laps. They circle the tents at all hours—even, for some diehards, at midday, when just standing under the sun creates the sensation of being literally cooked.

Or, like enlisted leaders of Langley's 27th Fighter Squadron, they spend their evenings gathered in the darkness outside their tents, seated around picnic tables or on "couches" fashioned from cots lashed together and

hung from makeshift wood frames. They drink sodas and "near-beer," smoke cigarettes, gripe about the desert mission, and trade tongue-in-cheek jibes.

The appearance around the tents of a camel spider—actually one of the large spider-like scorpion relatives known as solifugids, possessed with legendary quickness and aggressiveness—provides fresh grist for after-work chatter.

Everyone has a camel spider story. "We were riding along on a patrol, and a camel spider chased our car," insisted AIC Miriam Lopez of Chicago, a member of the base's security force. "We stepped on the gas. He kept up for a little while." SSgt. Chuck Hawkins of Lakeland, Fla., a fellow security forces specialist, nodded assent. "They're fast," he said.

Insects like P-SAB. It offers the only shade within 50 miles.

Some airmen stay glued to the tube. SSgt. Jamie Fore of the 27th FS watches the quiz show "Jeopardy" every night. Televised sports are hugely popular. Chapel services are held nearly every night inside a large, well-appointed tent. The brokenhearted can find counseling there, as well.

Nearly every night, TSgt. Mike "Tiger" Smith strolls to the center of



the tent city, electric guitar and miniature amplifier in hand. There, seated on the steps of a trailer, Smith plugs in and starts playing and singing for passersby. He specializes in popular song melodies with personalized lyrics. One favorite goes to the tune of the 1959 Ritchie Valens hit, "La Bamba."

*I wanna get out of P-SAB*

*I wanna get out of P-SAB*

*'Cause if I don't, I'm a-gonna go crazy.*

Airmen said it's tough feeling trapped in the desert, never leaving the base, living in a tent, and having a sense that there is absolutely no privacy.

"Last year, we pulled 90 days," said A1C Terry Reed, a crew chief of the 71st Fighter Squadron based at Langley, referring to the length of a 1997 deployment. "I was about ready to kill the people I worked with."

P-SAB is a place so terminally monotonous that one measure of quality of life is the type of latrine one uses and its proximity to one's tent.

When USAF began seriously developing Prince Sultan after the Khobar Towers blast, latrines were open-bay models. Last year, the Air Force began replacing them with latrines in white metal trailers with

separate stalls and doors for each commode. The improvement was such that they immediately earned the name "Cadillacs."

They don't smell much better than the old models. In fact, they're worse, because no one uses the old models, creating more business for the Cadillacs than they can handle. No matter where one stands in P-SAB, a slight stench of sewage can be discerned.

At night, side streets are darkened, making flashlights essential equipment for most. Some find alternate ways to navigate. "One of my supervisors counts the number of steps from his tent to the showers," said SrA. Cliff Vangieson, a finance clerk from Ramstein AB in Germany. "It's exactly 100."

Whether one counts steps, indulges in black humor, or reads *War and Peace*, exercising the mental muscle may be the key to maintaining sanity at P-SAB.

"You've got to keep your mind occupied," said Maj. Cameron Burke, a Rockville, Md., native assigned to the AWACS squadron. "You have to set a goal—little goals from week to week—to help you get through."

### Fighting Frustration

The 27th FS came to Saudi Arabia

in August knowing that if war broke out, less than three-quarters of its 18 F-15 fighters would be fit to fly into combat.

The reasons for the deficit represent a microcosm of the problems facing the Air Force today: aging fighters, shortages of spare parts, and a shrinking pool of experienced mechanics.

Many of the 27th's technicians are leaving the Air Force to escape a seemingly continuous stream of overseas deployments on top of the normal time spent away from home for training.

Often, the overseas trips end up at hot, isolated P-SAB. The living conditions and separations are bad enough, but those problems are compounded by another: parts shortages that leave airmen questioning the nation's commitment to their duty in the desert.

The 27th FS, for example, doesn't have enough money for spare parts for its aging F-15Cs. To patch the problem, the 27th "cannibalizes" one or more fighters at a time, robbing parts from some to keep others flying.

"We have one-third of our aircraft broken at all times," said Capt. Monty Deihl, the 27th's maintenance officer. "We have wasted over 1,000 man-hours in five weeks moving spare parts, because we don't have parts."

The missing parts range from simple brakes to the "black boxes" that are at the fighter's nerve center.

Additional money will not provide a quick fix. Said Deihl, "Even if they gave us all the money we needed for parts right now, it would be two to four years before we actually see the parts in the field."

Forty percent of all sorties flown, Deihl said, require the movement of a part within or between aircraft. The shortages degrade the unit's combat capabilities.

Lt. Col. Charles K. Shugg, commander of the 27th FS, was asked how many of his 18 F-15s could be launched into combat on a single day's notice. He replied, "Probably 13 or so." A year ago, he said, the answer would have been "14 or 15."

If the unit had enough trained workers, more fighters would be available because cannibalizations could be performed more quickly, Deihl said. But the unit came to



*SrA. Christopher Parks, a maintenance crew chief, checks over an F-15. The 27th Fighter Squadron, from Langley AFB, Va., went to P-SAB in August with a shortage of spare parts for its F-15s and 50 fewer fighter maintenance crew members than it is authorized.*

Photo by William H. McMichael





Out in the desert, on the front lines of the effort to keep an eye on Iraqi forces, the US military's ongoing budget crunch is equally perplexing.

"No one wants to be the guy who can't get the job done with less money," said Capt. Mike Fontaine, an F-15 pilot with the 27th. "You see on CNN the news about record budget surpluses, and then you go out to your jet that doesn't have any spare parts. And this is important to the country?"

At every turn during a trip to Prince Sultan, one sees members of the military working with efficiency and verve in a harsh, austere environment. They display both a sense of duty and a considerably wry outlook on life in the desert.

P-SAB with 50 fewer fighter maintenance workers than it is authorized to have—the product of declining retention.

The squadron was critically short of expert maintainers and had to make do with less experienced airmen.

"We should have about 25 percent at the apprentice level," Deihl said. "However, we average 40 to 50 percent. So we're short of manning in the first place, and then we're short of skilled manning."

"It puts the pressure on the younger guys," said A1C Roosevelt Jones, a 22-year-old crew chief, "and they're not ready to do the job."

The crews are under pressure to produce combat-ready fighters for the daily no-fly missions. Amn. Philip Hepfer, 19, said, "They expect to show it to us once, and we're expected to know how to do it."

Lt. Col. Jimmy Clark, the squadron operations officer, pointed out that the problem extends to fighter pilots. Over the past 18 months, he said, four of the 27th's mid-career pilots—those with experience to lead four-aircraft units into combat—became eligible to separate. All did.

"That's a zero retention rate," said Clark. "The Air Force is expecting a 70 percent retention rate."

Elsewhere, one finds similar problems. "I've lost six guys with 124 years of experience since January," said MSgt. Tim Weathers, who op-



**Fitness and recreation centers, swimming pools, fast-food vendors, and team sports break up the monotony, but pilots and other personnel are frustrated because they don't see an end to American deployments to the Gulf.**

erates refueling booms for the 6th Air Refueling Wing out of MacDill AFB, Fla. "They've replaced them with four guys with no experience."

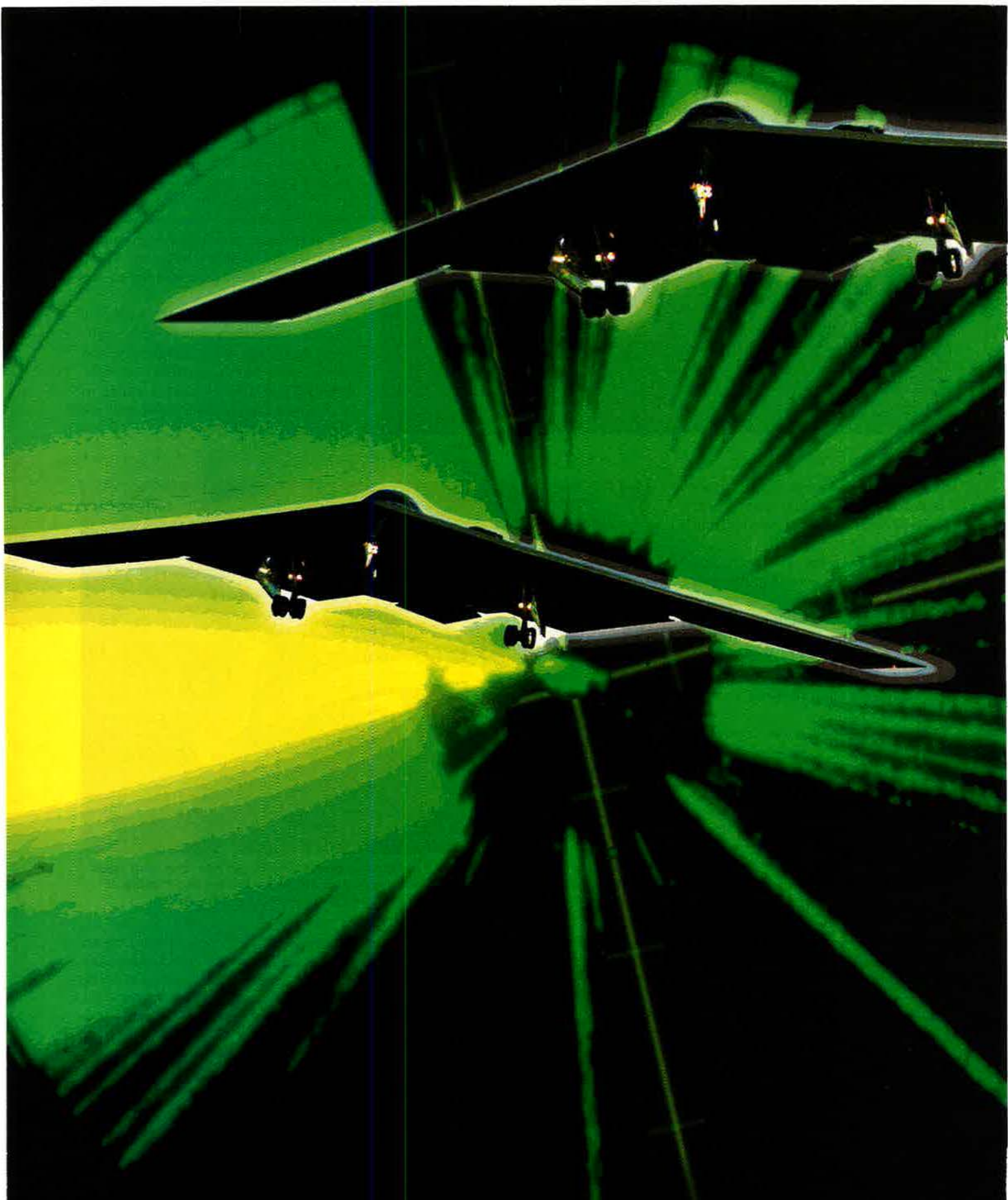
Many at Prince Sultan are perplexed at the nature of the American deployments to the Gulf. "We're not seeing any finality to it," said Capt. Craig Campbell, a 27th FS F-15 pilot from Thousand Oaks, Calif. "We're soldiers. We'll do what we're told, but we won the war eight years ago. Nobody's dying, but we're slowly bleeding the Air Force to death."

Inside the F-15 operations center, a sign on the wall proclaimed the 27th FS rotation to the desert to be the "Anthrax Tour '98"/"Hurts So Good." Everyone here has had at least their first round of anthrax inoculations. The initial round includes three shots. At least one of the three hurts—a lot.

"Maybe when the dorms are built, things will be a lot better," observed crew chief Jones, referring to the oft-delayed completion of the Friendly Forces Housing Complex, where troops now living in tents were scheduled to move early in 1999. "But they've been telling us we're going to move in for the past one-and-a-half years." ■

*William H. McMichael, the military reporter for the Newport News (Va.) Daily Press, recently spent six days at Prince Sultan AB in the Kingdom of Saudi Arabia. This is his first article for Air Force Magazine.*





**The invention of radar changed the balance between attacker and defender—but it was changed again by the invention of stealth.**





By Rebecca A. Grant

# the Radar Game

**S**INCE World War II, the radar game between attackers and defenders has determined who will control the skies. The winner of the radar game gains the ability to bring the maneuver and firepower of air forces to bear against a foe or to deprive an enemy of this power. Highly survivable aircraft will contribute directly to achieving joint force objectives, and the ability to project power with efficient and effective air operations will depend on winning the radar game.



Aircraft survivability depends on a complex mix of design features, performance, mission planning, and tactics. The effort to make aircraft harder to shoot down has consumed a large share of the brains and resources dedicated to military aircraft design in the 20th century. Since the 1970s, the Department of Defense has focused special effort on research, development, testing, and production of stealth aircraft, designed to blunt the power of defenders to detect them and thus defeat or destroy them.

Stealth technology minimizes aircraft signature in several ways but most notably by greatly reducing its radar signature. Future plans for the Air Force F-22 and the triservice Joint Strike Fighter call for the nation to continue to procure advanced Low-Observable (LO) aircraft for the military. The Navy F/A-18E/F Super Hornet has a different and far more limited type of stealth. They mark the latest phase of the radar game.

For decades, the balance between the air attacker and air defender has shifted back and forth. However, invention of radar on the eve of World War II radically changed the balance of power in the air. During World War I, visual detection in daylight did not exceed 15 miles. Even in the late 1930s, defenders expected to listen and watch for attacking aircraft. By 1940, however, radar could spot incoming aircraft at a distance of more than 100 miles. Early detection gave defenders much more time to organize their air defenses and to intercept attacking planes. Radar height-finding assisted anti-aircraft gunners on the ground. Primitive airborne radar sets were installed in night fighters in the later years of the war.

### Three Timeless Elements

In short, the radar game had begun. The game is about survivability. Elements of the survival duel emerged first during World War I, before the appearance of radar, and reappeared in World War II, Korea, Vietnam, and Desert Storm. There are three parts: detection, engagement, and probability of kill. Detection refers to spotting and tracking enemy aircraft. Engagement means fighters attempting to close with the enemy or ground-

based defenses tracking and firing. Probability of kill means applying enough firepower not only to hit the other aircraft but to actually destroy or disable it.

The defender attempts to complete each stage. Without detection, no engagement is possible. Without engagement, there is no probability of kill. On the other hand, the attacker's task is to thwart the defender at each stage. Ideally, the attacker would enjoy total surprise and arrive at the target undetected. If detected, pilots evade or prepare for engagement. If engaged, they seek to destroy or avoid enemy aircraft and to dodge enemy surface fire. If the aircraft is hit, probability of kill would depend on the nature and extent of the damage.

