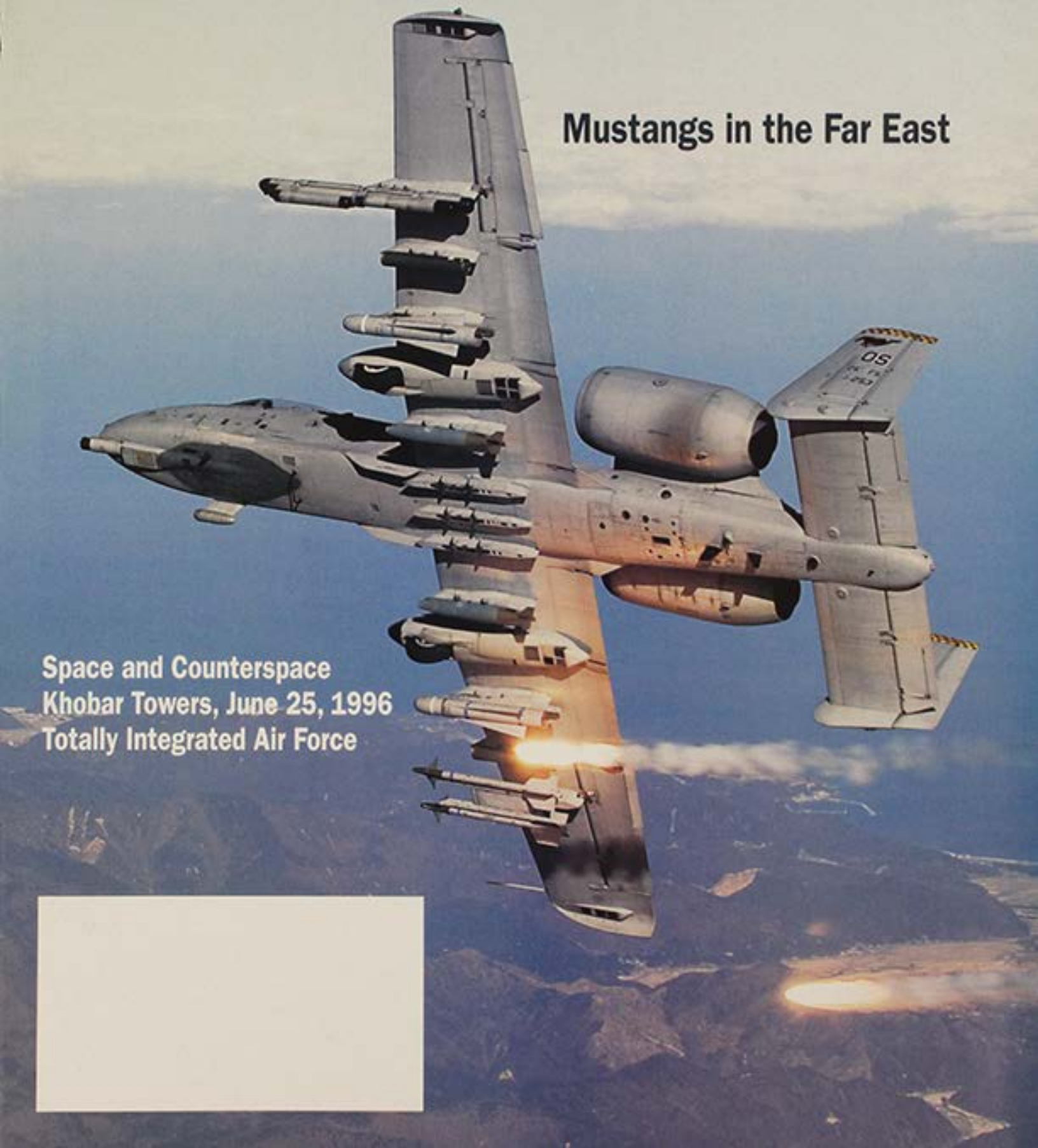
June 2006/$4

AIR FORCE MAGAZINE

JOURNAL OF THE AIR FORCE ASSOCIATION



Mustangs in the Far East

Space and Counterspace

Khobar Towers, June 25, 1996

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U.S. Air Force photo by Tech. Sgt. Ben Bloker

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June 2006, Vol. 89, No. 6

AIR FORCE MAGAZINE

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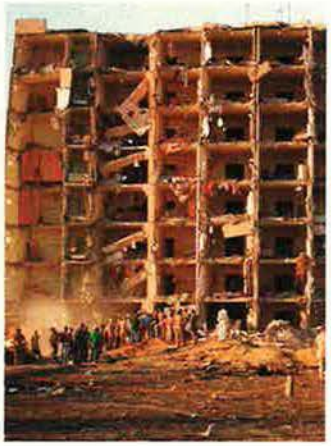
About the cover: An A-10 with the 51st Fighter Wing, Osan AB, South Korea. See "The Mustang Line," p. 56. Photo by Jim Haseltine.



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Editorial

By Robert S. Dudney, Editor in Chief

Of Airpower and Morality

IT MUST infuriate World War II bomber veterans for critics to suggest they are war criminals. According to certain academics—and their amen corner in the media—the great 1942-45 air offensives against German and Japanese cities constituted moral atrocities, amounting to a deliberate killing of 800,000 innocent civilians.

Such claims have been advanced with special vigor by A.C. Grayling, a University of London philosophy professor, in his new book *Among the Dead Cities: The History and Moral Legacy of the WWII Bombing of Civilians in Germany and Japan.*

Grayling's 361-page morality pageant, which now enjoys great popularity in the better salons of Europe and America, turns on this basic claim (p. 272): "The area-bombing campaigns of the Second World War were, as a whole, morally criminal." As Grayling sees it, precision bombing was permissible, but city-bombing was unneeded, ineffectual, disproportionately savage, unhumanitarian, offensive to Western morals, illegal—in short, "very wrong."

For Grayling, guilt flows even to individual airmen; they, after all, failed to back away from what he believes were immoral deeds.

The subject is vast and complex, and this space is not large enough for an extended discussion of Grayling's charges. However, several responses are in order, partly because the "war crimes" claims are heard more and more, but also because the book has obvious contemporary relevance.

The first point to make is that World War II airmen, to the exasperation of their academic critics, are convinced their area-bombing efforts did, in fact, contribute to victory. They do not grant to Grayling his pivotal claim that Allied area-bombing in Europe and Japan had little military impact. This is a key count in his "war crimes" indictment; without military justification for bombing cities, there could be no moral one.

However, justifications did exist. For one thing, London and Washington were determined to convince the Soviet Union, which was bearing the brunt of combat against Hitler, that they were not sitting out the war. Otherwise, the Kremlin might make a separate peace with Germany. For the US and Britain, one of the few options at that time was to strike from the air at German cities, and that evidently was sufficient for Stalin.

Moreover, in Germany, area bombing kept anti-aircraft guns and troops pinned down and away from other fronts. Hitler's minister of armaments, Albert Speer, left no doubt about this. "The real importance of the air war consisted in the fact that it opened a second front long before the invasion of Europe," said Speer. "That front was the skies over Germany. The fleets of bombers might appear at any time over any large German city or important factory." The need to defend against this threat, he said, tied up 10,000 guns, hundreds of thousands of troops, squadrons of fighter aircraft, and half of Germany's electronics industry.

Are critics all that interested in long-ago deeds, or are they actually targeting today's US Air Force?

Critics overreach with another claim: that the Allies continued to pound away months—perhaps years—after the Axis nations were beaten. Doing so, they argue, was morally wrong. But how, one may ask, could Allied leaders—or anyone else—know at the time when Germany and Japan were defeated? Stalin could create a serious reversal of the war all by himself. Hitler's V-2 rockets and nuclear arms program caused deep anxieties. In the Pacific, Japan's fanatical defenses of Iwo Jima and Okinawa made it clear that Tokyo, in 1945, planned for a grisly fight to the finish.

Finally, the war crimes accusation has about it the aroma of *ex post facto* moralizing. As even critics of the bombing concede, the Allied attacks on Axis cities did not constitute a war crime at the time of World War II. The relevant international proscription didn't appear until 1977, more than three decades after specific military acts which the academics now condemn.

The morality of airpower (as well as land and naval power) has been a contentious issue in many eras, and World War II was one of them. Still, one wonders: Are Grayling and other airpower critics all that interested in long-ago deeds in Europe and Asia, or are they actually targeting today's US Air Force?

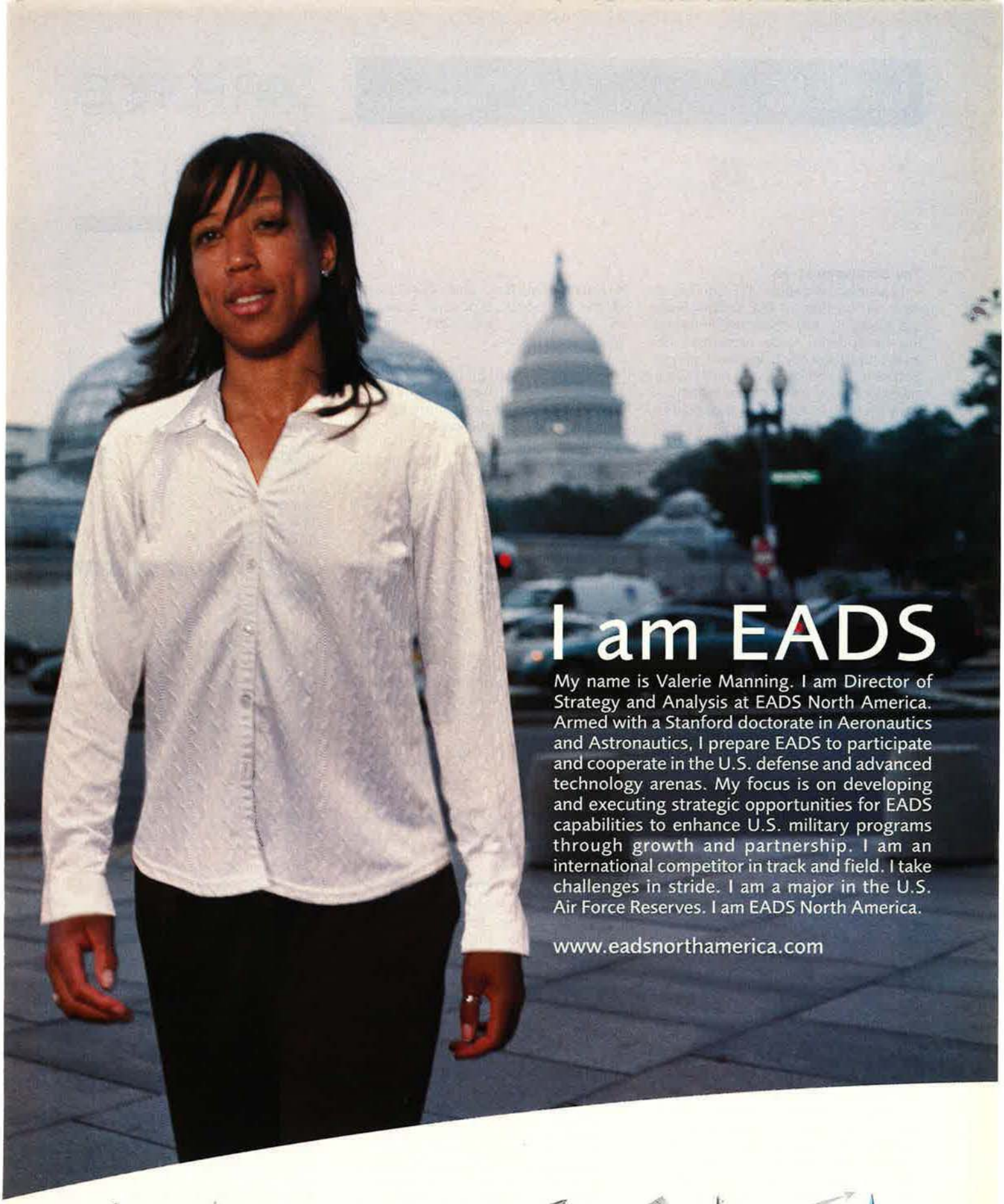
Grayling himself lets the cat out of the bag. The book's dust jacket claims that these World War II cases are "especially relevant in this time of terrorist threat, as governments debate how far to go in the name of security."