What is the payoff for signature reduction by means of a smaller Radar Cross Section? Achieving a lower RCS degrades the ability of enemy radar to detect, track, and engage aircraft. Lower RCS means aircraft are detected much later. A combat aircraft's RCS varies with aspect and with the frequency of the radar attempting to track it. According to theoretical principles, very low frequency radar waves may often be able to detect such aircraft. However, if RCS reductions are optimized to the higher frequencies of fire control radars, significant benefits can be achieved.

Lowering the aircraft's observability to radar allows the aircrew to complete more of a mission before becoming vulnerable to radar-controlled weapons. This provides the attacker the advantage of avoiding the threat and minimizing the time in the "red zone" where detection leads to valid Surface-to-Air Missile shots. Also, stealth enables attacking aircraft to get closer to their targets. For example, shrinking SAM rings makes the SAM site and the targets it attempts to defend much more vulnerable.

For the purposes of this analysis, aircraft radar signature levels fell into five categories. Starting with the least advanced, they were:

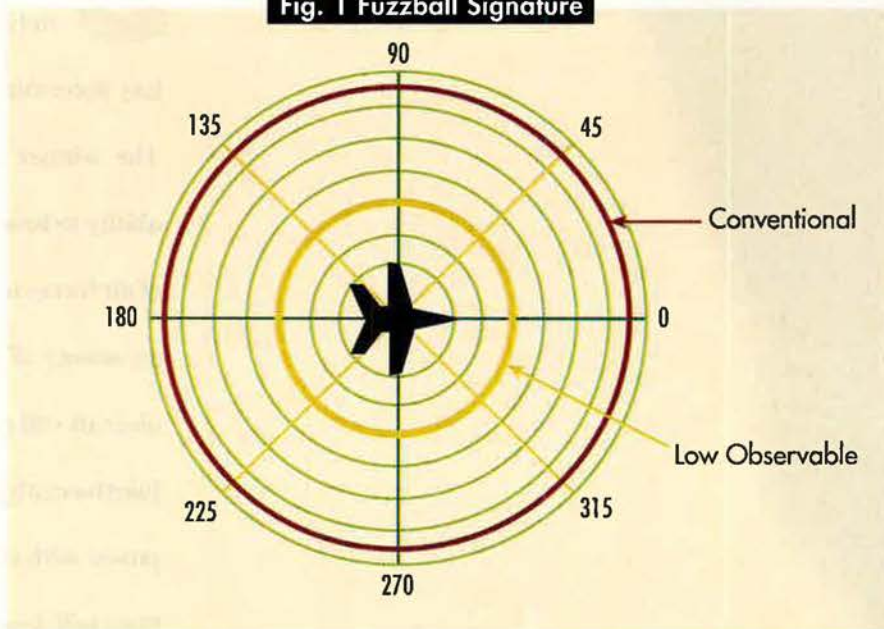
- Conventional—no signature reduction and a large RCS.
- LO1 and LO2—levels of RCS reduction in the stealth zone but still not as low as aircraft may achieve.
- Very Low Observable 1—highly desirable and achievable RCS reduction.
- VLO2—hypothetical extreme not likely to be achieved.

To simplify the data presentation, Figs. 5-10 portray each radar signature type only in the "mid-range" VLO1 form.

### A Tale of Three Shapes

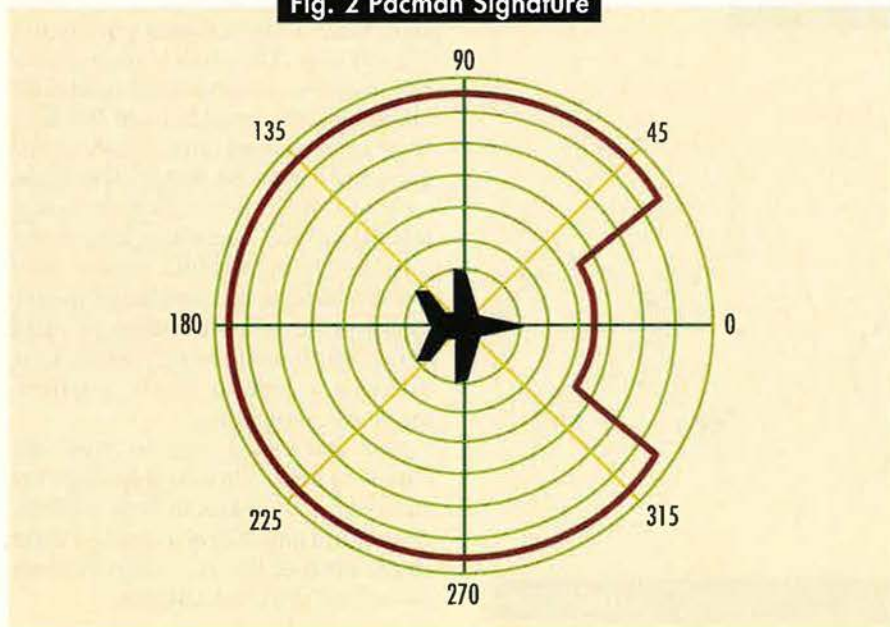
Combat aircraft in today's inventory employ a number of different techniques for reducing their Radar Cross Sections, which are of three

Fig. 1 Fuzzball Signature





**Fig. 2 Pacman Signature**



different shapes. The Fuzzball, Pacman, and Bowtie shapes are highly simplified symbols for basic signature patterns. Actual signatures are considerably more complex, of course, and information about them is restricted. The three shapes are used to depict how general patterns of RCS reduction give attackers a revolutionary edge.

**Fuzzball.** A conventional, non-stealthy aircraft has a Fuzzball signature (Fig. 1), one which is constant from all aspects. Fuzzball is the ideal shape for a stealthy aircraft, with uniform reduction at all angles. It could in theory achieve remarkable results at the lowest levels. Theoretically, a perfect Fuzzball with a uniformly reduced cross section at -55 decibels would deny any radar return. However, a stealthy Fuzzball RCS is purely hypothetical and is used here only for illustrative purposes.

**Pacman.** This signature type (Fig. 2) is a simplified approximation of the RCS of a conventional aircraft retrofitted to reduce signature in the front aspect only. Within certain parameters, modifications can reduce RCS and improve survivability. For example, the Navy's new F/A-18EF will emphasize front-aspect stealth. Applying Radar-Absorbent Materials to forward surfaces, shielding inlets, ducts, and canopies, and minimizing ordinance and other protrusions are

some of the measures that can lower RCS from the nose-on angle. Rear and side aspects would not be reduced. Thus, in this notional case, a retrofitted aircraft might have a signature reminiscent of the creature in the early 1980s Pac Man video game.

**Bowtie.** This hypothetical signature type (Fig. 3) is smaller in front and rear aspects than it is from the side. That would form something like a man's bow tie. In simplified form, the theoretical Bowtie shape has a 15 dB reduction in RCS in its front and rear aspects. The Air Force's F-117,

B-2, and F-22 and the triservice Joint Strike Fighter are designed to be true stealth aircraft that are low observable from all aspects. Hypothetically, true stealth aircraft may achieve their smallest signature levels in the front and rear aspects. This might form a shape like a man's bowtie.

Stealth aircraft operations left the realm of computer simulations and training and endured the test of combat nearly a decade ago, in 1991. Air operations in Desert Storm illustrated that reduced RCS could indeed enable the F-117 to accomplish missions in air defense environments that would have been too hazardous for aircraft with conventional signatures.

The F-117s drew the most dangerous missions of the first night of the war. Iraq's early warning radars, whose coverage reached well south of the border into Saudi Arabia, were designed to detect attacking aircraft as they approached Iraqi airspace. Sector operations centers would then coordinate tracks of the attackers, alerting SAM batteries and fighters as the mission profiles emerged.

As a postwar survey described it, these F-117s "flew into, over, and through the heart of the fully operating air defenses." By doing so, they struck targets that weakened enemy air defenses and military command and control, with

**Fig. 3 Bowtie Signature**

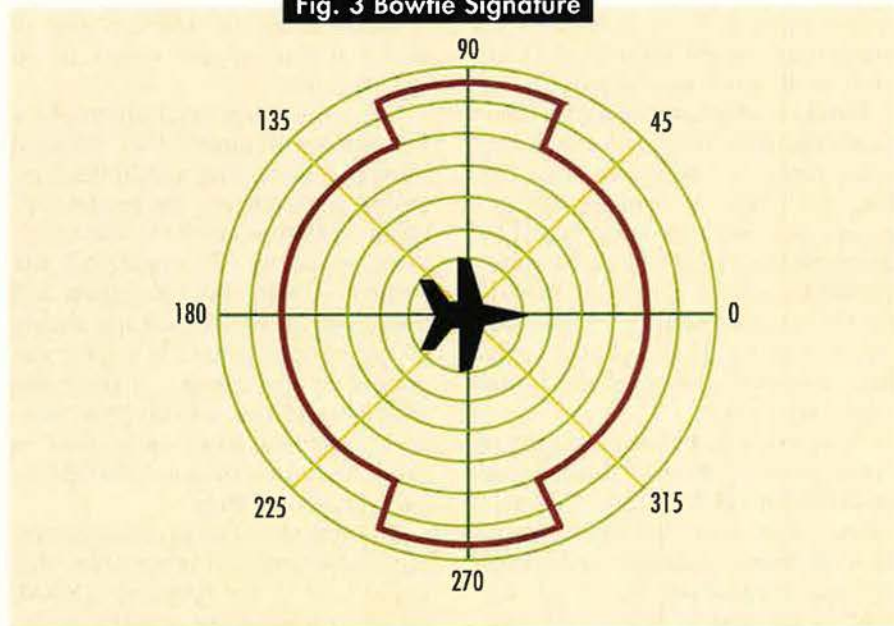
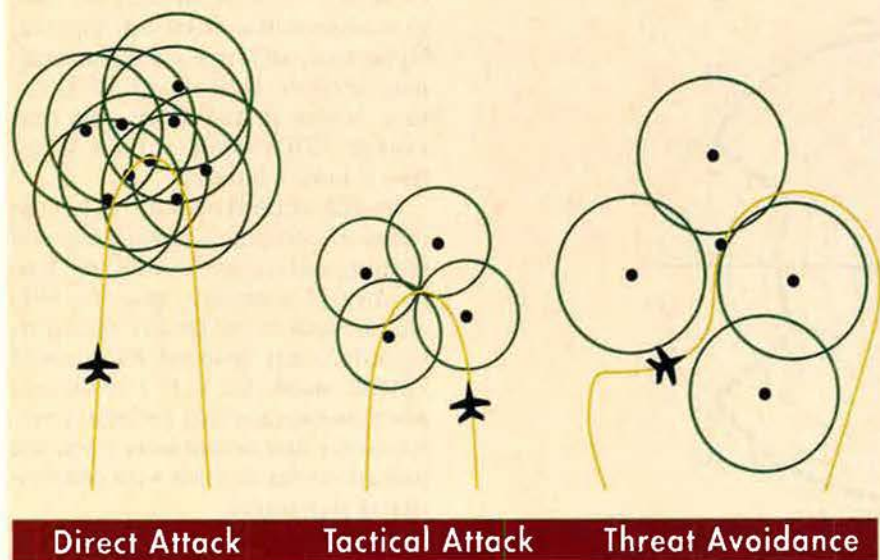




Fig. 4 Future Attack Scenarios



important effects for subsequent air operations.

Overall, the F-117s logged 1,297 sorties with no losses. With no attrition, the Joint Forces Air Component Commander was free to employ F-117s against any high-value target. As an official Air Force study concluded, "Throughout the war, they attacked with complete surprise and were nearly impervious to Iraqi air defenses."

### Duels of the Future

F-117 operations in Desert Storm demonstrated that direct attacks in heavily defended regions could be carried out by these LO aircraft. The record of the F-117s pointed toward many future applications for LO aircraft in the joint air campaign.

Future scenarios will not be identical. Heavily defended areas may have more air defenses than did Iraq in 1991. A number of scenarios will involve what might be described as a medium-threat environment, where a mix of mobile SAMs presents planners with a different type of challenge. On top of this, strike objectives of the future could also vary.

This article is based on results of simulations of three different threat environments of the future. The simulations were run to help illustrate how different signature reductions become controlling factors in aircraft survivability and in air cam-

paign planning. These three scenarios were studied using a simplified version of a common air defense simulation model. Each environment mirrors the types of attacks that the joint forces commander may call on the air component to perform (Fig. 4).

- Direct Attack simulated a mission into a heavily defended region to attack a high-value target such as a command and control center or a weapons of mass destruction storage site.

- Tactical Attack ran a simulation of an attack on a target that is part of a fielded military force.

- Threat Avoidance featured aircraft flying a carefully planned route around known air defense sites to attack a time-urgent target in an isolated area.

The simulation itself employed a mission-level model that focused on events occurring within the integrated air defenses. The model captured variables such as the decisions made by the command and control system, the allocation and operation of SAMs, and the ability of the various radars in each component of the system to track the attacker and fire a valid shot. Several variables were simplified in order to extract the unclassified results presented here.

Simulated sorties produced a certain number of valid detections that could lead to the firing of a SAM. Graphs recorded the number of de-

tections judged as leading to a valid shot. Once a shot was fired, the action did not stop. The model continued to run so as to record the total number of detections that could result in shots fired at each signature shape on ingress and egress. No attempt was made to assess how many shots it would take to kill the aircraft or how many missiles the air defense system possessed. Instead, the simulation sought to assess the relative change in valid detections leading to a SAM shot for different signature levels, countermeasures, and tactics.

One interesting way to view the data is to track "time in jeopardy" for each shape as measured from the time fire control units begin to register valid shots. Each of the three scenarios are run at two different altitudes.

### Scenario 1. Direct Attack

The Direct Attack scenario posited an attack on a capital city in 2010. Key military targets are ringed with overlapping modern long- and short-range SAMs of a modern Integrated Air Defense System (IADS). The air defenses are generally positioned to maximize coverage. Only regions of major military importance are worth the investment of overlapping coverage. Where SAM detection rings overlap, coverage is so dense that it is intended to ensure a kill.