"One suspects that it is British and American pilots operating over Afghanistan, Iraq, and perhaps Iran, whom the professor would like to see in the dock," wrote historian Michael Burleigh in a recent *Times* review. "While Grayling implicitly regrets that he can't haul wartime Allied airmen into [court], ... the purpose of his book is to increase the likelihood that contemporary American (and British) pilots will face that prospect every time one of their precision bombs hits a collateral target."

The danger is not theoretical. USAF pilots might soon be in action against Iran, under circumstances likely to cause civilian casualties. Investigative reporter Seymour M. Hersh, writing in the April 17 issue of *The New Yorker,* quoted US officials as saying "Air Force planning groups are drawing up lists of targets" of nuclear facilities, most of which are in urban areas.

Modern airpower already is tightly constrained. Targets are approved only after detailed analysis and review. Those with high potential for civilian casualties frequently don't make the cut. The process often bogs down in legal wrangles. "Lawyers already abound at the United States Central Command in Florida," Burleigh notes. "If Grayling has his way, they'll be scuttling along beside the pilots on the runways."

The Air Force does not need more shackles placed upon it. It is a truism—because it is true—that the United States will always struggle to safeguard civilians and conduct operations in a just fashion. What Americans also need to remember is that, in the trials to come, as in World War II, failing to prevail would be an immoral act all by itself. ■

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Letters

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The Schwalier Case

I was the commander, JTF Southwest Asia, at the time of the Khobar Towers bombing and observed firsthand the exceptional force protection efforts undertaken by Brigadier General Schwalier. Additionally, he and I were closely involved with the three investigations that were conducted subsequent to the attack *["The Second Sacking of Terryl Schwalier," April, p. 38].*

I supported General Schwalier in his appeal to the Air Force Board for Correction of Military Records (AFBCMR) and was gratified that they found in favor of restoring his promotion to major general. However, I am dismayed to learn that once again the OSD has overruled due process and is yet again denying General Schwalier his promotion.

I want to thank Rebecca Grant for her excellent article detailing the byzantine way the OSD has worked to deny General Schwalier his due. I urge the Air Force Association not to let this issue die. Ms. Grant and the many Air Force leaders she quoted in her article have it right—Terry Schwalier was the victim of political pressure as well as a double standard, and he clearly deserves restoration of the promotion unfairly denied him in 1997.

Maj. Gen. Kurt B. Anderson,
USAF (Ret.)
Fort Worth, Tex.

Thanks so much for the rollout of information on Terry Schwalier's cases. It is a marvelous summary and a good focus on the legal issue.

Col. George E. "Bud" Day,
USAF (Ret.)
Shalimar, Fla.

I have a question after reading Ms. Grant's article: How many of the DOD lawyers (Paul S. Koffsky, Daniel J. Dell'Orto, and Mary L. Walker) involved in this latest injustice are holdovers from the reign of Secretary William Cohen? After all, how many lawyers have ever admitted to being wrong about anything? Clearly, bolstering their own self-image has to be more important than correcting any injustice done to a warfighter.

Maj. Jim Rotramel,
USAF (Ret.)
Lexington Park, Md.

■ *Koffsky, Dell'Orto, and Walker came to the Pentagon as general counsels in 1980, 1998, and 2001, respectively.*—THE EDITORS

I read with great interest the article by Rebecca Grant. I was appalled when they sacked this fine young general officer after the Khobar explosion. I recently spoke with [former Chief of Staff Gen.] Michael Ryan and congratulated him on his perserverance in this case.

Col. John E. Molchan,
USAF (Ret.)
Mesa, Ariz.

That was an awesome article by Ms. Rebecca Grant—informative, well-written, and objective (from where I stand). Thanks and kudos to Ms. Grant and *Air Force* Magazine for fighting to present the truth.

I am disappointed the Pentagon did not allow the Board for Correction of Miltary Records decision to stand. We should want to reverse, not perpetuate [the error].

Lt. Col. Roy Swygert,
USAF (Ret.)
Robins AFB, Ga.

The April 2006 article on Brigadier General Schwalier states, "In October 2000, al Qaeda operatives launched an audacious, waterborne bombing of the Navy destroyer USS *Cole* in Yemen's Aden harbor. Seventeen US sailors perished. After this disaster, which happened on Cohen's watch, the Pentagon chief did not seek a scapegoat. All realized that it was an act of war, and the ship's captain was not faulted."

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

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While I was not faulted for the suicide terrorist attack, the subsequent Judge Advocate General Manual (JAGMAN) investigation pointed out that my entire chain of command and I did not do enough to anticipate this new type of threat that USS *Cole* was faced with on the day of the attack.

I have never wavered from the principle of accountability. As the former commanding officer of the USS *Cole,* I was the accountable officer for how my ship and heroic crew performed before, during, and after the attack. There is, however, a fundamental difference between accountability and blame.

As the commanding officer when USS *Cole* pulled into Aden, Yemen, for a brief stop for fuel, I chose to selectively implement a limited set of force protection procedures. This discretion, which the Navy allows its commanding officers, was based on my assessment of the threat and the conditions in the port, as they existed that morning. Through a confluence of unpredicted issues beyond my control, the crew of USS *Cole* and I were destined not to be able to protect our ship due to the lack of foresight by the entire chain of command, which failed to foresee and prepare us for the type of attack perpetrated by those suicide terrorist bombers. Even today, our military system is unable to defend against suicide terrorists anywhere in the world.

In January 2002 I was selected for promotion to captain. Since then, my promotion has been blocked or held up at various points in my chain of command, including the United States Senate. It currently remains in an undetermined status with the Secretary of the Navy, due to political concerns.

My career has been effectively terminated. I have not been promoted; I have not been given assignments of increased responsibility; nor have I been selected for future commands. This has occurred against the backdrop [where] every person in my chain of command has been either promoted or given positions of greater responsibility. This is the same chain of command that, according to the JAGMAN investigation, bore responsibility for the attack.

In short, I have suffered the same fate as Brigadier General Schwalier and have been made a political scapegoat in the War on Terrorism.

Cmdr. Kirk S. Lippold,
USN
Alexandria, Va.

To Wear or Not To Wear

The pictures and article on battlefield airman school were very interesting, but I do have a question for you about the Army patches on the Air Force uniforms. *[See "Battlefield Airman School," April, p. 54.]* I understand the patch on the left sleeve is for the Army unit they are

attached to, and the patch on the right is the unit they spent time in a combat zone with. I have been told that the Air Force will allow the patches on the left if they are currently assigned to an Army unit, but the patch on the right must come off when you return Stateside. I spent time attached to an Army unit in Afghanistan and was informed there that I was able to wear the shoulder sleeve insignia on my right sleeve, but when I returned Stateside, I was told to "take off those Army patches" by an E-9 assigned to HQAFRC/SF (Air Force Reserve Security Forces). What is the current ruling on those Army patches? Thanks for your help and keep up with the great articles and information.

MSgt. Steve Pridgen,
USAFR
Rocky Mount, N.C.

■ *According to AFI 36-2903, Sept. 29, 2002, an airman currently aligned with and supporting an Army ground unit here in the US, or deployed and aligned with a ground unit, can wear the combat zone unit patch and the Army unit patch. But once that airman is no longer aligned with that Stateside or deployed ground unit, he can no longer wear those patches.*—THE EDITORS

Defense Budget Chart Pages

I suggest that it would be informative to add to the "Defense Outlays as a Share of Gross Domestic Product," *["Defense Budget Chart Pages," April, p. 62]* an overlay showing total Federal outlays as a share of the GDP for the same period.

Maj. Dean K. Boles,
USAF (Ret.)
Tucson, Ariz.

The Fall of Lima Site 85

[In] reference [to] "The Fall of Lima Site 85" *[April, p. 66]* and the posthumous award of the Air Force Cross to CMSgt. Richard L. Etchberger: I was executive officer to the vice chief of staff, Gen. John D. Ryan, when the recommendation for this award came to our office. As I recall, the vice chief was the final approving authority for all awards above the Distinguished Flying Cross. General Ryan had charged me with reviewing all recommendations and then giving him my views for the awards and if they should be approved or not.

I distinctly remember the recommendation for Chief Master Sergeant Etchberger. After reading all the supporting documentation, I went into General Ryan's office and told him that as far as I was concerned, this had every element for the Congressional Medal of Honor rather than the Air Force Cross.

After reading all the supporting documents, General Ryan said that he agreed. However, we had to consider that the Congressional medal could not be awarded without national news attention. Due to the sensitivity of Lima Site 85's location, the circumstances surrounding its role, and the subsequent loss, these factors could not be revealed. We could, however, fly the Etchberger family to Washington and in a quiet, appropriate ceremony award the Air Force Cross without national fanfare.

I then told General Ryan that I understood this rationale, but in fairness to Chief Master Sergeant Etchberger felt that his records should be flagged so that they would be reviewed periodically. When the conditions and circumstances surrounding Lima Site 85 were no longer classified as top secret and the true story could be revealed, then the orders awarding the Air Force Cross could be rescinded and the Congressional medal be awarded. General Ryan agreed wholeheartedly.

I have often wondered if this recommendation was carried out. It must have fallen through the crack somewhere along the line.

Col. Ruffin W. Gray,
USAF (Ret.)
Diamondhead, Miss.

I first read about Lima Site 85 in a *Bangkok Post* Sunday supplement in 1972. *Bangkok Post's* intel was pretty good. More than once, I read about a new secret project in the *Post* over breakfast, before getting the official briefing later at the office. Even so, I had learned to distrust most of what I heard about Laos, even from my "contractors" there.

One thing I did know was, during the 1973 Arab oil embargo, I bought the fuel for the friendly forces in Southeast Asia. Summit Oil had the contract for northern Thailand and Laos. One of Summit's delivery stops was a mountain radar station in [northeastern] Laos near the North Vietnam border. Coincidence? This was a half-year after the Paris Peace Accords were signed.

Paul J. Madden
Seatac, Wash.

As a young airman stationed at Udorn, Thailand, in 1966-67, who made several trips out of country into Laos, I read this article with a great sense of respect and admiration for the men who volunteered for this hazardous duty.

At the same time, I cannot help but question the mentality of leaders who would place these personnel in a highly precarious situation without adequate means to protect them or at least provide them with a timely escape mechanism such as an on-site helicopter. The fact

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To educate the public about the critical role of aerospace power in the defense of our nation.

To advocate aerospace power and a strong national defense.

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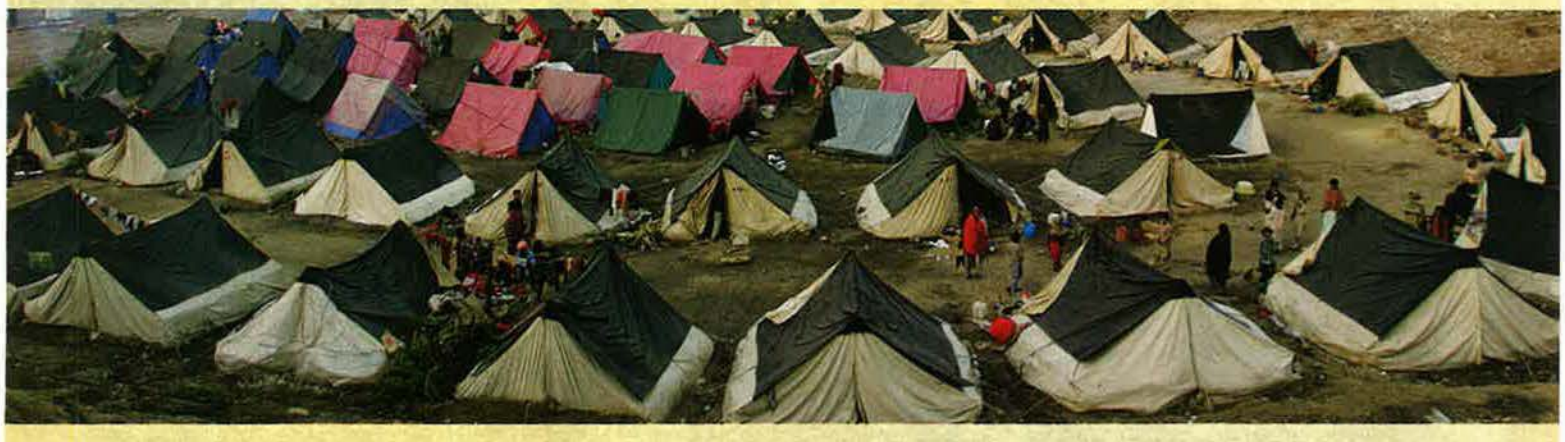
We're proud to celebrate an important milestone for the C-17, the world's most capable airlifter: A million hours of flight. This remarkable accomplishment is a testament to its unmatched ability to support our forces and deliver humanitarian relief virtually anywhere, anytime. We salute the U.S. Air Force C-17 crews, support teams, as well as the men and women across the nation who help build the C-17 and make it an invaluable asset to the world.



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that these airmen were not even armed until several days before the attack, and then only with M-16s, verges on the absurd.

It seemed to us that every time we went "up country" and surrendered our military IDs and other identifiers to go "covert," the only people our leaders thought we were deceiving were our elected officials in Washington, since the enemy always knew who the "round eyes" were, and they made no distinction in attempting to kill us whether we were military, CIA, or civilians.

Hopefully, the tragedy and negligence of LS-85 will be studied in the classrooms of our future leaders as a case study of how not to waste brave American lives for an operation that was questionable at best.

My thoughts and prayers go out to these men, who so proudly served our country, and their families.

Charles Miller
Fort Lauderdale, Fla.

Tell the Story

John Correll's excellent recounting of Lt. Col. Bill Jones' bravery *["Determination of a Sandy," March, p. 42]* reminded me where I had heard that name before.

As a member of the Air War College faculty for seven years, I walked into Jones Auditorium many hundreds of times. I do recall reading the bronze plaque, but paid it no special attention over the years since we did not always do a good job of celebrating our heroes as part of the curriculum. With the benefit of hindsight, it would be most appropriate for the AWC commandant to open each class with a brief recounting of this Medal of Honor recipient for the benefit of the international officers and other service class members.

Col. Vic Budura,
USAF (Ret.)
Huntsville, Ala.

Balancing Act

The April 2006 article "The Tehran Triad," p. 74, does a good job of outlining Iran's relative political, economic, and military strengths and weaknesses and makes a solid case that at least part of their security strategy is "asymmetric" when arrayed against America's strengths. Iran, however, is employing both traditional and asymmetric means to counter the US because they have little choice. The Iranian regime's bellicosity, increasingly evident as American forces remain preoccupied by the war against terrorism and everything else in Iraq, Afghanistan, and elsewhere, is an attempt to buy time. Iran is faced with social and political instability on their eastern and western borders, in both instances current areas of dominant American interest and substantial American forces. To their north, Iran sees a fair-weather ally that they probably cannot count on in a pinch.

Internally, there are other uncertainties that the Iranian regime must deal with, including a large, youthful population that is increasingly questioning Iran's economic choices, form of government, hard-line foreign policies, and support to terrorist organizations. Among these internal issues, and possibly the most threatening, are the questions of Kurdish autonomy and the status of the large Kurdish population inside Iranian borders. The regime may be able to keep the Iranian Kurds down, but Iraqi and Iranian Kurds aligned with the US in a strategy to destabilize the Iranian regime would increase Iran's security problems exponentially.

The Iranian regime may also envision their worst nightmare, a stable, united Iraq, allied with the US with a substantial US military presence remaining in Iraq. The regime in Tehran has much to fear in the various potential post-OIF and -OEF futures, and they are pursuing an eclectic strategy because it's all they can do short of appearing to capitulate to US demands, which would further undermine the regime's legitimacy. This regime is apparently convinced that their brash rhetoric, combined with increased conventional strength, looming nuclear capabilities, and continued support to terrorism, offer them the most flexibility in responding to future events. They may also believe that their strategy provides them the time they need to strengthen their position in the area relative to the US by continuing to support insurgency in Iraq and Afghanistan until the US gives up or substantially reduces its goals. Despite views to the contrary, Iran is pursuing a rational strategy, but it is a risky strategy, too.

The greatest risk to Iran is that their bellicosity and efforts to enhance their conventional and nuclear military capability could have the unintended consequence of creating equally hard-line positions among the US, its allies, and unsympathetic UN members. Iran's oil and gas reserves aside, it has little to offer potential adversaries that would keep hard-line rhetoric from becoming hard-line reality, resulting in more stringent economic sanctions and escalating political tensions. Iran does not want to become another North Korea, but both the US and Iran have a narrow beam to traverse, and the only potentially good result requires both to stay on the beam. This will be a difficult, if not impossible, balancing act.

Col. Rick Harris,
USMCR (Ret.)
McLean, Va.

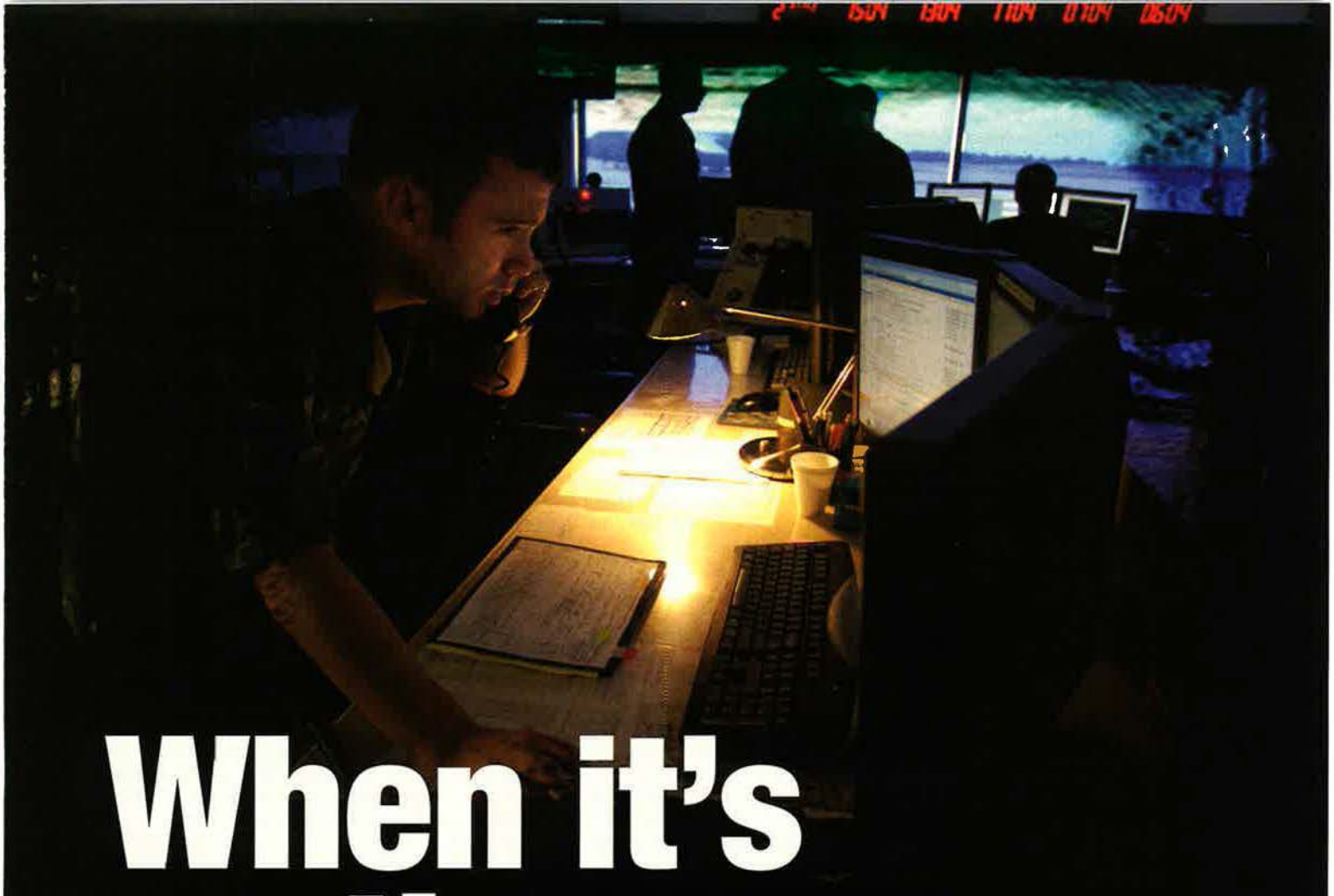
Needed: An Alternative JSF Engine

[Regarding "Aerospace World: Congress Hits JSF Engine Cut ... While London Weighs In," April, p. 17]: I was assigned to the Maintenance and Engineering Directorate of Tactical Air Command at Langley AFB, Va., from 1974 to 1977, first as the chief of the F-15 Branch and then as the chief of the Fighter Reconnaissance Division. As such, I became painfully aware of, and had to deal with, the reliability problems of the F-15 engine (the Pratt & Whitney F100) on a daily basis—the main engine problem being the tendency of the P&W F100 to develop a stall stagnation which resulted in an in-flight engine shutdown.

In September of 1977, I was assigned to the 388th TFW at Hill AFB, Utah, as the deputy commander for maintenance. The 388th was scheduled to be the first F-16 operational wing and was also the organization that was to be responsible for maintaining the 12 F-16s assigned to the Multinational Operational Test and Evaluation program and for training the maintenance personnel from the four foreign MOT&E nations, i.e., Norway, Netherlands, Denmark, and Belgium. One of the main reasons I was assigned as the 388th DCM was because of the extensive experience I had with the F-16 engine, the P&W F100, the same as that used in the F-15.

Within a few months' time after receiving our first F-16s in January of 1979, we experienced our first F-16 stall stagnation and dead stick landing at an auxiliary field near the gunnery range on the desert. Indeed, it was only after that first F-16 flameout landing that official engine-out approach and landing procedures were included in the F-16 "Dash 1." It was shortly after our second successful flameout landing (if my memory serves me correctly it was an MOT&E aircraft) that we were paid a visit by the Secretary of the Air Force, Dr. Hans Mark, who requested a briefing on the status of the F-16 beddown.

After I concluded my briefing, Dr. Mark asked me what I thought was the most important thing that we could do to improve F-16 maintainability, reliability, and safety. My answer? It was imperative that an alternative engine to the P&W F100 be developed and procured. I said that procurement of an alternative engine would drive both manufacturers to improve reliability, operational performance, and price, and, most importantly,



When it's go time

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I stated that we were headed for an all F-15/F-16 fighter force and if this force were equipped with a sole source engine and if in the future this engine developed a serious flaw, then we would have seriously jeopardized the capability of the United States Air Force to defend the United States of America. It was not too long after that visit by Dr. Mark that USAF announced that a contract was being awarded to GE to develop an alternative to the P&W F100 engine.

The point I am trying to make here is that I firmly believe that those arguments I put forth for an alternative to the F-16 P&W F100 engine are as valid today for the JSF engine as they were 27 years ago for the F-16 engine, perhaps even more so, since the JSF is being procured by the Air Force, Navy, and the Marine Corps.

Col. Gene Cirillo,
USAF (Ret.)
Gold River, Calif.

Airpower Classics

I received my April issue of *Air Force* Magazine and quickly turned to the back to see what this month's airpower classic would be *["Airpower Classics: F6F Hellcat," p. 96]*. Oh, the humiliation, a Navy plane already!