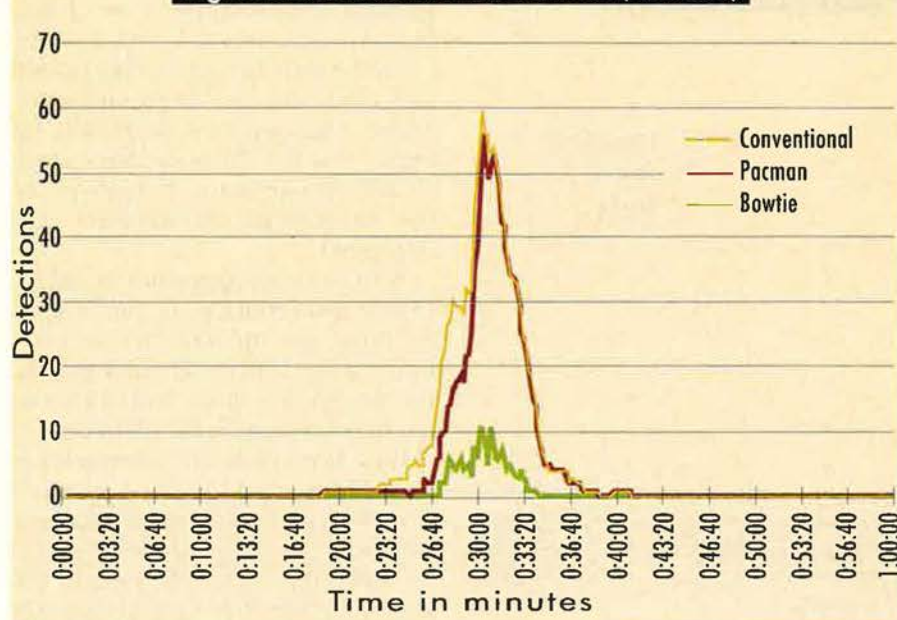
To attack, the aircraft must penetrate to its weapons release points even with threats from SAMs coming from all sides. The Direct Attack environment exposes aircraft to numerous radars, as would be expected in such an attack. In this most dangerous environment, a conventional aircraft signature suffers from both sustained, early detection and from a gigantic spike in detections over the target area.

In Figs. 5 and 6, the yellow line corresponds to an attack mission flown by a conventional, non-stealthy aircraft at an altitude of 500 feet and 25,000 feet, respectively. Flying the mission at low altitude yields improved survivability, but not much.

In Figs. 5 and 6, one sees how the Pacman shape performs in the Direct Attack environment, at both low and high altitudes. An aircraft with a Pacman signature, having only front-aspect stealth, fares only



**Fig. 5 Direct Attack at Low Altitude (500 feet)**



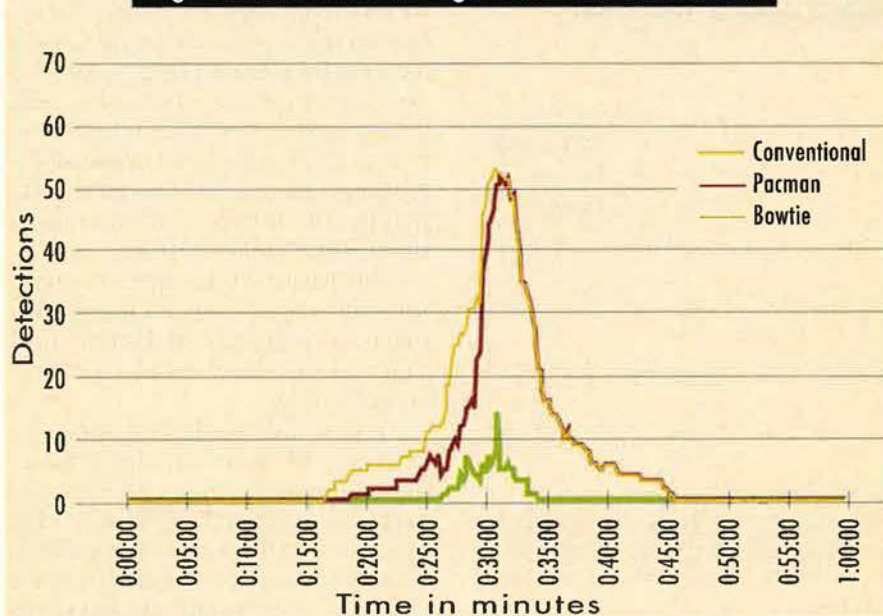
slightly better than the conventional shape. At low altitude, enemy detection of the Pacman-type aircraft occurs at about the same times as that of the conventional aircraft. At a point about nine minutes later, radar detections of the Pacman shape still number about 10, while the conventional shape has suffered about 30 radar detections. However, from that point on, the detection rates for both spike dramatically; Pacman suffers more than 50 detections over the target area.

Fig. 6 shows that, even at high alti-

tude, the story essentially is the same. Pacman-type reductions would be of limited value to the campaign planner. Even when “nose-on” reductions put that part of the signature in the Very Low-Observable category, the number of engagements remains almost as for non-stealthy aircraft. The aircraft, as it flies away from the target, exposes large areas where its signature is not reduced.

Aircraft having Pacman-type RCS would not have a good chance of completing the mission. Attrition

**Fig. 6 Direct Attack at High Altitude (25,000 feet)**



tion rates would be high. This factor would make it difficult for the JFACC to count on sending such aircraft to attack heavily defended nodes. The JFACC would devise an air campaign plan that focused on rolling back air defenses prior to launching Direct Attacks of this sort.

Figs. 5 and 6, however, show that an aircraft featuring the Bowtie RCS shape, with significant all-around reduction, display a notable increase in survivability. The Bowtie RCS shape has two effects. First, the aircraft's time in jeopardy diminishes. Second, signature reduction causes a drop in the number of valid shots. At low altitude, the aircraft spends only about seven minutes in jeopardy, compared to 23 minutes for a conventional signature shape in the same scenario. At high altitude, the figures are eight and 29 minutes, respectively.

Tactical advantages of Bowtie RCS are potentially enormous. Front and rear aspect reduction, especially at lowest signature levels, greatly increases survivability against overlapping SAM coverage. The aircraft pounces on the air defenders, not even coming into the region of vulnerability until it is very near the target. Even over the target, defense radars record only about 10 detections at low altitude and 14 at high altitude.

### Scenario 2. Tactical Attack

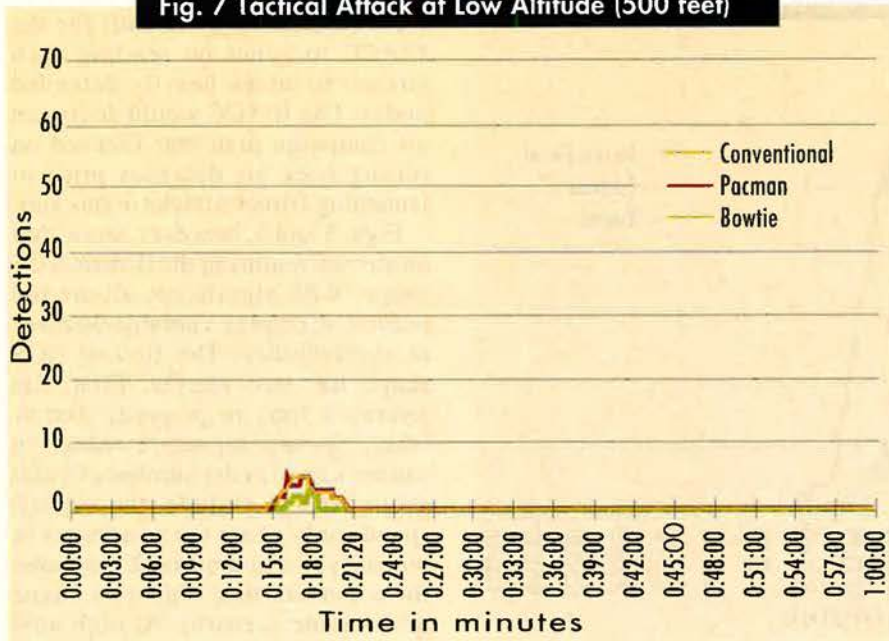
Tactical Attack is a scenario in which the air defenses are less dense but where numerous sorties will be flown either as part of peace enforcement operations or as part of wartime attacks on enemy forces in the field.

Some critical and demanding types of air operations entail attacking fielded military forces. In Desert Storm, for example, more than 70 percent of all sorties were flown in the Kuwait Theater of Operations in a tactical threat environment. The Tactical Attack scenario postulated an environment where forces on the move will bring along mobile, shorter range SAMs.

Fig. 7 lays out simulated radar engagement tracks corresponding to the three basic RCS types as the aircraft engage in Tactical Attack runs at low level—about 500 feet. As can be seen, such low-level at-



**Fig. 7 Tactical Attack at Low Altitude (500 feet)**



tacks put great stress on mobile SAM operators. Even conventional, non-stealthy aircraft encounter relatively few radar detections. Pacman's performance is not substantially different from conventional. The aircraft with the Bowtie RCS is hardly detected at all.

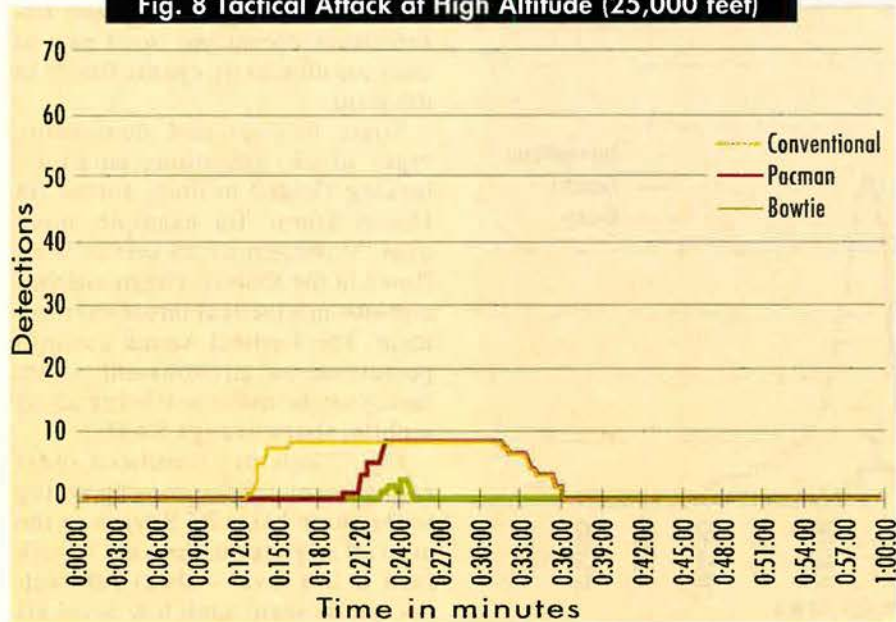
In Fig. 8, the yellow line denotes the simulated engagement track of a conventional aircraft shape at high altitude. Detections are fewer than in the environment of Direct Attack. Even so, the conventional shape is still fired on for a long time. The nose-on reduction of the Pacman shape

keeps it from being detected until much later. Once inside a certain range, however, the Pacman's large side and rear signature areas make the aircraft as vulnerable to radar tracking as a conventional shape.

A major contrast is presented by the Bowtie shape. Its detection comes late, its vulnerability to air defense shots is minimal, and its time in jeopardy is brief.

The evident lesson is that Pacman's survivability advantages must be tightly coupled with the scenario. Nose-on RCS reduction of this type might be useful when

**Fig. 8 Tactical Attack at High Altitude (25,000 feet)**



an aircraft is part of a package performing lethal Suppression of Enemy Air Defenses to knock out fire control radars before turning to exit and exposing the large signature areas. Attrition risks will still be higher for the Pacman shape than for the Bowtie shape, but prospects for successful employment are improved.

Altitude is an important variable. In low-level attack runs, survivability improved for both the conventional shape and the Pacman shape. For the Bowtie shape, altitude does not make a significant difference.

Low-level operations bring their own kinds of dangers, however. Low-altitude runs face the danger of dense anti-aircraft gun threats. In Vietnam, over 85 percent of aircraft were lost to anti-aircraft fire. In Desert Storm, aircraft in the KTO reported sporadic dense anti-aircraft fire and shots from handheld infrared SAMs, even after the IADS had been reduced to almost zero effectiveness. The advantage of low-altitude missions—i.e., less vulnerability to radar detection—must be considered in light of threats from optically guided anti-aircraft fire, small arms fire, and handheld SAMs.

### Scenario 3. Threat Avoidance

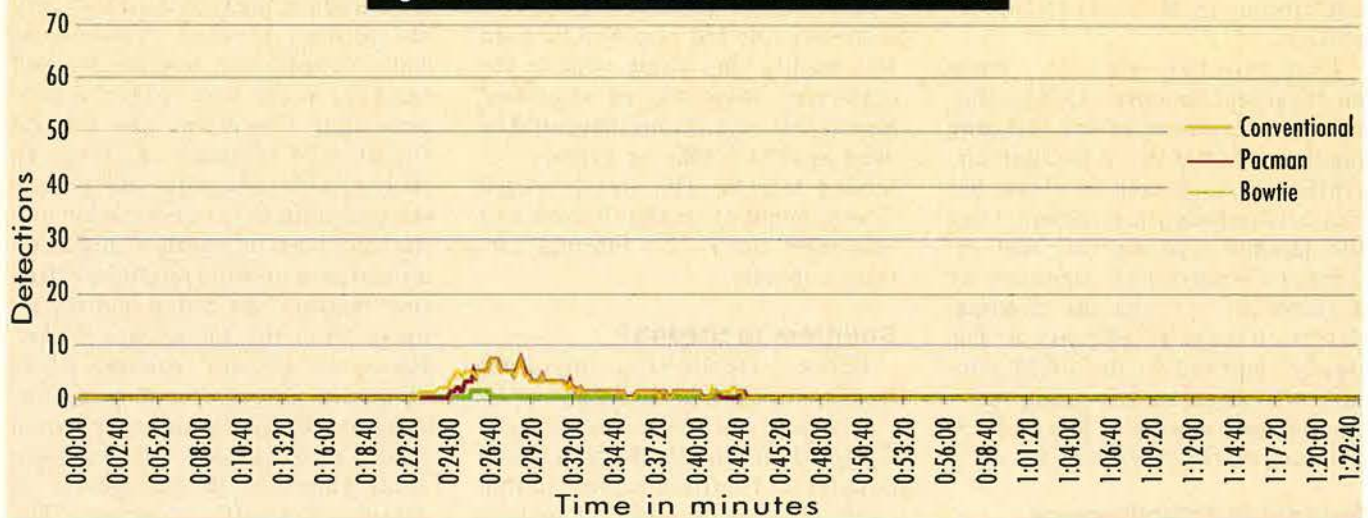
In the Threat Avoidance scenario, similar results emerge. This is another scenario in which an aircraft attacks a point target on a flight path that deliberately minimizes exposure to the fire control radars. The Threat Avoidance scenario relies on maximum use of tactics. In a carefully planned flight path, the aircraft skirts the edges of anticipated radar coverage areas. Low observables reduce the range of detection, and the SAM rings shrink, making the prospect of "threading the needle" much better.

The Threat Avoidance scenario presents convincing evidence that balanced signature reduction provides the greatest boost to tactics and planning.

Figs. 9 and 10 illustrate that aircraft with the conventional and Pacman signatures, even with effective route planning, will still face a high number of shots at low and high altitude. However, a real difference emerges when the simulation sends



Fig. 9 Threat Avoidance at Low Altitude (500 feet)



in the Bowtie shapes. The VLO Bowtie signature aircraft showed enormous improvement in survivability, experiencing only one valid tracking.

For the Pacman shape, what helped most was flying the attacks at lower altitude. Running the signature at low altitude minimized time in jeopardy and decreased overall shots taken.

The Threat Avoidance scenario confirms that significant low observables are essential to assured mission success. In Desert Storm, some targets could be attacked from low altitude by conventional aircraft. However, anti-aircraft fire was a factor; most attacks moved to medium altitudes as a result. British Tornados flew low-level attacks against Iraqi airfields and experienced some of the highest loss rates of the war.

The simulation showed that, as a survivability tool, going to lower altitude is not nearly as effective as reducing the signature. Moreover, the results suggested that flying at high altitude does not draw the aircraft out of the range of all SAMs, so stealth is important there, too.

However, the real message is that signature reduction enables the aircraft to plan a route that greatly increases the chances of survivability.

#### Stealth and ECM

The duels of the future may also draw on a combination of stealth and Electronic Countermeasures to improve aircraft survivability in specific scenarios. A conventional aircraft cannot operate safely in high threat environments until the integrated air defense is nearly immobilized. In theory, an extremely LO shape could be survivable in

almost any environment. However, planning for the majority of air operations falls somewhere in the middle of that spectrum. As threat radars expand their capabilities, stealth and ECM have a role to play in working together to increase aircraft survivability—especially when prompt attacks on key nodes have reduced the efficiency of the enemy IADS.

In some scenarios, ECM can also provide additional assurance for LO aircraft against certain types of threats. While analysts have established that the F-117s did not benefit from ECM support from EF-111s on the first night of the war, records suggest that the additional use of the EF-111 was welcomed by F-117 crews in subsequent missions. For aircraft without the F-117's signature reduction, or for aircraft operating

Fig. 10 Threat Avoidance at High Altitude (25,000 feet)





in other environments, ECM can contribute significantly to survivability.

Conventional aircraft return much larger signatures. ECM is limited by the power of the airborne jammer. Therefore, a smaller aircraft RCS is easier to cloak because it requires less power from the jammer. An aircraft that reduces its front-aspect signature by a factor of 10 cuts the notional detection range by 44 percent. The power required in the ECM jammer also decreases in proportion. For the same amount of power, ECM can jam more effectively.

### Improving Effectiveness

The first operational stealth aircraft, the F-117, and the B-2 demonstrated the feasibility of LO and their importance to rapid and effective air operations. Like all combat aircraft, they rely on tactics to reach peak survivability, and they have limitations that must be recognized to ensure proper employment. For example, the F-117 and B-2 operate primarily at night. Many conventional aircraft do the same to maximize survivability under some conditions.

Several developments will make highly survivable aircraft even more effective. The F-117's ability to deliver laser-guided bombs was a crucial component of its effectiveness. Recently, the B-2 has demonstrated great accuracy with the GPS-Aided Targeting System GPS-Aided Munition. Ability to deliver 16 independently targeted weapons in any weather represents a formidable improvement. In the near future, the development of small munitions will enable all aircraft to carry more destructive power. Testing is under way on 250-pound, 500-pound, and 1,000-pound bombs that pack the explosive force of the 2,000-pound bombs in today's inventory. When stealth aircraft can deliver more munitions early in the campaign, they will take up an even greater share of the air component's tasks.

With LO as the centerpiece, a range of technologies helps extend mission planning options and creates the tactical edge that translates to greater effectiveness and flexibility in air operations for a joint

force commander. The F-22 not only will be able to achieve a dominant air-to-air role but also will be used as a highly survivable vehicle for delivering advanced air-to-ground munitions—munitions that could be used against SAMs or heavily defended targets. The trend toward development of smaller bombs will maximize the F-22's internal carriage capacity.

### Counters to Stealth?

Because stealth is so important to current air operations and military strategy, it is reasonable to ask if and when it might be effectively countered. Historians contend that every military invention in history has been countered by new inventions or tactics, in due time. The radar game illustrates this principle, too. Radar changed the survivability duel during the Battle of Britain in 1940. Stealth changed it back fifty years later, in the Persian Gulf War of 1991. The most relevant question to ask is not "Can stealth be countered?" but "How difficult is it to counter stealth with known technology?"

To counter stealth with a monostatic radar, the air defense radar would have to greatly increase its gain at the receiver. The way to do this would be to greatly increase the power of the system. If the target aircraft had an RCS reduction of 1,000 the radar power would have to increase by a factor of 1,000 to detect it at the same range as a non-stealthy aircraft. However, increasing power is easier at long wavelengths—not at the short, rapid frequencies commonly used for fire control. Ultrawide band radar poses a similar problem. An ultrawide band pulse could emit waves at several different frequencies hoping to catch the stealth aircraft at a weak point in its RCS reduction. However, transmitting over a wide band diminishes the power in each band, cutting the efficiency of the radar.

The second issue in discussions of counter-stealth is that stealth

aircraft are designed against monostatic radars, the type used in nearly all military systems. Monostatic radar couples the transmitter and receiver at the same place, a process that simplifies the crucial function of distance tracking. In theory, a bistatic radar that placed the transmitter in one location and the receiver in another might be able to pick up what might be called the "trailing" RCS that is directed away from the monostatic radar. However, bistatic radars, while simple in concept, have many fundamental technical and operational issues to overcome, according to John Shaeffer, RCS engineer at Marietta Scientific in Georgia. The receiver antenna beam must intercept its companion transmit beam and follow the transmit pulse which is moving at the speed of light. Unless the transmitter and receiver pulses are synchronized, distance measurement is impossible. Even a workable bistatic radar must then address the problem of how much volume of airspace it can scan at a given power setting in a given time. When the receiver, transmitter, and target are located on a straight line, the receiver can be overwhelmed by the transmitter pulse, which hides the target's radar return. As Shaeffer put it, "This is similar to looking into the Sun for light scattered from Venus."

The RCS reduction of stealth aircraft is difficult to counter. Improvements in radar must go a very long way to match the performance they were designed to achieve against non-stealthy aircraft.

Winning the radar game will remain central to American success in future joint operations. Air defense threats have increased throughout the 20th century and will continue to do so in the 21st century. Stealth is no magic panacea, but the edge it offers in the radar game is indispensable. Paired with other advantages from ECM to advanced munitions, the effects of LO multiply and will keep the edge of America's airpower sharp. ■

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**Troop carrier airmen entered enemy airspace unarmed to deliver men and supplies.**

# Troop Carriers of World War II

By C.V. Glines

*C-47s tow gliders across D-Day  
beaches to landing zones in France.*





**T**HE exploits of World War II fighter pilots and bomber crew members inspired huge numbers of books, articles, and movies over the past half century, so much so that one might conclude that they were the only US airmen to face enemy fire in that epic conflict. It is a view that does not do justice to the troop carriers who faced combat danger on a regular basis.

Many transport crews flew their slow, unarmed, and highly vulnerable aircraft in formation, at low altitudes, and often at night beyond the front lines to deliver troops and supplies by parachute. In the same vein, glider pilots in fragile, motorless aircraft were towed over a battle area and cut loose to land infantrymen behind enemy lines.

The transport crew member flew through fire and flak and then returned to base through the same fire and flak. The glider pilot faced an inevitable landing that often ended in a crash. If he survived, he would then have to fight alongside the same troops he had just carried into battle.

USAAF Lt. Gen. Lewis H. Brereton, commander of the 1st Allied Airborne Army, offered highest praise. In a postwar statement, he noted that on many occasions transport crews doggedly flew their damaged or burning aircraft on to their assigned areas "in spite of the fact that [they] well understood that continuing on course destroyed any ... chance of survival for themselves."



**USAAF trained more than 4,500 troop carrier crew members and about 5,000 glider pilots during World War II. This Dutch farmer's backyard became a landing zone during one of the glider cargo missions they carried out.**

Of the glider pilots, Brereton said: "Not only did they deliver a magnificent and well-coordinated landing—which in many cases was in the midst of hostile positions—but were immediately engaged with their airborne associates in the hottest kind of hand-to-hand fighting."

Brereton's view is echoed by retired Col. Charles H. Young, a 1936 graduate of the Army Air Corps flying school who was recalled to active duty in 1942 to help organize and train troop carrier forces. Young later was named commanding officer of the 439th Troop Carrier

Group that took part in the Normandy invasion and airborne invasions of southern France, Holland, and Germany. In Young's view, the troop carrier airmen who dared to enter enemy airspace unarmed to deliver troops and equipment showed virtually unparalleled courage under fire.

### The First Drops

Young's book—*Into the Valley*—reports that the story of air troop carrier operations dates from 1918 in World War I. French two-man demolition teams were dropped behind German lines to destroy enemy communications. Some resupply of Allied forces by aircraft was carried out during the St. Mihiel and Meuse-Argonne campaigns of late 1918.

Development of this concept continued during the interwar years. In 1929–30 Italian paratroopers made several mass drops in North Africa, for instance. Soviet forces also experimented with airborne operations in the 1930s.

American interest in the transport of ground troops by aircraft began in 1931 when a field artillery battery was flown to Panama for maneuvers, followed by delivery, two years later, of a full division of troops for "hemispheric defense." Later, an infantry detachment was landed behind "enemy" lines as a surprise test during maneuvers at Ft. DuPont, Del. It was led by Army Air Corps Capt. [later Gen.] George C. Kenney. In May 1937, the 10th Transport Group



**Although it came late to the war, the C-46 Commando earned great fame airlifting supplies over the Hump in the China–Burma–India Theater. It also joined C-47s and gliders to drop paratroopers in the European Theater.**



was activated and trained with C-27 and C-33 transports.

However, the first real employment of the airborne assault concept in wartime occurred when a regiment of German paratroops made surprise drops on several airfields in Norway and Denmark in April 1940. The following month, Nazi glider troops made the so-called "silent" surprise attack on Ft. Eben Emael near Liege, Belgium—the first use of gliders in military combat. German Ju-52 transports towed and released nine DFS-230 gliders with 78 "parachute engineers" on board. They landed on the roof of the massive fortress and planted explosive charges that penetrated the 5-foot-thick walls and killed the protecting gun crews. The surviving garrison gave up the next day.

On the day of the Eben Emael attack, approximately 500 Ju-52s delivered five parachute regiments and one infantry division to objectives in Holland. The next month, Soviet TB-3 bombers dropped two airborne brigades into Romanian targets.

The Allies attributed the success of the Eben Emael action not to the men of the German glider force but to the blitzkrieg of tanks and Stuka dive bombing attacks that followed. Thus, the potential value of a gliderborne force was lost in a fog of misinformation and little notice was taken by American and British headquarters.

### Churchill's Instinct

Britain's newly elected prime minister, Winston Churchill, was impressed, however. He encouraged the War Office to analyze the German airborne attack in depth. As a result, the British military selected 500 men to form a glider unit and then ordered 400 Hotspur training gliders, each of which could carry 10 troops and be towed by heavy bombers.

The British Army had no enthusiasm for the idea and it stalled. However, Churchill was not to be denied. A glider pilot regiment was eventually formed. One of its initial missions was the November 1942 attack on the Vemork heavy-water plant in southern Norway, carried out by engineers who rode into the operation in British Horsa gliders. When one of the gliders crash-landed, German troops rounded up 14 airborne troopers and executed them by firing squad. The other Horsa crashed into a mountain. Eight troops died in the crash, another four died as a result of poisoning by the German captors, and five others died in a Nazi concentration camp.

On the Continent, Hitler was jubilant about the Eben Emael success and planned to make an airborne landing on British soil with paratroop and glider forces as soon as possible. He changed his mind when German aerial reconnaissance revealed that Britain had erected anti-glider poles and planted mines on prospective landing fields.

The concept seemed valid for German operations elsewhere. Paratroops and glider forces would provide increased mobility and allow vertical envelopment of the enemy's forces. Assault by air would add another dimension to the task of winning ground areas. This view was put into operation in the Mediterranean. Hitler approved a plan to capture British-held Crete with paratroopers and glider infantry. Beginning on May 20, 1941, a force of 22,000 men was deployed onto the island by 75 DFS-230 gliders towed by Ju-52 aircraft. They arrived in phases over the island. Hundreds of paratroopers dropped onto heavily defended airfields. After a week of bitter fighting, British forces were defeated and survivors had evacuated to Egypt.

This German "success story" had a strange ending twist, however. As it turned out, Germany paid a severe price for its Crete invasion, suffering about 5,000 casualties, many from the crack 7th Airborne Division. Hitler, furious at the losses, decided then and there to abandon any further use of gliders.

In the United States military, just the opposite was happening. Col. Bonner Fellers, the US military attaché in Egypt, studied the Crete operation in detail and wrote a colorful 258-page report in September 1941.

### "Epic in Warfare"

"The drama of Crete marks an epic in warfare," he wrote. "The concept of the operation was highly imaginative, daringly new. Combat elements drawn from Central Europe moved with precision into funnel-shaped Greece. Here they reformed, took shape as a balanced force, were given wings. The operation had the movement, rhythm, harmony of a master's organ composition. For the first time in history, airborne troops, supplied and supported by air, landed in the face of an enemy, defeated him."

In Washington, the Fellers report received a respectful hearing and was studied intently. Within months, in July 1942, the US Army Air Forces had established the First Troop Carrier Command. Its mission was the "transport of parachute troops, airborne infantry, and glider troops." It was to coordinate its activities with the air training commands from which it drew its crews, with the four continental air forces which carried the



*The C-47 Skytrain was the primary troop carrier aircraft. Here, C-47s line an English flightline, with an array of gliders on the inner rows, in preparation for an airborne invasion in Europe.*



main responsibility for unit training, and with the Army ground forces for which its training was conducted.

US troop carrier crews served in all combat theaters and were under the direct control of a separate troop carrier command answering to the theater commander. Between December 1942 and August 1945, USAAF trained more than 4,500 troop carrier crew members (pilots, navigators, radio operators, and flight engineers), along with about 5,000 glider pilots. By the end of the war, USAAF boasted 29 troop carrier groups.

The principal troop carrier aircraft was the Douglas C-47 or its C-53 variant, although Curtiss C-46s were also used later in the war. The 13-passenger, two-pilot Waco CG-4A glider made by more than a dozen companies was the most satisfactory of several competing models that were tried, and 12,700 were procured.

The USAAF troop carrier concept received its first major test in North Africa in November 1942. Thirty-nine C-47s carrying a battalion of the 503d Parachute Infantry Regiment flew nonstop 1,100 miles mostly at night and in poor weather from England over Spain to points near the Algerian city of Oran. Their mission: Release paratroops at designated drop zones to prepare airfields for an Allied invasion force.

However, intentions of the local French forces were not clear, communications were disorganized, and the units were poorly trained. Three C-47s were shot down or forced down by French fighters while others eventually assembled on a dry lake bed. Two troop carrier pilots and three airborne troopers were killed and 18 were wounded. According to Young, it was a misuse of airborne forces. Still, the US learned valuable lessons.