MSgt. Stephen L. Childers,
USAF (Ret.)
Wyoming, Del.

Your Navy F6F airpower classic feature is the most comprehensive, accurate, and complete Hellcat article I have ever seen, and on one page! The F6F-5 was the first aircraft engine I ever started (1948). Well done, AFA.

Capt. Norman S. Bull,
USN (Ret.)
Crownsville, Md.

["Airpower Classics: F6F Hellcat"] correctly states that Navy and Marine Corps F6F pilots, both carrier and land-based, were credited with shooting down 5,156 Japanese aircraft in the Pacific. However, not mentioned are the 47 "kills" scored by British Fleet Air Arm pilots in the PTO. Ditto the 13 air victories scored by American and British pilots in Europe, giving the Hellcat a grand total of 5,216 air victories.

Steve Blake
Mission Viejo, Calif.

Your article in the April magazine on the F6F Hellcat was of special interest to me because of my year of exchange duty with the Navy back in 1952-53. My squadron commander at the time I completed my Navy tour was Cmdr. Hamilton McWhorter III, who was the Navy's first F6F ace. As a lieutenant (j.g.) in November 1943, he shot down his fifth Japanese plane, all victories coming in the Hellcat. Mac was a great pilot and is still a good friend.

Col. Ed Mason,
USAF (Ret.)
Alexandria, Va.

Let me add my own enthusiastic approval of "Airpower Classics" and particularly the one on the F6F Hellcat where you note that it "briefly equipped Blue Angels after World War II."

I was a pilot in training in Ontario in 1950 when my class learned that the RCAF Vampire aerobatic team, as well as the Blue Angels Hellcat team, would be putting on a show at the Willow Run airfield across the border in Detroit. We drove en masse to watch them, and though I have seen countless shows since, none enthralled me as much as these two teams—the main reason being they were small and maneuverable aircraft that rarely left the confines of the field, and I suspect there were no restrictions on how low they could go or how close to the crowds they could come. Even the taxiing in was a thrill: All those P&W R2800 snorting and belching and the Vampires whining and screeching with their kerosene smells are memories that have outlived most others in a lifetime in aviation.

George Fulford
Mill Valley, Calif.

Verbatim

By John T. Correll, Contributing Editor

Don't Call Them Evil

"It is sometimes convenient, for purposes of rhetorical effect, for national leaders to talk of a globe neatly divided into good and bad. It is quite another, however, to base the policies of the world's most powerful nation upon that fiction. The Administration's penchant for painting its perceived adversaries with the same sweeping brush has led to a series of unintended consequences."***—Former Secretary of State Madeleine Albright on the "axis of evil," op-ed,*** **Los Angeles Times,** ***March 24.***

The "Supporting Arm"

"The future of the Air Force is in the service to the mission on the ground. It is in support of our young corporals and sergeants engaged in the real fight. Unfortunately, it seems that many of the senior leaders are reluctant to recognize that waves of Russian fighters will not be coming over the horizon any time soon. The future of the Air Force is not the main effort of the fight, but it is that of a supporting arm."***—Sen. Conrad Burns (R-Mont.), Senate Appropriations defense subcommittee, March 29.***

Supporting Arm's Contributions

"Within the joint force, our Total Force—active, Guard, and Reserve airmen—grounded the Iraqi Air Force, destroyed the combat effectiveness of the Iraqi ground forces, blinded the Hussein leadership, and paved the way for a series of ground battles that saw Baghdad fall in 22 days."***—Gen. T. Michael Moseley, USAF Chief of Staff, letter to airmen on third anniversary of Operation Iraqi Freedom, March 20.***

Pave PAWS Goes to the Snakes

"I always look for snakes. This is a rattlesnake haven. I've seen them hanging out the door."***—County Sheriff David Doran, making a security check at the old Pave PAWS strategic radar facility near Eldorado, Tex., closed since 1995,*** **Houston Chronicle,** ***March 26.***

Keep the Missiles

"What has changed since January 2002 to necessitate a further reduction in our ICBM force? Am I correct in concluding that this is simply a budget decision driving strategy? The proliferation of nuclear weapons throughout the world requires that we maintain these missiles as part of our strategic defense capability."***—Sen. Conrad Burns (R-Mont.), on proposal to reduce the US ICBM fleet from 500 to 450,*** **Great Falls Tribune,** ***March 30.***

There's That

"And what if a bomb the size of the Hiroshima bomb was set off around here? Well, we'c all be dead, so we wouldn't have to worry about a mass evacuation."***—Terrance Gainer, departing chief of the US Capitol police,*** **Washington Post** ***Magazine, April 9.***

Most Serious Threat

"We may face no greater challenge from a single country than from Iran."***—National Security Strategy, March 16.***

Wild Speculation

"I read the articles in the newspapers this weekend. It was just wild speculation, by the way. What you're reading is wild speculation, which ... happens quite frequently here in the nation's capital."***—President Bush on news reports of intensified US planning for an attack on Iran, speech at Johns Hopkins University, April 10.***

No Gulf War Syndrome

"An enormous amount of money and effort have been expended on understanding Gulf War illnesses worldwide. These reviews make it clear that there is no single cause."***—Simon Wessely, co-director of King's College Centre for Military Health Research, London*** **Times,** ***March 25.***

The Danger in Withdrawing

"If we should withdraw from Iraq and simply wash our hands of the situation there, we risk creating a failed state in the heart of the Middle East, a situation that would enable terrorists to train and plan attacks against the United States with impunity. We saw just such a situation develop in Afghanistan after international disengagement from that country, and it resulted in 9/11. We must not make that mistake again."***—Sen. John McCain (R-Ariz.),*** **Arizona Republic** ***(Phoenix), March 19.***

Iraq Was Peripheral

"I now regret that I did not more openly challenge those who were determined to invade a country whose actions were peripheral to the real threat—al Qaeda."***—Retired Marine Lt. Gen. Gregory S. Newbold, director of operations for the Joint Chiefs of Staff, October 2000 to October 2002, signed column,*** **Time** ***magazine, April 17 issue, published April 9.***

Opportunity to Speak

"We had then and have now every opportunity to speak our minds, and if we do not, shame on us because the opportunity is there. ... The plan that was executed was developed by military officers, presented by military officers, questioned by civilians as they should, revamped by military officers, and blessed by the senior military leadership."***—Marine Gen. Peter Pace, Chairman of the Joint Chiefs of Staff on war in Iraq, Pentagon news briefing, April 11.***

No Discouraging Words

"In the five years Mr. Rumsfeld has presided over the Pentagon, I have seen a climate of groupthink become dominant and a growing reluctance by experienced military men and civilians to challenge the notions of senior leadership."***—Retired Army Maj. Gen. Paul D. Eaton, the US general in charge of training new Iraqi military members after the fall of Baghdad,*** **New York Times** ***op-ed, March 19.***

9/11 in Perspective

"Before Sept. 11, 2001, there was somewhat of a misunderstanding in America about terrorists and in some circles I suppose there still is today. Even today, some folks view terrorists as criminals, not as combatants—some even consider them victims. Some seem to think that the years before September 11th were decades of peace, but that is not so. Though we think of September 11th as the first day in the Global War on Terror, it wasn't the first day for the enemy. Extremists had declared war on free people decades ago. In 20 years, terrorists attacked and killed Americans more than 20 times."***—Secretary of Defense Donald H. Rumsfeld, speech at Army War College, March 27.***

Joint Cargo Aircraft

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The Keeper File

Nunn's Bleak Tale

Not long after the fall of the Soviet Union, Sen. Sam Nunn (D-Ga.) shook up the US military with a ringing call for change. The Senate Armed Services Committee chairman did so with a memorable 7,000-word Senate speech, one that painted a bleak portrait of service parochialism and wasteful duplication of capabilities. He called for a major review—and revision—of roles and missions.

At the top of Nunn's hit list was overlap in airpower, particularly in power projection within the Air Force and Navy. Nunn argued that redundancy in airpower was squandering billions. However, in a report unveiled in early 1993, Gen. Colin L. Powell, Chairman of the Joint Chiefs of Staff, expressed strong support for maintaining such redundant capabilities as a hedge against surprises. Still, the pressure created by Nunn's speech has never dissipated.

"DOD Must Thoroughly Overhaul the Services' Roles and Missions"

Sen. Sam Nunn
Address to the US Senate
Washington, D.C.
July 2, 1992

Find the full text on the Air Force Association Web site
www.afa.org
***Air Force* Magazine**
"The Keeper File"

I am convinced it is time for General Powell to conduct a no-holds-barred, everything-on-the-table review of the current assignments of roles and missions among the military services. ...

The first area of potential streamlining is projection of airpower. [The 1991 Gulf War] provided compelling evidence of the critical role that airpower plays on the modern battlefield. Tactical aircraft were among the first forces in theater to deter further advances by Iraq, provided an ongoing air defense screen over Saudi Arabia while the reinforcement proceeded, and conducted an extremely successful interdiction campaign once the war started.

But we spend tens of billions of dollars every year operating tactical aircraft squadrons in each of the four services. The services now have over $350 billion worth of new combat aircraft on the drawing boards, with only limited efforts to achieve commonality. We must find ways to save billions of dollars with streamlining and eliminating the duplication in this area.

We have two modes of airpower—land-based aviation and sea-based aviation. Land-based aviation provides the mass needed for modern air combat. Sea-based aviation provides presence in areas where land basing is not possible or until it becomes possible. Both are unique capabilities and assets we require. From my point of view, the issue is not whether we have one or the other. The issue instead is choice on the margin: As we invest scarce resources in coming years, what is the most cost-effective mix of forces?

As I review the service plans and programs, I note several items that cannot be considered apart from a careful assessment of roles and missions. For example, this year's budget request contains an $800 million down payment on a $4.8 billion aircraft carrier, and $165 million to start the development of a $60-to-$80 billion new stealthy medium-range bomber to fly off aircraft carriers, the so-called AX airplane. At the same time, the Air Force is proposing to start a $5 billion upgrade to the B-1 bomber.

This raises several important questions. What is the most cost-effective way to provide air interdiction in the future—with long-range bombers from the United States or with large numbers of aircraft carriers with medium-range bombers on their decks? ...

I am not saying we do not need aircraft carriers or do not need long-range bombers. But I do believe that as we look to a future of shrinking budgets and changing requirements, we need to make some clear-eyed decisions about the most cost-effective mix of these forces.

There are other areas of duplication in airpower. The Navy operates F-18 aircraft as multirole fighters and the Air Force operates F-16 aircraft as multirole fighters. The Navy wants to buy a new version of the F-18 that will cost nearly $5 billion to develop and $55 [billion] to $75 billion to procure. The Air Force wants to develop a new multirole fighter in the future to replace its current F-16 fleet. That airplane will cost tens of billions of dollars as well. During the 1960s and 1970s, the Navy, the Air Force, and the Marine Corps all operated one fighter—the F-4, which was an extremely successful aircraft.

This raises several key questions: Can the services cooperate and develop a common multirole fighter? Could the Air Force use the Navy's F-18 as its multirole fighter? ...

The Air Force operates some 26 equivalent wings of fighter aircraft. The Navy operates 13 wings, and the Marine Corps operates four wings. Each wing costs hundreds of millions to operate and train annually, and billions to outfit. Obviously, each of the services would like to keep all their own wings of aircraft. But we must ask some specific questions. Do we need separate and parallel fleets of multirole fighters in the first place? How many squadrons do we need and how many should be in the Navy, in the Marine Corps, and in the Air Force? Should each of the services have a complete cross section of types of aircraft or could the services specialize?