The next significant Allied airborne operation occurred in July 1943 when British and American troop carrier and glider pilots delivered troops during the invasion of Sicily. It was not a success. Young, after studying the operation, concluded it was undermined by "poor coordination of unit headquarters, imprudent planning, especially on the glider tow to the British sector on D-Day, inexperienced aircrews without proper training in night navigation and formation fly-



*Near Port Moresby, New Guinea, troops board a C-47 "Gooney Bird," heading into combat. The first US airborne operation in the Pacific took place on New Guinea in September 1943.*

ing, and trigger-happy Allied naval and army gunners who shot down more than two dozen American troop carrier aircraft on the missions."

These problems, he said, "combined to place the entire airborne-troop carrier program in jeopardy."

#### **MacArthur's Joy**

Still, the program moved forward. The first American airborne operation in the Pacific took place on New Guinea in September 1943. Eighty-four C-47s of the 54th Troop Carrier Wing dropped 1,700 paratroopers from the 503d Parachute Infantry Regiment to secure the airfield. Their landing was supplemented by C-47s and B-17s carrying supplies and some artillery. Gen. Douglas A. MacArthur witnessed the show from a B-17, "jumping up and down like a kid," according to then-Southwest Pacific Allied Air Forces head Kenney, who also witnessed the operation from the air and called it "a magnificent spectacle."

Between March and May 1944, another major US operation took place. Eighty CG-4A gliders and C-47s of Col. Philip G. Cochran's 1st Air Commando Group were used to land a force of 9,000 men, 1,300 animals, and 250 tons of equipment and supplies at bases in northern Burma. Most of the operation took place at night.

By the time of the Normandy invasion in June 1944, troop carrier planners had learned many lessons,

and they were put to their sternest test yet. In just two days, 27,000 troopers were dropped behind German lines by powered aircraft or put down there by one of more than 600 American and British gliders. There, they were used to help prevent German counterattacks and to open up breakout routes for following forces.

More airborne experience was gained in Operation Dragoon, the August 1944 invasion of southern France from Allied-occupied Italy. There, 9,100 American and British troops, 200 vehicles and artillery pieces, and 500 tons of supplies were air-dropped or glider-landed in CG-4As and Horsas. There were so few casualties that the American airborne soldiers dubbed it the "Champagne Campaign."

In the Low Countries, history's largest airborne assault, part of Operation Market Garden, began Sept. 17, 1944, and unfolded over two weeks. US and British troop carrier units mounted more than 5,000 powered and 2,200 glider sorties. Starting from various points, they delivered 24,000 troopers, 1,500 vehicles, 260 artillery pieces, and 3,000 tons of other equipment to back up the Allied invasion of German-occupied Holland. Combined losses were heavy; 1,400 men died and 6,000 were taken prisoner; 142 aircraft were lost and 1,200 were damaged.

The last German airborne assault—Germany's only night parachute operation—took place in mid-





**A cockpit view from a 17th Airborne Division glider shows the aircraft's fragility and how close they flew. The 1945 Rhine River crossing was the last use of a mass formation of winged aircraft to invade enemy airspace.**

December 1944 southeast of Liege in eastern Belgium. Ninety Ju-52s were dispatched with inexperienced crews to drop troopers near the Baraque Michel area south of Eupen, Belgium. Allied gunners shot down 10 with great loss of life. Most of the others got lost and never delivered their troops to the battle area.

### At the Bulge

Young said the Allied operation at the French village of Bastogne in the final days of December 1944 "will live on in the minds of troop carrier personnel as one of the most critical, albeit one of the most tragic, of the war." By Dec. 22, 1944, elements of the US 101st Airborne Division had dug themselves into fields and forests near Bastogne but found themselves surrounded by advancing German soldiers. Believing they held the advantage, German officers, under a white flag, entered the 101st camp demanding a surrender. Brig. Gen. Anthony C. McAuliffe issued a one-word, morale-boosting response: "Nuts!"

Without troop carrier resupply—ammunition in particular—the Battle of the Bulge would undoubtedly have turned out much differently, and McAuliffe may not have been as confident as he appeared. When the first airborne resupply missions arrived, each US artillery position was down to about 10 rounds. McAuliffe later admitted, "Had it not been for air resupply, the situation would have

become worse than desperate; it would have been untenable."

The US lost 26 percent of the troops in a 50-ship glider tow to Bastogne on Dec. 27, 1944—the highest proportion for any troop carrier mission of the war. To help iron out communication and coordination problems, USAAF trained combat control teams and pathfinder groups to mark drop and landing zones ahead of oncoming troop carrier "serials" and have pathfinder equipment and trained personnel in place on the ground when the troop carrier forces arrived. They operated on special VHF radio frequencies to assure discrete ground-air communications. In addition, intership communications were established between troop carrier forces and protecting fighters over the target areas.

The largest one-day airborne assault in history took place March 24, 1945, when troop carrier aircraft and gliders carried British and American divisions to assist the Allied crossing of the Rhine River near Wesel, Germany.

The massive formation included 1,800 C-47 and C-46 transports,

1,300 gliders, most in double tows, and 240 B-24s used for resupply drops. According to Young, it took three hours and 12 minutes for the entire formation to pass a given point. More than 17,000 troopers, 1,200 vehicles, 130 artillery pieces, and seven million pounds of equipment and supplies were air-dropped or air-landed within a 25-square-mile area.

It was the last use of great armadas of winged craft in mass formations to invade enemy airspace and speed up the capture of enemy territory. The key to the operation's success was the improved communications and interunit coordination through the use of the combat control and pathfinder units.

As Allied troops pressed on into the German heartland between January and May 1945, the troop carrier units and gliders hauled gasoline, ammunition, and other supplies to the advancing armored columns. Statistics from this period are impressive: The units hauled 242 million pounds of freight (including gasoline, ammunition, and vehicles), 200,600 airborne and glider-borne troops on missions and training flights, 128,000 patients, 132,000 passengers, and 165,000 freed American POWs.

One testament to the troop carrier crews came from then-Lt. Gen. Matthew B. Ridgway, XVIII Airborne Corps commander, who, after the debacle in Sicily, had been critical of the AAF crews for not placing parachute units within effective attack distance of a chosen drop zone at night. After the Rhine crossing, however, Ridgway changed his opinion. "In the run to the drop zone, they flew formations tighter and more precise than any of the bombers ever flew, and they did it at night," said Ridgway. "They wouldn't take evasive action either, no matter how hot the fire from the ground might be."

In short, Ridgway concluded, the troop carriers were "as skilled as any aviators I ever knew, and God knows they were brave men." ■

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*C.V. Glines is a writer living in Dallas, Texas. His most recent story for Air Force Magazine, "Blood Chit," appeared in the October 1998 issue. In the preparation of this article, the author was greatly assisted by retired Col. Charles H. Young, who provided source material from his book Into the Valley: The Untold Story of USAAF Troop Carrier in World War II From North Africa Through Europe, co-authored by Charles D. Young and published by PrintComm Inc. of Dallas.*



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**NEVADA** (Las Vegas, Reno): **Albert S. "Sid" Dodd**, 1921 Dresden Ct., Henderson, NV 89014-3790 (phone 702-295-4953).

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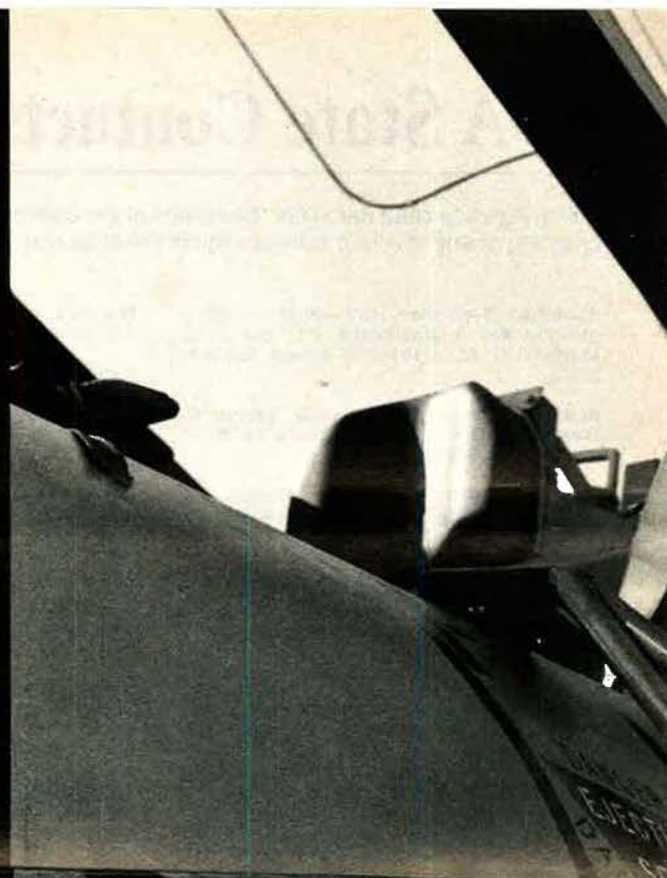


By Walter J. Boyne

# Stuart Symington

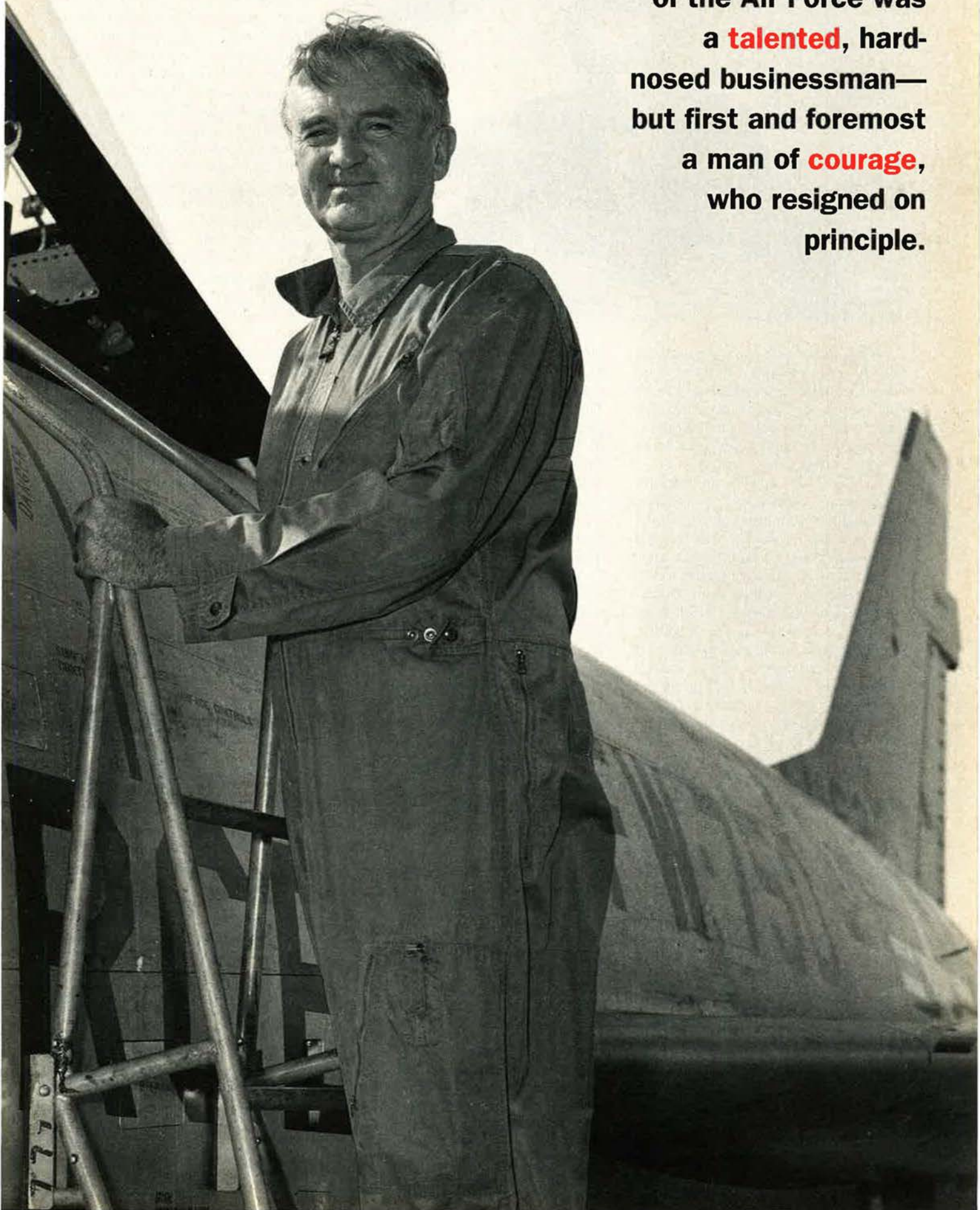
**T**HE United States Air Force was exceedingly fortunate to have among its early patrons two famous men from Missouri. These were President Harry S. Truman, who understood the necessity for an independent Air Force, and industrialist W. Stuart Symington, chosen by Truman to be the first Secretary of the Air Force.

Both had strong personalities, and they battled vigorously over the fundamental issue of the size of the independent United States Air Force and its share of the defense budget. The battles did not impair their friendship, however, and Truman would later become a strong supporter of then-Senator Symington as a presidential candidate.





The first Secretary  
of the Air Force was  
a **talented**, hard-  
nosed businessman—  
but first and foremost  
a man of **courage**,  
who resigned on  
principle.







Both men were indispensable to the founding of the Air Force, and both contributed substantially to its welfare in the years to come. Yet they were physically and temperamentally far apart and came from very different backgrounds.

Truman, the son of a mule trader and farmer, was smaller, stockier, and had the common touch of a politician who had worked his way up from the ranks. Symington, patriotic son of an Amherst College professor, was tall, urbane, and sophisticated. During World War I, Truman became a captain in the artillery. Symington enlisted as a private and was commissioned at 17 as a second lieutenant. Truman did not attend college. Symington went to Yale.

Their business careers showed the most pronounced differences. Truman's series of business failures as a farmer, lead-mine owner, oil prospector, and haberdasher are well-known. In contrast, Symington went from success to success, either engineering successful start-up companies or rescuing companies in distress.

### Talent Spotter

Curiously enough, it was Symington's series of successes in private business that caused Truman to single him out for service to the government. A lesser man might have resented the success of a younger, handsomer, better-educated, more socially adept business tycoon; instead, Truman approved of Symington and put him in positions where the government could benefit from his talents.

Fortunately, despite their power-

ful personalities and differences, they had similarities that bound them together to the benefit of the Air Force. They were patriots who objectively put their country's interests ahead of their own. They were hard workers, who were willing to delegate but still demanded results from subordinates. Both were blessed with a basic common sense that made it easy for them to work together even when their beliefs did not coincide.

An important factor in their relationship, not fully appreciated at the time, was that they served together during an era when the powers of their respective offices were at their peaks. Each fostered independent thought from subordinates, but each was the master of his house who made the final decisions.