The fundamental question is not what is best for the Navy or the Air Force or the Marine Corps. The fundamental question is what is best for America. ■

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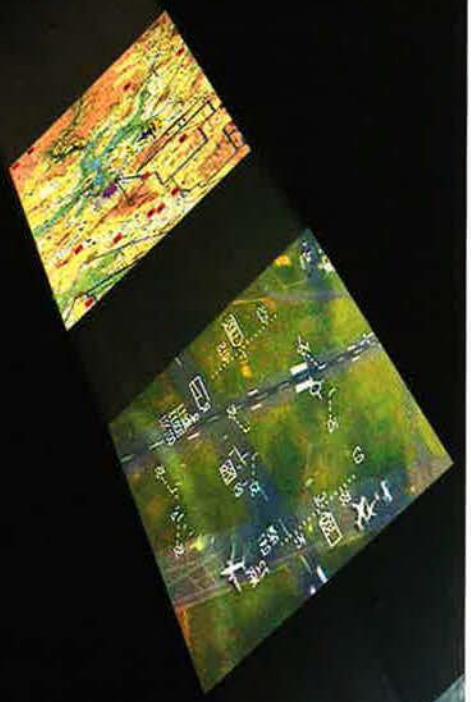

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Washington Watch

By John A. Tirpak, Executive Editor

Eight Bomber Prospects; Poke in the Eye to Airbus; Up and Down With the F-22 ....

No Easy Answers on New Bomber

There is no obvious answer to the question of how the Air Force should fulfill its assignment to get a new long-range strike system in place by 2018, according to the Congressional Budget Office.

In a study titled "Alternatives for Long-Range Ground-Attack Systems," released in April, the CBO looked at eight current and future approaches to long-range strike, evaluating them on attributes such as speed, payload, survivability, and cost.

CBO concluded that no single solution stuck out as a clear winner, although some were decidedly cheaper than others. For example, the report projected that new supersonic bombers would cost more than $900 million apiece, while new high-speed cruise missiles could cost just $1.4 million apiece. Whether the cruise missile would be more cost-effective, however, was not stated.

The CBO did not identify a preferred solution, instead suggesting that policy-makers sort out the pluses and minuses of the various options and then decide. If the critical need is extremely quick response time, for example, then the Pentagon might be willing to pay a premium to get it.

CBO also said there may not be a single solution to the long-range strike requirement, noting that it may involve "more than one of the systems CBO examined." The eight alternatives were:

- Specialized "arsenal aircraft"
- Medium-range subsonic bomber
- Medium-range supersonic bomber
- Long-range subsonic cruise bomber
- Long-range supersonic cruise bomber
- Medium-range, surface-based hypervelocity vehicle
- Long-range, surface-based hypervelocity vehicle
- Space-based re-entry vehicle

As a general rule, the faster the response time of a given solution, the more expensive it tends to be, the CBO found.

Of all the options considered, CBO gave the nod to large, stealthy subsonic bombers as being able to offer the greatest firepower in a single package, able to loiter in the target area for long periods while dispensing low-cost ordnance. While the time of flight of a weapon released from a loitering bomber was quick in an established conflict, where the aircraft were already over the battlefield, it was much slower than other options from a "standing start," said the report.

In More Detail

Arsenal Craft. CBO considered the prospect of using USAF's C-17 airlifter as the basis of a new kind of arsenal aircraft, one capable of carrying many cruise missiles internally and releasing them out the rear cargo door for launch.

This, CBO found, was the least expensive of the eight options. It might not even be necessary to buy any new aircraft for this approach, CBO said, if the strike mission could be accommodated by using existing airplanes.

A drawback is that the nonstealthy C-17 would have to loiter outside a danger zone and launch its missiles from there, thus reducing its reach. Large and not designed for evasive action, the C-17 would make an attractive target.

USAF photo by TSgt. Cecilio Ricardo

The new one may look like this.

Over all, said CBO, arsenal airplanes would offer "significant firepower" at a cost well below that of bombers. The C-17 would carry missiles that could fly at Mach 3 and travel at least 575 miles, at a cost of under $2 million apiece.

Medium-Range Bombers. CBO's medium-range bombers were projected at sizes in the F-111 class. Both would be stealthy, but the subsonic version would have a payload greater than that of the supersonic type, which CBO likened to the FB-22 concept. (See "The Raptor as Bomber," January 2005, p. 28.) The fast version could dash at a speed of Mach 1.5. Either could be manned or unmanned.

The medium bombers would offer "reach and firepower improvements over current long-range strike fighters," the CBO said, but wouldn't address the need for global reach or be able to loiter in the target area very long. The Air Force could buy more of them than larger bombers, but not necessarily have greater net firepower, the CBO noted. A larger fleet of aircraft also would entail higher support costs but cover more geographical area at the same time.

The CBO postulated that it would cost $188 million apiece—average unit procurement cost, including research and development—to build a subsonic medium bomber, over a run of 275 aircraft, while a similar number of the supersonic dash version would cost $220 million apiece.

Long-Range Bombers. The large subsonic bomber would be "similar in concept (although not necessarily in specific design) to the stealthy, subsonic B-2," said CBO, while the large, supersonic craft would be capable of sustaining Mach 2 over most of its mission. Again, the slower model would possess more firepower, but the faster version would reduce the response time. These aircraft, too, could be manned or unmanned.

The big subsonic bombers offer global reach, loitering ability, and a response time of about 15 hours from a "go"

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order. The supersonic big bombers would sacrifice loitering time and some payload in exchange for a shorter response time, which the CBO did not specify.

The CBO said it would cost about $409 million each for 150 long-range subsonic bombers, including R&D, but the cost would shoot up to $912 million apiece if they were required to cruise at supersonic speed.

The Air Force and the Pentagon have both expressed a desire for a strike platform that could put ordnance on targets within a few minutes of a launch order, but CBO said that doesn't seem to be technically possible given the state of the art.

USAF photo by MSgt. John E. Lasky

Could USAF make this an arsenal?

Hypervelocity Vehicles. The high-speed missiles would be derived from the Common Aero Vehicle, which has been studied by the Air Force and Defense Advanced Research Projects Agency for several years. The CBO looked at land-launched models, as well as those fired from ships, submarines, and aircraft. The most expensive but fastest on the spectrum of options was the "re-entry vehicle" version of the CAV, which would be maintained in orbit, ready to descend on a time-sensitive target at any time.

The CAVs would be unmanned vehicles "capable of flying through space on suborbital trajectories ... shaped to generate sufficient lift so that, after re-entering the atmosphere, they can glide many thousands of miles to their targets at hypersonic speeds with a combination of thrusters and flaps providing maneuvering control."

Space Vehicles. Orbital CAVs would be in equatorial low Earth orbits until needed, while ground-based CAVs could be launched by a converted intercontinental ballistic missile.

The CBO found that even the hypervelocity CAVs would need about an hour to get to their targets from a standing start but that it would be nearly impossible to defend against them.

"However, their high unit cost implies that they probably could not be purchased in sufficient numbers to provide the sustained firepower offered by aircraft forces," CBO concluded.

The CBO posited a program unit cost of $26 million each for 48 surface-based CAVs; $36 million each for 24 long-range surface-based CAVs (likely launched on excess ICBMs); and $55 million each for 128 space-based CAVs.

Making the Top 10 List

Under law, the military services have a legal responsibility to "organize, train, and equip" their forces, but new Pentagon moves seem designed to circumvent the services' "equip" role, with or without changes to the law.

The shift is evident in new steps by Adm. Edmund P. Giambastiani Jr., Joint Chiefs of Staff vice chairman, to beef up and broaden the authority of the Joint Requirements Oversight Council, which he chairs. The JROC, a panel comprised of the vice chiefs of all the services, has traditionally evaluated the top wish lists proposed by the services and ranked them for funding in order of priority.

Giambastiani has altered the process, however, by allowing the regional combatant commanders to establish the priorities lists. The COCOMs now are invited to participate in JROC meetings and develop requirements staffs of their own.

The moves echo recommendations of the Defense Acquisition Performance Assessment, a 10-month study headed by retired Air Force Lt. Gen. Ronald T. Kadish. DAPA recommended giving the COCOMs a bigger say in dictating which weapons systems should get first dibs on Pentagon funds. (See "Washington Watch: 'Radical' Acquisition Ideas," March, p. 14.) The Kadish panel said that the new system, if adopted, would put higher emphasis on near-term needs, the better to react to changing battlefield conditions and technologies.

The DAPA panel pointed out, though, that legislation would be needed to implement such a change and that its drawback would be a lessening of attention to long-term development of big technological breakthroughs.

Giambastiani, in concert with the COCOMs and the JROC, has developed a new short list of pressing military needs, based on capability gaps identified by the group. This list presumably trumps any priorities put forward by service chiefs. The ranking is known as "the top 10 list," although it is not necessarily limited to 10 items.

The JROC prime membership will concentrate on debating these top priorities, and lesser issues will be addressed by JROC staff.

Pentagon officials said Giambastiani's new steps are an effort to bring more logic to the process of ranking department-wide priorities, especially in light of what are expected to be further reductions in out-year buying power, which will unfurl in the Fiscal 2008 Program Objective Memorandum, or POM, process. The POM is a five-year plan for programming and budgeting, and both Defense Secretary Donald H. Rumsfeld and his deputy, Gordon England, have pledged that the Pentagon will no longer launch programs that can't be afforded down the road.

Tanker Competition: Hand in Glove

The Air Force's formal launch of an aerial tanker replacement program in April showed an interesting twist that suggests the Bush Administration is taking seriously its own advice to get disparate government agencies working together in common cause—in this case, the commerce department and the Air Force.

The request for information that went out to industry identified various attributes that the Air Force wants in its new tanker, which will replace the Eisenhower-era KC-135s. Those attributes include size, ability to fuel by either probe and drogue or boom apparatus, possible use as a communications node, secondary roles in cargo/aeromedical evacuation, etc.

The Air Force said it would consider hiring a private company to do the tanking, providing the company can give good answers about how such a scheme would work, and when it would be available, and especially liability and indemnification.

The most interesting thing about the RFI, though, was USAF's insistence that responding companies explain any financial assistance they receive from their governments, such as subsidies, financing (such as launch aid) for design and development, grants, and government assistance for expanding or developing manufacturing sites, as well as preferential loans and debt forgiveness.

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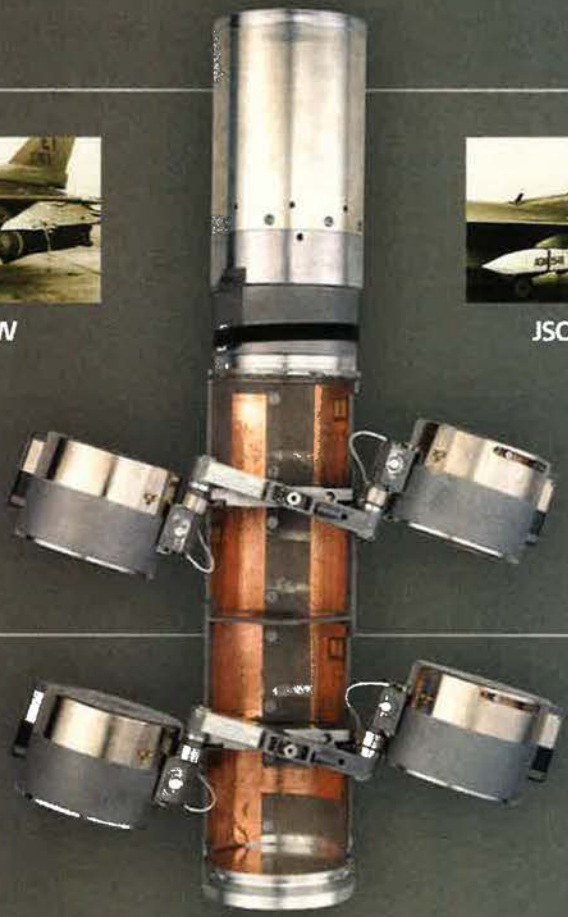

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USAF photo by SrA. Meghan Gels

KC-135s need some new stablemates.

The Air Force wants to know these things so it can determine how they "may affect the life cycle costs of the KC-X program."

The language in the document, though, is a poke in the eye to Airbus, which is the only major challenger to Boeing to provide a new tanker to USAF. The US and Europe have wrangled for years over the issue of subsidies and how they affect the prices that the two companies can charge for their airliners. The US argues that Airbus receives subsidies, loan forgiveness, and other bailouts from European governments, especially France, to preserve their airliner industrial base; the Europeans counter that Boeing gets lots of defense work from the US government, and these amount to subsidies, allowing Boeing to keep factories and design teams humming along.

The subsidies issue nearly erupted in a trade war last fall, as both the US and Europe traded fusillades at the World Trade Organization, and tempers have only slightly cooled since. The Air Force's tanker RFI is likely to heat things up again.

The language leaves Airbus in a tough spot: It either reveals the degree of subsidies it does receive, which would provide ammo for the WTO challenges, or it declines and eliminates itself from the tanker competition.

So far so good, except for the potential backlash: One of the main opponents of the original tanker lease deal was Sen. John McCain (R-Ariz.), who accused the Air Force and the Pentagon of creating the lease arrangement as a sweetheart deal to Boeing, implying a corrupt purpose. The "poison pill" of the subsidies language could easily put McCain back on the warpath.

Although it was Congress, and not the Air Force, that legislated that Boeing should get the work sole-source, and that it should be a lease (see "The Tanker Blame Game," September 2005, p. 61), the later fallout of the Darleen Druyun contracting scandal permanently tainted the arrangement, which was dropped.

The KC-X program is potentially worth about $20 billion, although the Air Force has not yet revealed its plan for how many tankers it will buy or at what pace. (See "Charting a Course for Tankers," p. 64.) A winner of the competition is expected to be chosen next year. Boeing is offering a militarized, tanker version of the 767 airliner, while Northrop Grumman is heading a challenge team including European Aeronautic Defence and Space Co., with the Airbus A330. Both outfits have said they will offer other aircraft if USAF's requirements dictate a larger or smaller aircraft, or a combination of aircraft. (See "The European Invasion," p. 68.)

Uncertainty on F-22 Numbers

Despite the apparent finality of the Quadrennial Defense Review's findings that 183 is the optimum number of F-22s for the future, there is some room for optimism that the number will increase, though perhaps not as high as the Air Force's stated requirement for 381.

Item one: A high-level review expected to recommend cutting the F-22 buy even further appears to be going in the other direction.

A study of tactical air requirements by the consulting firm of Whitney, Bradley, & Brown, Inc., set in motion last fall by Deputy Defense Secretary Gordon England (see "Washington Watch: England Launches New Fighter Review," October 2005, p. 12), will recommend between 220 and 260 F-22s be bought, according to Pentagon officials. That's a surprise because the last WBB study England asked for recommended a cut in the combined Navy-Marine Corps combat aircraft fleet, and England proceeded to reduce the fleet by 400 aircraft. England's instructions that the firm seek "optimization" of the military's overall air combat capability in the current study was understood to be marching orders to find savings through more cuts.

The report isn't due to England until August, leaving plenty of time for anti-Raptor factions in the Pentagon to weigh in, but the very fact that such figures leaked out is considered a positive sign for the Air Force.

Item two: USAF's Chief of Staff says the Pentagon leadership has been given "assurances" that 183 is the rock-bottom number of F-22s, and more may be needed for industrial-base reasons.

Gen. T. Michael Moseley told defense reporters in April that "we do have assurances from [the Office of the Secretary of Defense] that 183 is the QDR number," which he said is "the baseline."

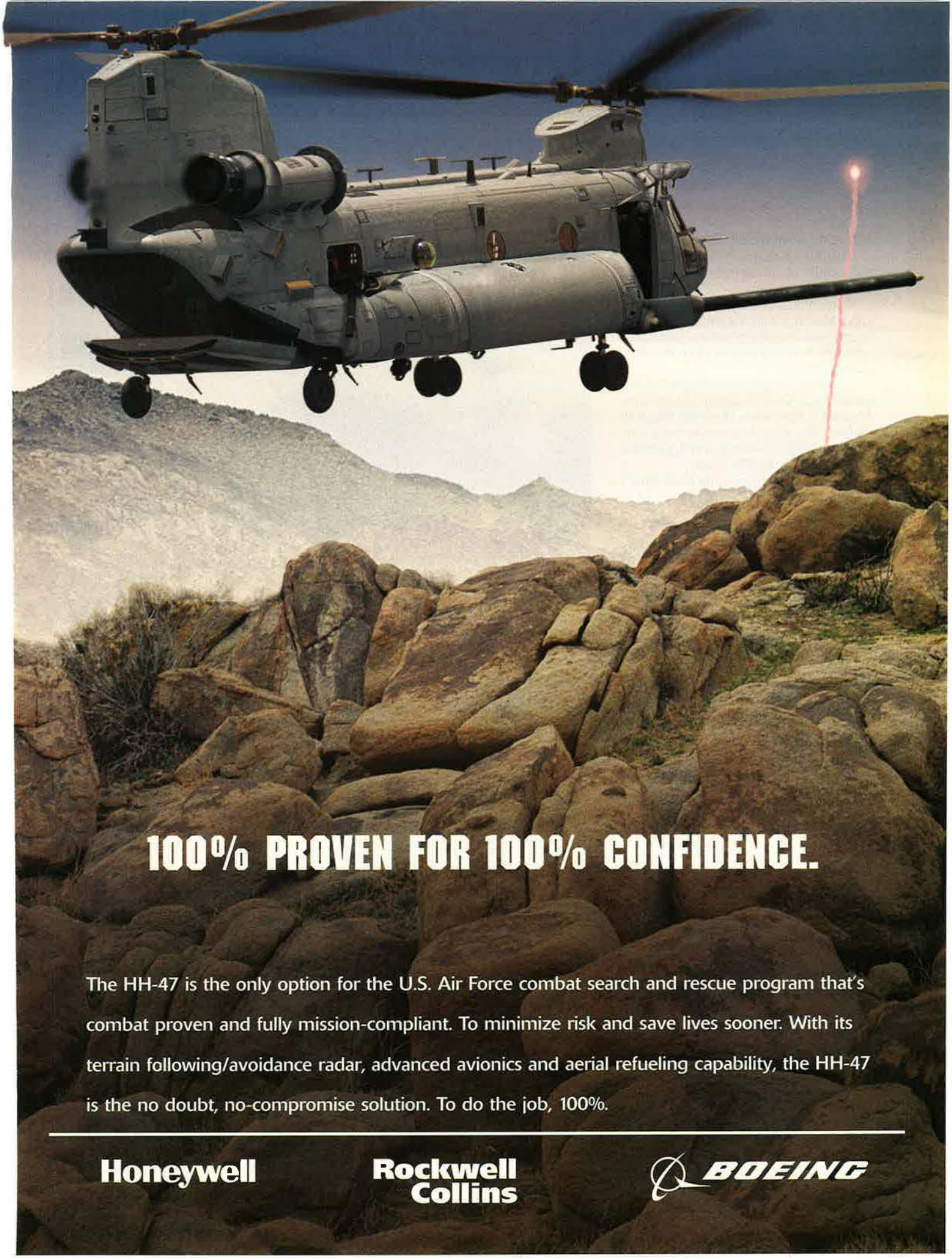
USAF photo by TSgt. Ben Bloker

What will happen with F-22 numbers?

However, he also noted that the QDR determined that the Air Force must have a warm production base for "fifth generation fighters," those aircraft which exploit a combination of stealth, speed, and sensor fusion. If the F-35 Joint Strike Fighter is delayed, Moseley said, it would mean the F-22 production line could be extended, and this move "bridges us to the F-35."

Asked about the WBB study, Moseley declined to say that the Air Force is hopeful it will get more of the Raptors.

"I think what I want to say is, let's just let the study play out," he said. In the meantime, the Air Force is concentrating on getting the program stabilized, from a vendor and subcontractor perspective. Getting that accomplished, along with approval for a three-year multiyear buy, he said, will likely get the F-22's unit cost down. If that happens, "I think we can set the plateau so that if we have to extend this, relative to Joint Strike Fighter, we're set right to do it." ■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By Breanne Wagner, Associate Editor

IED Kills Airman in Iraq

The Defense Department announced the death of an airman in Operation Iraqi Freedom.

TSgt. Walter M. Moss Jr., of Houston, died March 29 in Baghdad when an improvised explosive device detonated while he was working to clear the area of such bombs.

Moss was deployed to the 447th Expeditionary Civil Engineer Squadron's Explosive Ordnance Disposal Flight at Sather AB, Iraq. His home base unit was the 366th Civil Engineer Squadron, Mountain Home AFB, Idaho.

A memorial service was held April 1 at Sather Air Base.

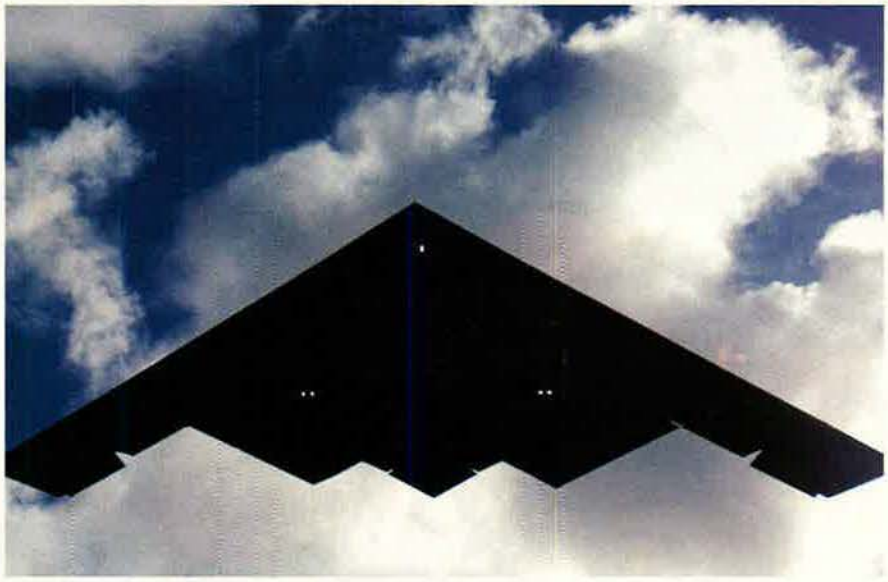
F-35 Production Approved

The Defense Acquisition Board has approved low rate production of the F-35 Joint Strike Fighter. Kenneth J. Krieg, the Pentagon's acquisition, technology, and logistics chief and the DAB chairman, signed the order on April 6.

The DAB gave its approval to start awarding contracts for long-lead items needed to construct the first five Conventional Takeoff and Landing examples of the aircraft. The CTOL model, F-35A, will be flown by the Air Force. The F-35B is the Short Takeoff and Vertical Landing version for the Marine Corps and British air arms, while the F-35C is the carrier-compatible version to be built for the Navy.