Symington was born on June 26, 1901, at Amherst, Mass. After his wartime service and four years at Yale, he went to work for his uncle in the shops of the Symington Co. of Rochester, N.Y., where he learned the ropes of manufacturing malleable iron products. The village of Geneseo, near Rochester, was the home of his bride, Evelyn Wadsworth, the daughter of Sen. (and later Rep.) James W. Wadsworth of New York. They were married in Washington, D.C., in 1924.

In 1925, Symington founded Eastern Clay Products, Inc., but two years later he returned to his uncle's firm as the executive assistant to the president. Even in a family operation, he was no pushover, being fired at least twice by his uncle for being too outspoken.

His executive mettle was not to be

proved fully until the Great Depression, when he became a specialist at turning companies around. In 1930, he became president of the Colonial Radio Corp., then desperately close to bankruptcy. He restored it to economic health, in part by securing a contract to make Silvertone radios for Sears Roebuck. The company was purchased by Sylvania for what Symington termed "a good price." In 1935 he took over the Rustless Iron and Steel Corp., improved its situation, and added to his reputation as an evenhanded manager who could deal fairly and successfully with unions. After having by 1937 made a virtually derelict business profitable, he sold it to the American Rolling Mill Co., again for "a good price."

With what would prove to be some historical irony, he was recommended by James V. Forrestal, his future boss in the Department of Defense, to take over and turn around the moribund Emerson Electric Manufacturing Co. in St. Louis. He became president in 1938 and charmed the banking world into advancing the firm the necessary capital, even as he charmed the truculent unions into an unprecedented cooperative campaign to save Emerson. And he succeeded, in part by re-establishing his contact with Sears and selling them Emerson's arc welders and electric motors.

### Setting the Stage

By 1940, Emerson had been turned around. The company had built an entirely new modern plant—just in time to launch a hugely successful wartime manufacturing enterprise that concentrated first on building artillery shells by the millions and then building gun turrets. For Symington, the stage was set for a career in government that would raise him first to the Senate and then to strong consideration as a presidential candidate.

Symington knew absolutely nothing about gun turrets. Still, he was asked by William S. Knudsen, former head of General Motors and then the director general of the newly created Office of Production Management, to go to England in 1941 and become an expert. He was to study aircraft armament, especially the British powered turrets with which British bombers (and the Boulton Paul Defiant fighter) were equipped. He returned to St. Louis in June 1941 and,



with characteristic directness, visited US manufacturers of similar equipment. He pirated three engineers from Preston T. Tucker's Detroit automotive firm and soon had a contract for 1,000 machine gun turrets per month.

Difficulties in converting the British turrets (which carried .303 Brownings) to handle US .50-caliber guns resulted in his brand-new plant building turrets for other manufacturers, including Sperry, during 1942. But a wide variety of excellent Emerson turrets were developed. By 1944 they were being produced at the rate of 70 per day. More than 12,000 of the Model 127 Emerson nose turrets were produced.

Symington had a hands-on management style; he walked the production lines, exhorting his workers to remember that every turret they built saved American lives. In time, his Emerson Electric Co. would become the world's largest airplane armament plant. The company produced huge quantities of power-driven nose and tail turrets for American bombers. Sales jumped from \$4.9 million in 1940 to \$114 million in 1944.

Symington ran Emerson Electric with a modern management style—delegated authority, good reporting systems, and tough cost accounting. His first official contacts with then-Sen. Harry Truman, head of the Special Committee to Investigate the National Defense Program, were not auspicious. Truman's investigations were rigorous, shining a spotlight on defense contractors who were not performing efficiently. His committee's reports pulled no punches on aviation production fiascoes.

The tremendous expansion of Emerson Electric had caused some problems in accounting and in production, and Truman's committee was tipped off. Symington met face to face with Truman and presented a defense that highlighted government interference with normal Emerson procedures.

### Making an Impression

The Truman Committee eventually exonerated Emerson. The future President had been impressed by Symington's defiant but reasoned defense of his business. In July 1945, Truman asked Symington to join the government as chairman of the Surplus Property Board. In October of that year he became administrator of the Surplus Property Administration.

These were important jobs, for the torrent of American production had flooded the world with everything from boots to tanks. Stacked in endless quantity in ports, supply depots, and open fields, the American equipment and goods were an immediate source of controversy. Any left abroad or destroyed could cause a public outcry about the sheer waste. Yet the cost of bringing home much of the material often exceeded its worth. Further, some materials, if brought home, could depress the market for manufacture of replacement goods. Symington mapped out commonsense programs that distilled as much value as possible from the surplus war material while offending as few people as possible.

Symington viewed his public service as a short-term move. He had hoped to return to Emerson Electric after six months, but Truman had other ideas. He appreciated Symington's excellent management at Emerson Electric and saw that it had been confirmed by his success with the thorny problem of surplus property.

Truman had become President after the death of Franklin D. Roosevelt, and he offered Symington a choice of three positions: assistant secretary of the Navy for air, assistant secretary of war for air, or assistant secretary of state. Aware that creation of an independent Air Force was imminent, Symington opted for assistant secretary of war for air.

It was an excellent choice, not

least because he was following in the footsteps of Robert A. Lovett, who held the job in the war years under Secretary of War Henry L. Stimson. Lovett was one of the most influential and important officials in the executive branch. He had worked well with Gen. George C. Marshall, Army Chief of Staff, and Gen. Henry H. "Hap" Arnold, Commanding General of the Army Air Forces, and he had been of almost decisive importance in gearing up the US aviation industry for wartime production. Lovett had more than a passing interest in operational issues as well.

Symington established immediate rapport with Gen. Carl A. Spaatz, Commanding General of the Army Air Forces and soon to be first Chief of Staff of the United States Air Force. He became an outspoken advocate of airpower and soon reached a *modus operandi* with Spaatz that would continue when the Air Force became independent. Although deeply interested in every aspect of the service, he did not make the mistake of assuming that his managerial experience translated to military expertise. He gladly left the operational elements to Spaatz and his staff. Instead, Symington used his talents to impose an overall management style on the Army Air Forces and to work smoothly with the other services, Congress, and the public.

### Tightening Down

As assistant secretary of war for



*Stuart Symington is sworn in as Secretary of the Air Force by Chief Justice Fred Vinson, as Secretary of the Army Kenneth C. Royall, Secretary of Defense James V. Forrestal, and Secretary of the Navy John L. Sullivan look on.*



air, Symington realized that he had an opportunity to chart a positive course for the future independent Air Force by establishing an effective cost-control system, which included a comptroller equivalent in rank to a deputy chief of staff. Brig. Gen. Grandison Gardner was his first comptroller. Gardner was succeeded by then-Brig. Gen. Edwin W. Rawlings, a great leader and administrator. Rawlings, who had earned a Harvard MBA degree in 1939, made the comptroller operation powerful and effective.

The success of Symington's efforts in this field are all the more important because they came just after World War II, when the main objective was to win the war and costs were a secondary consideration. After V-J Day, Congress would no longer be so open-handed, and Symington would have to battle for every dollar, no matter how well-managed.

It was generally recognized immediately after the war that the services were going to be reduced in size and a more unified command structure was necessary. The US Navy felt threatened by the impending changes, feeling that an independent Air Force and the Army would gang up against it in the fight for funds. The Secretary of the Navy, James Forrestal, was opposed to the concept that eventually materialized in the National Security Act of July 26, 1947, which established the Department of Defense. Forrestal was

selected as the first Secretary of Defense, in part to mollify the Navy.

Unlike Symington, Forrestal was not a personable leader, and while the two men were longtime friends and respected each other, they did not get along because their points of view on the disposition of the budget and the operation of the Department of Defense were often diametrically opposed. Ironically, Symington urged that the Secretary of Defense should be given more authority, including power to dismiss the service secretaries. Instead, Forrestal sought to coordinate, rather than lead, the service departments.

That decision was unfortunate, for the next several years would see the new Department of Defense engaged in internal battles over roles and missions and budget share. The decisions made on roles and missions tended to be compromises that made future arguments inevitable. The defense budget levels were so unrealistically low that the roughly equal divisions that were made were irrelevant: None of the services were adequately funded.

### The No. 3 Power

Forrestal's personal management philosophy turned out to be greatly to the benefit of the Air Force, for Symington had greater power than any subsequent Secretary. The Secretary of the Air Force (because of the nuclear bomber) was in fact the third most powerful man in govern-

ment, after the President and the Secretary of Defense. Symington used this power wisely to get the brand-new Air Force up and running.

The first Secretary of the Air Force stated his objectives forthrightly. They were:

- A 70-group Air Force, considered by Spaatz's team to be the minimum required for peacetime defense.
- A trained Air National Guard and Air Force Reserve.
- An adequate commercial transport industry to support Air Force needs and
- A healthy aircraft and component production industry.

He would labor valiantly for all four, persuading Congress and the public and responding to requests from Spaatz and later Gen. Hoyt S. Vandenberg. At the same time he had to deal with a series of controversies. The first of these concerned the illegal wartime activities of Maj. Gen. Bennett E. Meyers, who had embezzled public funds with false contracts given to a company he owned. Symington, in characteristic fashion, gave the public a full view of the case, and Meyers was dismissed from the Air Force. He was successfully tried in a civil court. As a direct result of this case, Symington established an Office of Special Investigations to ferret out fraud and impropriety.

Symington's sterling character and integrity were also demonstrated in the trumped up charges made by the Navy against the procurement of the Convair B-36 in 1949. As George M. Watson points out in his excellent book *The Office of the Secretary of the Air Force, 1947-1965*, "He took control, marshaled his forces, orchestrated the Air Force's case, and in presenting compelling testimony, carried the day. He performed brilliantly, demonstrating the authority of his position and settling the issue of civilian control of the military services."

Although Symington listened to his military staff, he left no doubt that he was unquestionably the boss. He monitored every aspect of the Air Force's operation and was particularly concerned about the welfare of enlisted personnel. His whole management style was characterized by the way he operated during the Berlin Airlift. He left the operational matters to his generals but did take an active interest in resolving unpleasant living conditions for the



USAF photo

**Stuart Symington and Gen. Carl A. Spaatz, first Air Force Chief of Staff, discuss the new organizational arrangement for the Department of the Air Force.**



enlisted personnel. Symington was also an advocate of research and laid the groundwork both for USAF's Arnold Engineering Development Center and the Air Force Academy.

His greatest management characteristic was courage. He fought hard for the 70-group Air Force, even after Forrestal and Truman tried to bring him into line. His efforts effectively destroyed his relationship with Forrestal and Louis A. Johnson, Forrestal's successor as Secretary of Defense, and even impinged on his strong friendship with the President. So strong were his feelings that the Air Force could not do its mission with less than 70 groups that he resigned as Secretary of the Air Force on April 24, 1950. The outbreak of the Korean War two months later more than confirmed his judgment.

Symington demonstrated his loyalty to Truman by staying on with government, becoming chairman of the National Security Resources Board and administrator of the Reconstruction Finance Corp. In 1952, he became the junior senator from Missouri, serving four terms.

### Tail Gunner Joe

As a senator, Symington conducted himself with dignity and continued to fight for the Air Force and other military services. His finest hour came in the spring of 1954, when he sat on both the Armed Services Committee and the Senate Subcommittee on Investigations. The latter was being used by Sen. Joseph McCarthy in mad-dog attacks on everyone, including the United States Army. Symington decided to take on McCarthy (who derisively referred to him as "Sanctimonious Stu") in the famous televised hearings.

The results were devastating for McCarthy, whose thug-like tactics were revealed to the public. Symington conducted himself brilliantly, responding sharply and with dignity to McCarthy's almost random assertions. At one point in the hearings Symington looked straight at McCarthy and said slowly, "You said something about 'being afraid.' Let me tell you, Senator, that I'm not afraid of you. I will meet you anytime, anywhere."

Symington led the charge for others, such as Army lawyer Joseph N. Welch, whose famous question—"At long last, have you no sense of



**Stuart Symington, accompanied by Secretary of Defense Louis A. Johnson (left) and Gen. Hoyt S. Vandenberg, USAF Chief of Staff, leaves the Pentagon after ceremonies honoring him. He resigned April 24, 1950.**

decency?"—marked the decline of McCarthy's career.

His excellent record made Symington a likely candidate for the 1960 presidential contest, although he recognized that only a deadlock between the front runners—John F. Kennedy, Hubert H. Humphrey, and Lyndon B. Johnson—would give him a chance. The primaries eliminated even this slender option, but they also made Symington the logical candidate for the vice presidential slot. His longtime friend, Clark M. Clifford, stated unequivocally in his memoirs that the newly nominated JFK unconditionally offered Symington the position. Symington had always said that he did not want the vice presidency but was persuaded to accept. The next day, political reality dawned, and Symington supporters, including Robert Kennedy, were stunned to find out that JFK had reneged on his offer and, in deference to Texas' electoral count, turned to Lyndon Johnson as his running mate.

Symington accepted the situation gracefully and even persuaded a reluctant Truman to join him in campaigning for Kennedy. Given Symington's 1967 decision to oppose further US involvement in the

Vietnam War, it is interesting to speculate what the course of history might have been if there had been a Kennedy-Symington ticket.

Symington had been a capable and effective Air Secretary, maximizing both his strengths and that of his military leaders by paying close attention to their advice. He worked with very limited funds compared to either World War II or the years subsequent to his time in office, but he was devoted to modernizing the Air Force with a steady concern for the welfare and morale of its men and women.

As Secretary, Symington had authority and used it. The role of the service secretaries would be continuously downgraded by amendments to the National Security Act that transferred authority to the Secretary of Defense. Robert S. McNamara would take full advantages of the legislative changes and use these powers to their fullest, further weakening the service secretaries' offices.

Symington had the courage to resign when the policies he knew to be necessary were not backed by the Administration. Fortunately for the Air Force, and the country, he was able to serve with even greater distinction as a US senator. ■

*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 400 articles about aviation topics and 29 books, the most recent of which is Beyond the Horizons: The Lockheed Story. His most recent article for Air Force Magazine, "Nickel Grass," appeared in the December 1998 issue.*



# AFA / AEF National Report

By Frances McKenney, Assistant Managing Editor

## AEF Board Plans Strategy

The Aerospace Education Foundation's board of trustees and committees met in Arlington, Va., in December for a first-of-its-kind orientation and strategic planning session that helped set their agenda for 1999.

AEF President Jack C. Price stated that he and AEF Chairman of the Board Michael J. Dugan "saw a need to increase the national recognition of the foundation and its programs and also to promote aerospace power to a wider audience than just AFA members. We needed the ideas and help from our board to start to make it happen."

AEF's standing committees cover scholarships, future planning, and development and are headed by Mary Anne Thompson, Charles P. Zimkas Jr., and Martin H. Harris, respectively.

During planning sessions, the Scholarship Committee looked at scholarship and grant policies.

The Futures Committee evaluated current programs and reviewed ideas that could help the aerospace education mission.

The Development Committee set out a series of programs to expand fund-raising through efforts such as direct mail campaigns.