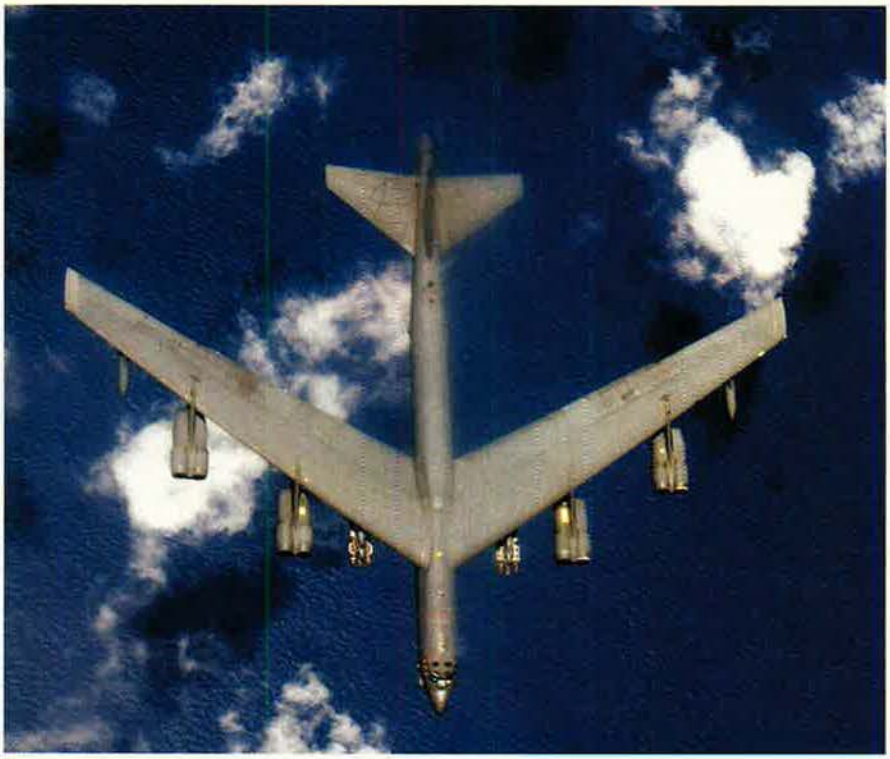
The Joint Strike Fighter is the largest DOD program ever, with new cost estimates at $276.5 billion. (See "Counted a Different Way, Major Weapons Costs Go Up," p. 24.)

The F-35 is being developed by Lockheed Martin.



USAF photo by A1C Michael S. Dorus

A B-2 bomber passes over Andersen AFB, Guam, in late April as it arrives for a four-month deployment. The Air Force is basing bombers in Guam on a rotating basis as part of an effort to beef up US capabilities in the Pacific region.



USAF photo by SMSgt. John Rohrer

A B-52H based at Diego Garcia traverses the Indian Ocean on its way to performing a close air support mission in Afghanistan. From September to May, B-52s flew more than 450 combat sorties over Afghanistan.

Tanker Competition Launched

Pentagon acquisition chief Krieg approved on April 13 the Air Force's plan to begin a competition for its next generation tanker aircraft.

The Air Force released a request for information (RFI) to industry in April, and a formal request for proposal is expected in September.

Krieg, in a memorandum giving the program a green light, said that in his view, there is "sufficient time to structure a traditional competitive program to gain the best value for the taxpayer."

A recent RAND study indicated that the KC-135 fleet is not in such bad condition that the Air Force must launch an urgent, sole-source contract to replace it. (See "Charting a Course for Tankers," p. 64.)

Secretary of the Air Force Michael W. Wynne said on March 30 that the service hopes to make a source selection for the tanker by mid-2007.

Wynne, at a Capitol Hill seminar, said the turnaround time to get a program under way should be "fairly minimal. ... I am convinced [it] can be done within 36 to 48 months."

The Air Force's existing KC-135 Stratotankers are more than 42 years old on average. Some scenarios anticipate a 31-year replacement effort with annual buys of up to 20 aircraft.

The RAND study found that most of the midsize airliners now in production could satisfy the tanker requirement, and the Mobility Capabilities Study stated a Defense Department preference for a combination tanker-cargo platform.

Boeing is expected to compete against Northrop Grumman for the tanker contract. Northrop Grumman would be the US prime contractor for the European Aeronautic Defence and Space Co. KC-330 or similar aircraft, based on an airliner built by Airbus. (See "The European Invasion," p. 68.)

USAF photo by Chrissy Cutilla

Completing a dive are A1C Josh Welch and SSgt. Brian Enslev, who were among 17 students to complete the first Air Force Combat Dive Course at Tyndall AFB, Fla. The course responds to a need for more dive-qualified special operations airmen.

C-130 Blows an AMP

Growing costs and other priorities have prompted the Air Force to drop the Avionics Modernization Program, or AMP, for all its C-130Es and some of its oldest C-130Hs as well.

An April 5 memo from Lt. Gen. Christopher A. Kelly, Air Mobility Command's vice commander, constituted "formal notification of AMC's intention to not AMP the active C-130E fleet," according to a report from Dow Jones Newswires. The memo also noted that AMC would rather not perform the AMP on its oldest C-130Hs. Boeing is performing the C-130 AMP.

Gen. T. Michael Moseley, Air Force Chief of Staff, telegraphed the move at a Capitol Hill seminar April 4, in which he noted that it would cost $20 million apiece to upgrade the C-130E's structures and systems, versus about $70 million apiece to buy new C-130Js. At the seminar, Moseley wondered out loud if there's "a better way."

He noted that, after the substantial modification, the 1960s-vintage aircraft would still be 40-year-old transports with all their performance and range limitations, versus the latest J model. He said then that the Air Force was considering a "continued buy" of some Js instead of throwing the money at old ones.

At an April 11 meeting with defense reporters, Moseley said he still thinks the AMP is necessary for the bulk of the H models, but "I just don't know that it's required for the Es."

The move also highlights a sore spot between the Air Force and Congress. The Air Force would like to retire its C-30Es, in large part because so many are grounded by wing box cracks. Congress, however, so far has restricted the service from retiring any E models.

Academy Sat Destroyed ...

The Air Force Academy cadet-designed and -built FalconSat-2 small satellite was destroyed in a launch failure March 24. The satellite was to measure the effect of plasma radiation on communications and Global Positioning System satellites.

US Identifies Remains of 11 World War II Airmen

The remains of 11 World War II Army Air Forces airmen missing in action since 1944 have been identified, DOD announced in April.

The airmen are Capt. Thomas C. Paschal, El Monte, Calif.; 1st Lt. Frank P. Giugliano, New York; 1st Lt. James P. Gullion, Paris, Tex.; 2nd Lt. Leland A. Rehmet, San Antonio; 2nd Lt. John A. Widsteen, Palo Alto, Calif.; SSgt. Richard F. King, Moultrie, Ga.; SSgt. William Lowery, Republic, Pa.; SSgt. Elgin J. Luckenbach, Luckenbach, Tex.; SSgt. Marion B. May, Amarillo, Tex.; Sgt. Marshall P. Borofsky, Chicago; and Sgt. Walter G. Harm, Philadelphia.

Remains from the entire crew, as a group, along with partial remains of each man were buried at Arlington National Cemetery on April 21, except for King, Giugliano, and Widsteen, whose remains were sent to their hometowns for burial.

Paschal and Widsteen were flying a B-24J Liberator on April 16, 1944, with the nine other men aboard, returning to Nadzab, New Guinea, after bombing targets near Hollandia, a Japanese air base during World War II. The airplane was last seen off the coast of the island, flying into poor weather.

The loss was investigated after the war and a military board concluded that the aircraft had been lost over water and was unrecoverable.

In 2001, a team of specialists from the Joint POW/MIA Accounting Command interviewed a native of Papua New Guinea who claimed to have found the aircraft and identification for crew members May and Harm. The JPAC team surveyed the site in 2002 and found airplane wreckage, matching the tail number of Paschal's aircraft, along with human remains. The team also took the remains collected by the New Guinea native. JPAC teams then excavated the crash site and found additional artifacts and crew remains. Identification tags were found for Luckenbach, May, and Paschal.

JPAC scientists and Armed Forces DNA Identification Laboratory specialists used the mitochondrial DNA from dental and bone samples to positively identify the airmen.

USAF photo by SSgt. Kristina Barrett

SrA. Jeffrey Oats and SrA. Kesha Snedecker fit a gun to a Humvee at Kirkuk AB, Iraq, in April. The new Common Remote Operated Weapon Station, or CROWS, allows gunners to fire from inside the vehicle, rather than from the vulnerable turret.

The FalconSat-2 satellite was being boosted from the Ronald Reagan Ballistic Missile Test Site on Kwajalein Atoll, in the Pacific Ocean. It was aboard the maiden launch of the SpaceX-built Falcon-1 rocket. SpaceX is a private-sector company.

Shortly after clearing the tower, the launch vehicle suffered a fuel leak and fire, destroying the payload. Academy cadets continue work on FalconSat-3, which is scheduled to launch in October.

... But Doesn't End Success Streak

Because FalconSat-2 was aboard a commercial launch vehicle, its loss did not end Air Force Space Command's record streak of consecutive successful space launches. At the end of March, AFSPC had 44 straight launches without a failure, a streak that dates back to May 1999.

Lt. Gen. Michael A. Hamel, commander of AFSPC's Space and Missile Systems Center, told *Air Force* Magazine earlier this year that a string of USAF launch failures in the 1990s were largely the result of insufficient oversight and attention. Space launch is a highly difficult business, and a "hands off" approach simply did not work.

The Air Force "didn't lose the recipe," for space launch success, Hamel said, but "stopped following it for about a decade." The lengthy string of successes beginning in 1999 is a testament to the fact that the Air Force has "put the rigor back in" to its launch standards and oversight, he said.

DOD To Set Up Joint Intelligence Operations

The Department of Defense is preparing to establish worldwide joint intelligence operations centers at each unified combatant command, at the Defense Intelligence Agency, and at US Forces Korea. They will be modeled after CENTCOM's Joint Intelligence Operations Center in Baghdad.

Defense Secretary Donald H. Rumsfeld issued a directive on April 3 to establish the centers to "operationalize" intelligence.

The joint operations center in Baghdad will serve as a template for the other combatant commands due to its success. Analysts at the Iraqi center now accomplish tasks in minutes that routinely would take hours to do at an old-style center, according to Army Lt. Gen. William G. Boykin, deputy undersecretary of defense for intelligence and warfighting support.

The centers are an attempt to put into effect lessons learned from the wars in Iraq and Afghanistan. They will seek to eliminate usual chain-of-command logjams and promote rapid crossfeed between analysts and intelligence collectors.

Counted a Different Way, Major Weapons Costs Go Up

The cost of 36 major weapon systems rose significantly in the last quarter of 2005, owing in large part to program changes and new accounting rules. The new rules—imposed by Congress to get better insight into cost growth—require a cost report versus both the original estimate and the most recent estimate.

The costs were detailed in the quarterly Selected Acquisition Reports, released April 7.

Some of the high-profile Air Force programs showing cost increases since the last estimate include:

- F-35 Joint Strike Fighter—Program costs rose 7.7 percent from $256.6 billion to $276.5 billion, due primarily to higher costs for acquisition of long-lead items for the first set of test aircraft.
- F-22 Raptor—Program costs increased 2.1 percent from $61.3 billion to $62.6 billion, because of the purchase of four additional aircraft, extension of procurement to Fiscal 2012, and increases in initial spares buys.
- C-130 AMP (Avionics Modernization Program)—Program costs jumped 10.9 percent from $4.4 billion to $4.9 billion, despite a reduction of 31 kits to be bought. Downsizing and stretch-out of the program were the culprits.
- C-130J—Program costs increased 22.3 percent from $6.2 billion to $7.6 billion due to buying 26 more aircraft.
- Global Hawk UAV—Program costs hiked 19 percent from $6.6 billion to $7.8 billion because of higher labor costs, extension of the system development and demonstration phase, and the addition of new sensors.

Rep. Duncan Hunter (R-Calif.), chairman of the House Armed Services Committee, said the new accounting rules mean, "We now have warning lights in the system to show when costs are escalating rapidly. This gives the committee a basis to analyze the true costs of programs."

ANG Recruiting Goes Up

According to an April 10 Pentagon news release, the Air National Guard in March met 100 percent of its recruiting goal. The recruiting goal had been set higher than in the previous four months.

By the end of April, the Air National Guard was at 92 percent of its authorized end strength.

All services exceeded their numbers for active duty recruiting in March and were expected to meet their retention goals for the rest of the fiscal year. Only the Army and Navy Reserve failed to hit their recruiting targets.

Senate Confirms England

By voice vote, the Senate on April 6 confirmed Gordon England to be the 29th deputy secretary of defense.

England had already been on the job since last summer, first as acting deputy—replacing Paul D. Wolfowitz, who left to head the World Bank—and

U.S. Air Force photo

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then as deputy, when President Bush bypassed the Senate and appointed England to the post during a Congressional recess.