Three new ad hoc committees participated in these planning sessions. The Ad Hoc Committee for Public Awareness, headed by Robert G. Stein, has begun to investigate programs ranging from a national television series on airpower legends to special programs and publications for the general public. The Ad Hoc Committee on Partnerships and Associates, chaired by Richard B. Goetze, will explore expanding alliances with university and other groups outside of the usual defense industrial base. The Ad Hoc Committee on Bylaws, whose chairman is Charles B. Jiggetts, is reviewing current AEF governing policies.

### At the LA Ball

The Los Angeles Space Celebration was the new name given to several days of activities that included



*AEF's special work session included (l-r) Martin Harris, vice president; Jack Price, president; Michael Dugan, chairman of the board; Phillip Sleeman, treasurer; and William Croom Jr., trustee.*

the AFA National Symposium and annual Air Force Ball in Los Angeles in November. The **Gen. B.A. Schriever Los Angeles Chapter**, the **General Doolittle Los Angeles Area Chapter**, and the **Orange County/Gen. Curtis E. LeMay Chapter** served as sponsors for the events.

The second annual Space Social, organized by the Schriever Chapter, kicked off festivities on the first evening. It turned the spotlight on corporate presidents and chief executive officers as well as senior defense and Air Force leaders.

The LA Symposium, with its theme of "Partnerships in Space: Government and Commercial," followed the next day. The 27th annual LA Ball, held at the Beverly Hilton Hotel, served as the culminating activity that evening.

In honoring the men and women of the US Air Force and pioneers in the aerospace industry, the ball saluted retired Gen. Bernard A. Schriever, Simon Ramo, and Dean Wooldridge.

Often called the father of the US Air Force's space and missile program, Schriever's leadership enabled the US to deploy the first-generation Atlas and Titan ICBMs. He retired as

commander of Air Force Systems Command. Ramo and Wooldridge formed the Ramo-Wooldridge Corp. in 1953 that eventually merged with Thompson Products to become TRW. Ramo and Wooldridge managed the technical direction of the ICBM program, achieving revolutionary advances in missile technology.

Retired Gen. Howell M. Estes III received the Gen. Thomas D. White USAF Space Trophy during a highlight of the formal ball. The award focused on his achievements as commander in chief of NORAD and US Space Command and as commander, Air Force Space Command (1996-98). While pursuing better space support for the warfighter, Estes also engendered new partnerships among the military, civil, and commercial space sectors.

Named for the fourth USAF Chief of Staff and established by the National Geographic Society, the trophy is now sponsored by the Schriever Chapter. It was presented by AFA National President Thomas J. McKee, Schriever Chapter President Chris Harlambakis, and Schriever Chapter Chairman of the Board G. Wesley Clark.

Harry C. Stonecipher, president and

Staff photo by Guy Acaio





chief operating officer of Boeing, was overall chairman of the ball this year. Retired Gen. Thomas S. Moorman Jr., former USAF vice chief of staff, served as master of ceremonies for the evening.

The list of guests recognized during the ball included two who served on its Executive Advisory Council—Merrill Karpf, King World Productions senior vice president for network programming, and Robert Relyea, MGM production president.

Other special guests were F. Whitten Peters, acting Secretary of the Air Force; Gen. Ralph E. Eberhart, USAF vice chief of staff; Gen. Richard E. Hawley, ACC commander; Gen. Richard B. Myers, CINC, NORAD and US Space Command, and commander, Air Force Space Command; and Gen. Lloyd W. "Fig" Newton, AETC commander.

AFA Chairman of the Board Doyle E. Larson and AEF President Jack C. Price were among the other association leaders in the audience.

At the ball's conclusion, James F. Albaugh, president of Boeing Space and Communications Group, pre-



**AFA National President Thomas McKee (left) flew on a nighttime CSAR AWACS mission at Nellis AFB, Nev. Pilot Lt. Col. Norm Potter (right), from the 961st Airborne Air Control Squadron, Kadena AB, Japan, filled him in on the readiness rate of AWACS aircraft.**

sented Price with a check for AEF from the LA Ball for \$50,000—proceeds from this year's event.

Over the past 27 years, the LA Ball has raised more than \$2 million to support aerospace education and scholarships.

### Nevada Hosts McKee

In a keynote address to the **Thunderbird (Nev.) Chapter** at Nellis AFB, Nev., in December, AFA National President McKee spoke about the Air Force's current lack of readiness and told the 70 guests at the annual Pearl Harbor Day luncheon, "We have been there before."

McKee's address was part of a two-day visit to Nellis that began with a briefing at the Air Warfare Center, where he learned about the mission and activities of the 53d, 57th, and 99th Wings. He also learned something about the pay situation of today's airmen. McKee reported that he was told 14 percent of the 99th Wing's personnel hold part-time civilian jobs to make ends meet.

At the AWC, he met CMSgt. Leo G. Gay, senior enlisted advisor and also a chapter member, who urged AFA to reach out to more mid-level NCOs.

Maj. Gen. Glen W. "Wally" Moor-



**Retired Gen. Howell Estes III (second from right) accepted the Gen. Thomas D. White USAF Space Trophy plaque from (l-r) Chris Harlambakis, Gen. B.A. Schriever Los Angeles Chapter president, G. Wesley Clark, chapter board chairman, and Thomas McKee, AFA national president.**

USAF photo by Ron Hall

USAF photo by SrA Susan Adams



head III, AWC commander and an AFA member, arranged for McKee to fly in an AWACS aircraft during a night combat search and rescue training mission.

The next day, McKee went to the 99th Security Forces Squadron at Indian Springs, north of Nellis. The 99th SFS trains security forces to protect military installations located in a desert environment. "I was impressed with the dedication and determination that the entire squadron conveyed with the limited resources available to do the mission," McKee said.

Brig. Gen. Theodore W. "Bill" Lay II, commander of 57th Wing at Nellis and a chapter member, was host, along with Ardell Galbreth, Thunderbird Chapter president, for McKee's visit.

### Working the Hill

Richard DeYoung of the **Huron (Mich.) Chapter** received his 1998 Medal of Merit from William L. Stone, chapter president, at a November meeting.

DeYoung earned the honor because of his efforts in lobbying for the restoration of free lifetime medical care for military retirees. A 30-year veteran, he began in 1991 by writing letters—with help from chapter member Kenneth W. Ratliff—to the President and military officials.

When he didn't like the answers he received, he began traveling at his own expense to Washington to meet with members of Congress. "I'm not bashful," he explained. Beginning in 1993, he made seven trips to Capitol Hill, each time staying for three weeks. He operated out of the office of Rep. James Barcia (D-Mich.), who represents DeYoung's district and had offered to help.

With Barcia setting up the appointments, DeYoung met Sens. Bob Dole (R-Kan.), Carl Levin (D-Mich.), and Strom Thurmond (R-S.C.) and Reps. Sonny Montgomery (D-Miss.), Jim Moran (D-Va.), Ike Skelton (D-Mo.), Floyd Spence (R-S.C.), and Bob Stump (R-Ariz.), to name a few.

### Gold Coast Air Show

Warbirds, antiques, and classic aircraft brought a huge crowd to the **Gold Coast (Fla.) Chapter's** first air show.

Held at Pompano Beach Air Park in Pompano Beach, Fla., the two-day event was billed as a family event and skipped flybys to instead emphasize on-the-ground displays that included not only aircraft but other military equipment such as jeeps and armored cars. Several thousand visi-

tors got a close look at nearly 20 aircraft, ranging from T-34 Mentor, Stearman, and T-6 Texan trainers to a deHavilland Tiger Moth.

Chapter President Ransom Meriam said the most popular airplanes on the tarmac were a B-25 Mitchell, a three-quarter-scale P-51 Mustang, and a replica Fokker triplane like that flown by World War I German ace Manfred von Richthofen.

A constant flow of visitors lined up to purchase a ride on a 1933 Waco (Weaver Aircraft Co.) biplane and a Bell JetRanger helicopter.

Meriam noted that all the aircraft owners voluntarily participated in the static air show, despite having to foot their own expenses. That's one reason the event grossed nearly \$13,000. This successful beginning

has spurred plans for making the air show, backed by corporate sponsorship, an annual chapter activity.

Chapter members Walter E. Houghton, who acted as aircraft coordinator, Milton Markowitz, Fred E. Bamberger Jr., and Robert M. Rawls led the air show planning effort—calling on contacts throughout south Florida to round up aircraft.

### Remembering Earl Clark Jr.

More than 200 guests attended the **Central Missouri Chapter's** November "Membership Gala" luncheon at Whiteman AFB, where AFA Chairman of the Board Larson served as main guest speaker.

Larson spoke about AFA's advocacy of a strong Air Force and its efforts to promote issues important



### Robert S. Johnson (1920–1998)

Robert S. Johnson, a World War II ace who was an Air Force Association national president (1949–51) and national director emeritus, died Dec. 27 in Tulsa, Okla. He had been living in Lake Wylie, S.C. He was 78 years old.

Johnson is credited with 27 victories in World War II and was the first fighter pilot to exceed Capt. Eddie Rickenbacker's World War I record of 26 kills.

Johnson became involved with AFA in September 1947 when he was invited to attend its first National Convention, held in Columbus, Ohio. He became head of the Manhattan (N.Y.) Squadron, as chapters were then called, and vice commander of the New York State Wing. At AFA's 1949 National Convention in Chicago, he was elected national president.

Born Feb. 21, 1920, in Lawton, Okla., Johnson became interested in flying after attending an air show there in 1928. He got his pilot's license at 15. After graduating from Cameron College in Oklahoma with an associate degree in engineering he entered the Army Air Forces. He began training in November 1941 as a bomber pilot but after graduation was assigned to P-47 Thunderbolts. He was sent to England in January 1943 and in June shot down his first aircraft, an FW-190.

Johnson was part of Col. Hubert "Hub" Zemke's 56th Fighter Group—the famed "Wolfpack"—for 18 months. He flew 91 missions, scoring his last two victories on his last mission in May 1944. He shared with Col. Charles H. MacDonald the rank of fourth leading ace for World War II. (Maj. Richard I. Bong, Maj. Thomas B. McGuire Jr., and Col. Francis S. Gabreski were the top three.)

His civilian career included 18 years with Republic Aviation Corp. and later in the insurance and securities business.



to both active duty and retired USAF service members.

The late Earl D. Clark Jr., a national director emeritus, was remembered at this gathering because of his longtime devotion to AFA, AEF, and the chapter. John J. Politi, national director, spoke about Clark's AFA contributions and service as national secretary, Midwest Region vice president, and AEF vice president and trustee. Clark was instrumental in founding the Central Missouri Chapter.

Charles H. Church Jr., national treasurer; Robert M. Williams, national vice president (Midwest Region); W. Graham Burnley, Missouri state president; Terri Politi, state vice president; and Patricia J. Snyder, state treasurer, were among the many friends of Clark present.

The Central Missouri Chapter was renamed in January as the Earl D. Clark Jr. Chapter.

Also at the luncheon, Capt. Charles B. Froemke Jr., chapter vice president, accepted the 1998 Exceptional Service national-level award for Best Single Program for the chapter's day-long special event, called Aviation Day. The chapter organized the program last March for fourth- and fifth-grade students from area schools. The 150 students were bused to an Army National Guard armory on White-man, where displays had been set up by representatives from many base organizations.

The kids had a chance to talk to pilots, maintainers, and Air Force personnel in many career fields. They were also able to look at and touch equipment such as a helicopter, flight simulator, security forces' M-16s, heart pump and stress-test equipment from the hospital, and a rotary launch assembly and GBU-37.

The Aviation Day program had been spearheaded by former chapter president Capt. Rene M. Chinn-Lang, now stationed at Keesler AFB, Miss., and a member of the **John C. Stennis Chapter**.

### Strike Up the Band

More than 1,000 residents in the Corvallis, Ore., area turned out for an Air Force Band of the Golden West concert, cosponsored by the **Eugene (Ore.) Chapter**.

Based at Travis AFB, Calif., the band tours California, Washington, and Oregon and is one of the Air Force's 10 regional bands. In Corvallis, a college town centered around Oregon State University, the band performed a lengthy program that ranged from classical music to marches.

The Eugene Chapter took the lead

*John Alison, AFA national director emeritus, was among those inducted into the Confederate Air Force's American Combat Airman Hall of Fame in Midland, Texas. O.R. Crawford, AFA national director emeritus and part of the CAF's general staff, presented the medalion and offered congratulations.*



in arranging the concert, providing funds and reserving the venue at OSU's LaSells Stewart Center. Chapter Treasurer Charles C. Tomlinson handled much of the local newspaper publicity, and Secretary Mildred J. Chambers worked on ticket distribution. Col. Samuel E. Snider, chapter president, served as the band's local point of contact. He also spoke to meetings of such groups as the American Legion, Veterans of Foreign Wars, and Rotary, explaining AFA's mission and distributing tickets to the concert.

Arnold Air Society cadets from OSU's AFROTC detachment served as ushers for the event.

### Award for Myers

Gen. Richard B. Myers received the Tennessee Ernie Ford Distinguished Achievement Award at the 17th annual awards banquet hosted by the **Tennessee Ernie Ford (Calif.) Chapter**. The late entertainer's wife, Beverly Ford, joined John K. Barbour, chapter president, in presenting the award.

The evening banquet in Santa Clara, Calif., in November recognized Myers for his tenure as commander of Pacific Air Forces from 1997 to 1998. He is now commander in chief, NORAD and US Space Command, and commander, Air Force Space Command.

Active duty personnel from Onizuka AS, Calif., who received awards were Capt. Glen L. Funkhouser Jr. and

SrA. Paul K. Suyat, both from the 5th Space Operations Squadron; 1st Lt. Amy M. Funkhouser, SMSgt. Steven Simpson, and TSgt. Rodney F. Woodington, from the 750th Communications Squadron; Capt. David C. Rose from Operating Division 4; and SSgt. Nancy Regan from Det. 7, Communications Technology Center.

Air National Guardsmen from the 129th Rescue Wing (ANG), Moffett Federal Airfield, Calif., who received awards were Maj. Rick F. McKittrick, 2d Lt. David Bozzo, CMSgt. Liliana Ramos, MSgt. Marianne Beyari, SSgt. John L. Garncarz, and SrA. Marcos S. Labuguen.

Other awards went to Maj. Thomas J. Grycewicz and 1st Lt. Douglas C. Derrick, both from Defense Contract Management Command Sunnyvale (Calif.), Antoinette Short from the 21st Space Operations Squadron, and AFROTC, AFJROTC, and Civil Air Patrol cadets.

Kathryn G. Chapman received her 1998 Exceptional Service Award, recognizing her role in producing the state's newsletter.

### Eagles in Tacoma

**Tacoma (Wash.) Chapter** President O. Thomas Hansen presented AEF Eagle Grant scholarships at the Community College of the Air Force graduation ceremonies at McChord AFB, Wash., in November.

MSgt. Wayne Lott, TSgt. Joey W.



Parks, SSgt. Daniel P. Kenison, and SSgt. Charles E. Williams (AFRES) were the award recipients.

Lott is superintendent, information systems flight, 62d Communications Squadron, and earned a CCAF associate degree in electronic systems technology. Parks, from the 62d Mission Support Squadron, is an NCOIC in an education services flight and earned his degree in criminal justice and education and training management. He is a chapter member.

Kenison, a contracting specialist with the 62d Contracting Squadron, earned a CCAF degree in contracts management. He is also a chapter member. An education and training manager with the 446th ASTS, Williams earned his degree in allied health sciences and recreation management.

### Moving South

Although the **Blue Ridge (N.C.) Chapter** usually meets in Asheville, N.C., they held their December meeting about 50 miles to the south—in East Flat Rock—in an effort to bring out members from the southern part of their membership area.

William D. Duncan Jr., chapter president, said about six new faces showed up in the audience of about 40 people, and the regulars didn't seem to mind having to drive farther to get to the meeting.

Guest speaker Jeff Moffitt, director of medical administration at the Asheville Veterans Affairs Medical Center, spoke about the Veterans' Health Care Eligibility Reform Act of 1996 and its goal of expanding health services through such avenues as preventive care and outpatient services. He described the VA enroll-

ment process, including the various income and disability rating tests used to prioritize patients. The Asheville Veterans Affairs facility has 265 beds.

### On Parade

As they do every year, the **John W. DeMilly Jr. (Fla.) Chapter** took an active, hands on role in helping Homestead, Fla., carry off the annual Veterans Day parade, featuring 35 entries marching through the town's historic district.

Alan A. Wallace, vice president for veterans affairs, and Calvin T. Morton, vice president for finance, organized the chapter's participation. Michael E. Richardson, Frank "Ron" Webb, Joseph M. Hunt, and Robert J. Canavan helped with parade marshalling, and Robert J. Jensen served as announcer on the reviewing stand.

Chapter member Richard J. O'Neil, senior instructor for Homestead High School's AFJROTC cadets, was among those who supervised the color guards and honor guards. Community Partner Kenneth A. Morton coordinated the Civil Air Patrol cadets.

Community Partner Elita Crow let the chapter use her bright red Cadillac for its parade entry. She joined cadet Donnie Powers from Homestead High School in riding on the back of the convertible. Powers earned the honor by having received an AFA award as his school's outstanding junior-year cadet.

### New in Altoona

They ate well at the **Altoona (Pa.) Chapter's** installation dinner, held at the Greater Altoona Career and Technology Center. Clair J. Smith, Pennsylvania state president, presented the center's culinary school with an

AFA Citation as thanks for the "extremely well prepared dinner," reported the chapter's new secretary, Thomas G. Baker.

The annual dinner marked the installation of new chapter officers Charles R. Harker, president; Donald E. Leipold, vice president; Frances J. Chatham, treasurer; and Baker.

Chapter member Richard McPhee, a retired lieutenant colonel, served as guest speaker for the meeting. His topic was Air Force readiness.

### More AFA/AEF News

■ On an extended visit to Puerto Rico last year, **Central Florida Chapter's** Richard A. Ortega, state vice president for aerospace education, promoted AFA and AEF in meetings with local AFROTC and AFJROTC cadets and signed up 11 new members. This year, he recruited closer to home and encouraged 37 cadets at Lake Brantley High School in Altamonte Springs, Fla., to join AFA. The students' instructors are chapter members Capt. Kenneth F. Long, USAF (Ret.); SMSgt. Mauricio Forero, USAF (Ret.); and retired MSgt. Raymond E. Luther—all of whom Ortega credits with doing the actual "recruiting."

■ The **Frank Luke Chapter** held a Veterans Day dinner featuring a Pageant of the Flags ceremony, performed by the Luke AFB, Ariz., honor guards. Local State Sen. Edward J. Cirillo was the evening's speaker. He is a member of the governor's Arizona Military Preservation Committee. According to Harry H. Bailey, chapter president, Cirillo spoke about how the state balances the needs of military installations and the surrounding communities. ■

## Unit Reunions

**2d Ferrying Gp.**, Wilmington Warriors Assn (WWII). May 24–28, 1999, at the Best Western Wright-Patterson in Fairborn, OH. **Contact:** Herman G. Benton, 6513 Sandia Vista Pl. N.E., Rio Rancho, NM 87124 (505-892-2344).

**22d Military Airlift Sq.**, Tachikawa, Japan. March 23–28, 1999, at the Days Inn in Branson, MO. **Contact:** Muriel Wright, 47 Normac Estates, Camdenton, MO 65020-9683 (573-346-7153).

**47th BG** (Twelfth AF). April 22–25, 1999, at the Marriott Kansas City Airport in Kansas City, MO. **Contact:** Costa Chalas, 64 Trapelo Rd., Belmont, MA 02178 (phone: 617-484-5620 or fax: 617-484-3309).

**64th FIS.** Oct. 14–17, 1999, at the Embassy Suites Colorado Springs in Colorado Springs, CO. **Contact:** William S. Turner, 7 Raven Hills Ct., Colorado Springs, CO 80919-1315.

**78th FS** (1940–98). April 30–May 4, 1999, in

Myrtle Beach, SC. **Contact:** Clyde Mortensen, 81 Fox Cir., Cottonwood, AZ 86326 (520-634-5239).

**80th FG** (WWII). Sept. 30–Oct. 2, 1999, in Seattle. **Contact:** Tom Bowie, 639 S. 298th St., Federal Way, WA 98003 (253-839-9019).

**89th Attack Sq.**, including 3d Gp. April 12–17, 1999, in Savannah, GA. **Contact:** Ron Hubbard, 2104 Fleet Landing Blvd., Atlantic Beach, FL 32233-7521 (904-246-7164).

**433d FIS**, Alaska and Truax AFB, WI. Oct. 7–9, 1999, in Fort Walton Beach, FL. **Contact:** Bill Applegate, 35 Birch Ave., Shalimar, FL 32579 (850-651-0848) (rwapple@aol.com).

**465th/19th Airborne Missile Maintenance Sq.** April 30–May 2, 1999, at Robins AFB, GA. **Contact:** Carl Tischer (912-922-3735) or Jerri Lewis, 205 Biltmore Ter., Warner Robins, GA 31088 (miminol@aol.com).

**692d Radar Sq.** July 2–4, 1999, in Baudette, MN. **Contact:** Loni Rickert, 224 Tyler St., Athens, PA 18810 (717-888-4349) or Lorraine Rone, R.R. #1, Box 1198, Baudette, MN 56623 (218-634-2124).

**BAD 2 Assn** (1942–45), Warton, UK. Sept. 17–20, 1999, in Albuquerque, NM. **Contact:** Dick McClune, 527 Quarterfield Rd., Newport News, VA 23602-6140 (757-877-3826).

**Perrin Field/AFB**, TX. June 26, 1999, in the Silver Wings Bldg., Grayson County Airport, Denison, TX. **Contact:** Eighth Perrin Reunion, 4040 Luella Rd., Sherman, TX 75090-5270.

**RAF Chicksands**, UK, alumni (1940–95), including RAF, USAF, USN, civilians, and dependents. July 8–16, 2000, at Chicksands Priory, UK. **Contact:** RAF Chicksands Alumni Association PO Box 4053, Crofton, MD 21114 (www.bedford.gov.uk).



## Unit Reunions

**White House Medical Unit** (1972-93). Aug. 27-29, 1999, in San Diego. **Contact:** Karen Ott, c/o ML&RS, Inc., PO Box 5310, Hickory, NC 28603 (828-256-6008) (dinamr@aol.com).

Seeking members of **Aviation Cadet Class 65-05**, James Connelly AFB, TX, for a reunion in Waco, TX. **Contact:** Ron Torgler (310-322-2722) or Charlie Johnson (316-733-2223).

Seeking trainees who completed **basic training at Miami Beach, FL**, 1942-43, for a reunion in Miami Beach in spring 1999. **Contact:** Bernie Gold (954-437-1511) (bgold@webtv.net).

Seeking **Class 55-P** members for a reunion. **Contact:** Carlos Higgins, 10712 Fountainbleu Cir.,

Austin, TX 78750 (carlosTX@worldnet.att.net).

Seeking veterans who were stationed at **Evreux-Fauville AB, France**, for a reunion. **Contact:** Jim Timmons, 758 221st St., Pasadena, MD 21122 (410-255-2735) (jimt0708@aol.com).

Seeking **OCS Class 59-B** members for a reunion in 1999. **Contact:** Allen Partin, 114 East Rahn Rd., Dayton, OH 45429 (937-436-9588).

Seeking **OTS Class 79-09** members for a reunion in May 1999. **Contact:** Jerry Rashal (703-204-0979).

Seeking members of Williams, AFB, AZ, **Pilot Training Class 80-06** for a reunion in 2000.

**Contact:** Craig Wallace, 1184 Dejoan Ct., Columbus, OH 43228 (614-878-5871) (cwallace@ohsgh.af.mil), or J.R. Dallas, 11048 Candlelight Ln., Dallas, TX 75229 (214-358-6510) (jdallas@arfm.af.mil).

Seeking Craig AFB, AL, **UPT Class 75-05** members for a reunion. **Contact:** Bruce Hedlund, 185 Sweetwater Ln., Ben Lomond, CA 95005 (831-336-0424) (N70CE@MSN.com).

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 contact with anyone who knew air cadet **Fred L. Bigham**, Class 43-K, Sq 8, Lemoore AAF, CA. **Contact:** Margaret V. Bigham, The Sequoias, 1400 Geary Blvd., Apt. 2003, San Francisco, CA 94109-6572.

Seeking information on **Hamilton AFB, CA**, from its inception to its deactivation, including units assigned and dates, navoids in use and dates, aircraft assigned, and stories. Also looking for the date of the 1960s or 70s crash of the F-106 piloted by the son of USAF's Chief of Staff at the time. **Contact:** Fred Oberding, 120 Lincoln Dr., Sausalito, CA 94965 (415-332-0625) (72177.1106@compuserve.com).

Seeking information on and photos of B-24D **Jose Carioca** of the 409th BS, 93d BG, that crashed into a Ploesti, Romania, women's prison Aug. 1, 1943. **Contact:** Joe Gonzales, 3707 Pipers Field St., San Antonio, TX 78251-1638 (210-647-7032).

Seeking contact with **Capt. M.J. Williams**, former F-4G pilot, 561st FS, or information on his career, particularly Gulf War experience. **Contact:** G. Aceto, 1501 Lee Hwy., Arlington, VA 22209 (gaceto@afa.org).

Seeking information on or contact with anyone with knowledge about a March 7, 1954, jeep accident that killed **William Henry Kelly Jr.**, of the 60th Air Police Sq, 60th Air Base Gp, at Rhein-Main AB, Germany. **Contact:** Dale E. Colston, 175 Prospect St., #23B, East Orange, NJ 07017-2633.

Seeking information on the **Lockheed AH-56 Cheyenne** attack helicopter developed for the US Army in the 1960s-70s. **Contact:** SSgt. R.L. Robb, CMR 460, Box 528, APO AE 09703.

Seeking members of the US Air Corps' **279th Bomb Unit** and former POWs of **Stalag 17-B** outside of Krems, Austria, during WWII. **Contact:** Lili P. Deptula, 97 E. Congress St., Ste. 130, Tucson, AZ 85701 (800-758-7054 or 520-620-7077).

For a book, seeking information, stories, patches, and photos from members of the **421st Night Fighter Sq/TFS**, Hill AFB, Utah, from May 1943 to the present. **Contact:** Jeff L. Kolln, 17125 Briar St. SE, Yelm, WA 98597-9755 (360-458-9793) (blkwidw421@aol.com).

Seeking contact with former members of the **8th Aviation Field Depot Sq**, Sandia AFB, NM, and RAFs Lakenheath and Greenham Common, UK, from 1951 through deactivation. **Contact:** David J. Clark, 5177 Island View Cir. S. Polk City, FL 33868-8901 (941-984-3008).

Seeking information on **Sgt. James "Skip" Thomas**, USAF security police at RAF Lakenheath, UK, 1969-70, who had a brother named

Jeremy Lee Thomas. **Contact:** Richard M. Bradbury, 153a Longford Rd., Cannock, Staffordshire, UK WS11 3LG (01543-467597).

Seeking contact with members of the **392d Missile Training Sq**, Vandenberg AFB, CA, 1958-62, and the **55th Fighter-Bomber Sq**, Weathersfield, UK, 1955-58. **Contact:** Gary D. Coker, 25 Eagle Pointe Dr., Augusta, GA 30909 (706-736-4333).

Seeking contact with anyone who served with **Col. Grange S. Coffin** to attend his 70th birthday party, July 10, 1999. **Contact:** Gary D. Coker, 25 Eagle Pointe Dr., John's Island, SC 29455(843-768-3655)

Seeking contact with the daughter of **Lt. Col. Wilfred B. Crutchfield**. **Contact:** William W. Pitcher (707-539-8919) (wwppap@pacbell.net).

Seeking information from crew members of **B-17G**

bombers in Europe during WWII. **Contact:** Roger A. Zook, 190767 RCI-H, 18701 Roxbury Rd., Hagerstown, MD 21746.

Seeking contact with **2d Lt. David Quentin Scott**, flight instructor, French Air Cadet Class 51-C, in May 1951. **Contact:** Claude A. Campion, 30 rue La Fontaine, Paris, France 75016.

Seeking contact with **Capt. Kenneth R. Eubanks** or anyone who saw someone stumble 40-50 feet before falling across a curb, around Jan. 4, 1968, at Naha AB, Okinawa, on the corner across from the dining hall. **Contact:** Eddie R. Thacker, 5212 Nelson Dr., North Little Rock, AR 72118-3950.

Seeking wooden promotional **HH-43B model helicopters** presented to pilots by Kaman Aircraft. **Contact:** Louis A. Mason, 5 Woods Ct., Natick, MA 01760.

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# Pieces of History

Photography by Paul Kennedy

## The Bear's Cave



A few days after a radar-controlled Surface-to-Air-Missile destroyed a USAF F-4C Phantom II over North Vietnam in July 1965, the Wild Weasel mission was born. The F-100F, then F-105F/G, F-4C, and F-4G were, in turn, modified for hunter-killer and defense suppression roles. In the first scenario, the Weasel "hunter" tempted the enemy to bring up a radar and discharge a weapon, re-

vealing the anti-aircraft site for a more heavily armed "killer" to destroy. In the defense suppression role, Weasels led strike aircraft to draw fire and reveal the SAM-controlling radars. The Electronic Warfare Officer had the job of electronically finding the deadly SAM sites. He sat in the back seat, often called "the Pit," shown here in the F-105G on display at the US Air Force Museum,

Wright-Patterson AFB, Ohio. The EWO had a few nicknames, too—like "the Bear"—because of the way he curled up, head down over the scope, deciphering readouts as the pilot positioned the fighter to take out the target.



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BUT SOMEHOW

IT CARRIES MORE WEIGHT.



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