During the Bush Administration, England served as Secretary of the Navy twice—succeeding himself the second time—with a stint in between as deputy secretary for homeland security. Much of his career, he worked for the land and aircraft units of both General Dynamics and Lockheed Martin.

Nuclear Center Opens at Kirtland

The Air Force has consolidated all its functions for the design and maintenance of nuclear weapons at the new Nuclear Weapons Center at Kirtland AFB, N.M. The organization was activated March 31.

The NWC won't result in any new hires or spending. It merely brings various functions, previously spread out across USAF, into one centralized location.

The center will manage the Air Force's nuclear weapons systems to support the National Command Structure and will act as a parent organization for Kirtland, with two subordinate units: the 377th Air Base Wing and the 498th Armament Systems Wing. The 377th will be responsible for nuclear safety, expeditionary forces, and operating support. The 498th will be responsible for a broad range of support functions.

Pakistani F-16 Deal Back On

Pakistan announced on April 13 that it would complete a deal to buy Lockheed Martin-made F-16 fighters, delayed after last year's earthquake.

The Pakistan government put the deal on hold last year when there were prominent domestic calls to spend the estimated $3.5 billion cost of the procurement on earthquake relief and reconstruction. The Oct. 8, 2005 earthquake killed about 73,000 people in Pakistan. (See "Aerospace World: Pakistan Suspends F-16 Buy," January, p. 16.)

Under the deal, Pakistan has received two older and updated F-16s and will acquire up to 77 more of the Block 52 configuration.

The Pakistani government also has approved the purchase of Chinese FC-10 fighter aircraft and JF-17 thunder airplanes being built jointly by Pakistan and China.

Senate OKs More C-17 Money

A Senate supplemental appropriations bill approved May 4 included $227.5 million to the budget to pay for advance parts and procurement for additional C-17 Globemaster III aircraft.

The extra funds in the bill would pay for C-17 parts, supplies, and raw materials, but must be ordered far in advance to be ready for installation on the airplanes.

The House version approved earlier this year only allocated $100 million. The difference between the two bodies will have to be ironed out in conference.

The House version of the 2007 defense authorization bill, passed May 11, included nearly $300 million to purchase three additional C-17s. As of mid-May, the Senate had yet to complete work on its bill.

The Air Force plans to end C-17 production in 2008, which would spell an end to hundreds of jobs at Boeing's Long Beach, Calif., plant where the aircraft is built. Some lawmakers—not all with constituencies in California—have been lobbying to keep the plant open. (See "Aerospace World: C-17 Halt Brings Penalties" and "Lawmakers Line Up for C-17," April, p. 14.)

"I have long believed that more C-17s are necessary to meet our nation's strategic airlift requirements. So I hope that this funding is the first step in ensuring that more C-17s will be built

News Notes

■ Capt. John Vargas, an F-16 Fighting Falcon pilot based at Aviano AB, Italy, was named the winner in April of the 2006 Colonel James Jabara Award for excellence in airmanship. Vargas, a 1996 Air Force Academy graduate, has completed 45 combat missions in Operation Iraqi Freedom, Operation Enduring Freedom, and Joint Forge and is credited with developing new F-16 tactics, including urban close air support and fighter integration with special operations forces.

■ The Air Force Association named its 2006 AFA Team of the Year in April. Five airmen in the "services" enlisted career field were selected for displaying superior technical expertise, eliciting the praise of their superiors, and providing leadership and inspiration to their coworkers. The airmen, SSgt. Heather Schaffer, SrA. John Hitchens, A1C Nicolas Paulino, A1C Andrea Quintanilla, and A1C Ashley Sakurai, were to be honored at a ceremony in Washington, D.C., on May 22.

■ Lockheed Martin received a $750 million contract from the Air Force on April 3 to sustain the Defense Message System, which provides secure e-mail, messaging, directory, and security services for the Department of Defense at all classification levels. The initial contract will be completed in April 2007 with nine one-year options.

■ The Air Force Memorial in Arlington, Va., received its third and final stainless steel spire base in late March. The base will be the foundation of the tallest of the three spires, at a height of 270 feet above the base, which will itself be 50 feet tall and weigh 34 tons. The memorial, built to honor the men and women of the Air Force and the former Army Air Corps and Army Air Forces, is slated for completion in mid-September.

■ USAF awarded a $408 million contract to Lockheed Martin on April 6 for engineering and operations services for satellite operation complexes at Schriever AFB, Colo., Kirtland AFB, N.M., and for space range systems services at Camp Parks Communication Annex, Dublin, Calif., and deployed locations around the world.

■ Air Force Space Command personnel launched an unarmed Minuteman III ICBM on April 7 from the North Vandenberg AFB, Calif., launch facility as part of a development test to demonstrate the weapon's effectiveness. The missile's re-entry vehicle traveled 5,100 miles to hit a predetermined water target in the Northern Mariana Islands in the Pacific Ocean.

■ Northrop Grumman Systems Corp. was awarded a $275 million contract March 20 for Litening targeting pods, upgrade support equipment, and pod integration for the A-10, B-52, F-15, and F-16 in support of the Air Force, Air National Guard, Air Force Reserve Command, and the Marine Corps. Completion date is to be announced.

■ One hundred thirty-five Air Force Academy cadet volunteers spent their March spring vacation building and restoring houses and cleaning up areas damaged by Hurricane Katrina, joining other college students working with Habitat for Humanity in Covington, La., Hattiesburg, Miss., and Biloxi, Miss. Cadets have for the past six years volunteered for spring community service missions called "Alternative Spring Break," but this year saw the largest number of volunteers yet.

■ Airmen and soldiers with the National Guard Counterdrug Program went to Washington, D.C., in early April in support of Vital Guardian, a training exercise designed to prepare for a terrorist attack with a weapon of mass destruction. The Counterdrug Program, which falls under the Guard's Domestic Operations Division that led the exercise, sent three helicopters, two RC-26B aircraft, and one light armored vehicle.

■ An EC-135 aircraft, formerly an airborne command post used by Strategic Air Command for continuous airborne launch control of Minuteman and Peacekeeper missiles, was placed at the Museum of Aviation in Warner Robins, Ga., on April 2. First commissioned in 1961 and retired from active duty in 2003, the EC-135 also served as a CENTCOM commander transport for Gen. H. Norman Schwarzkopf and Gen. Tommy R. Franks.

■ Applications for Air Force active duty enlisted retraining programs went online March 31 as part of the Personnel Services Delivery Transformation. Called the Virtual Military Personnel Flight, the online program features a retraining advisory, instructions for retraining, job instructions, and the actual applications, which will be routed electronically to unit commanders.

■ The Air Force Research Laboratory and Lockheed Martin have completed 200 hours of wind tunnel tests on a stealthy strike tanker concept model. Such an aircraft could fly at low or high speeds and refuel everything from small unmanned aerial vehicles up to fighters and large sensor aircraft. The team used Lockheed's Marietta, Ga., facilities to collect two weeks' worth of aerodynamic data on locations around the model, as well as the aerodynamic environment of the receiver aircraft. AFRL is exploring the concept with both Lockheed Martin and Boeing. ■

USAF photo by TSgt. Scott Seyer

Former First Lady Nancy Reagan on April 10 dedicated Vandenberg AFB, Calif., missile defense facilities, renaming them the Ronald W. Reagan Missile Defense Site. The facility comprises four silos, two of them housing missile interceptors and two that are slated for test work. During the ceremony, Air Force officials unveiled a bust of the late President, honoring his commitment to missile defense.

in the coming years," said Sen. Dianne Feinstein (D-Calif.).

The Air Force has put the acquisition of seven C-17s—as attrition replacements for aircraft being prematurely worn out in the Iraq and Afghanistan Wars—at the top of its Fiscal 2007 unfunded priorities list. They would cost $1.6 billion to build.

New Life for U-2, F-117?

The Air Force may have been premature in deciding a date for retirement of the U-2 and F-117, service Chief of Staff Gen. T. Michael Moseley said on April 11.

While the Fiscal 2007 budget request called for retiring both aircraft within the next five years, Moseley acknowledged that their planned replacements may not materialize on time.

"I am not opposed" to the idea of extending F-117 and U-2 service, Moseley said. Using the analogy of a wing-walker, Moseley said USAF won't let go of one strut until it has the next firmly in hand and won't retire an important capability before a replacement is ready.

The Global Hawk Block 10 aircraft are already flying combat missions, but Moseley believes the Block 20 aircraft will be the first version to compare with the U-2's capability.

"Until the Global Hawk is ready, then taking the U-2 off line doesn't make sense, because the combatant commander still has a requirement for long look radar capability as well as signals intelligence and electronic intelligence," remarked Moseley.

Intel Sweats the U-2

Prior to Moseley's comments, Letitia A. Long, deputy undersecretary of defense for policy, requirements, and resources in the Office of the Secretary of Defense for Intelligence, told the House Armed Services tactical air and land forces subcommittee on April 6 that OSD has tasked STRATCOM with reviewing the U-2 retirement plan to "ensure we have the proper capabilities coming on line before we draw down those platforms."

Long did concede that if the review proves that OSD acted too quickly on the decision, an adjustment would be requested. Neither Long nor Moseley specified how much longer the U-2 would fly or how much additional money it would require.

The Air Force's February budget proposal had removed $1 billion from U-2 funds though Fiscal 2011.

Boeing Gives Big Gift

Boeing made a $15 million gift to the National Air and Space Museum in April, to help complete construction of the Steven F. Udvar-Hazy Center in Chantilly, Va., and to fund various programs.

The donation represents the single largest corporate gift ever given to the Smithsonian Institution.

The facility—at one time known as the "Dulles Annex" to the NASM because it is adjacent to Dulles Airport outside Washington, D.C.—opened more than two years ago, but its artifact restoration facilities are still under construction. The museum collection includes large aircraft that do not fit in NASM's main building in downtown Washington, D.C. (See "The Nation's Hangar," and "Airplanes Under Glass" March 2004, p. 22 and p. 30.)

In recognition of the gift, the Smithsonian will name the main portion of the Udvar-Hazy center's display area the Boeing Aviation Hangar.

Boeing made a separate $5 million donation in 1998 for phase one construction of the Chantilly facility. Boeing also has been the lead sponsor since 1996 for the "How Things Fly" exhibit at the downtown Washington site, donating $1.4 million.

The War on Terrorism

Operation Iraqi Freedom—Iraq

Casualties

By May 5, a total of 2,415 Americans had died in Operation Iraqi Freedom. This total includes 2,408 troops and seven Defense Department civilians. Of those fatalities, 1,901 were killed in action by enemy attack, and 514 died in noncombat incidents.

There have been 17,874 troops wounded in action during OIF. This includes 9,680 who returned to duty within 72 hours and 8,194 who were unable to quickly return to action.

Airmen Control Airspace, Act as Lawmen

Airmen with the 407th Air Expeditionary Group deployed to Ali Air Base in Iraq now control one-third of Iraqi airspace, making it the second busiest air traffic control center in the Middle East Theater. Balad Air Base is the busiest.

Controllers at Ali now handle traffic as far as 200 miles away and up to 40,000 feet.

Airmen from the 407th also are responsible for law enforcement at Ali, including writing speeding tickets, gatekeeping duties, patrolling land outside the air base's perimeter, checking and escorting local and foreign national labor, and removing explosive ordnance when necessary.

The allocation of such duties to the Air Force, particularly on a base that is mostly US Army personnel, is rare, according to Col. Kevin Kilb, the 407th AEG commander.

USAF has been steadily decreasing the number of airmen at Ali, but for security airmen, the Air Force has extended the standard tour of duty from four to six months.

Predator Drone Kills Insurgents

An MQ-1B Predator unmanned aerial vehicle killed three insurgents who were planting a homemade bomb along the road near Balad Air Base, on March 28. The UAV launched an AGM-114 Hellfire missile against the three.

The Predator monitored the insurgents for approximately 30 minutes, watching them dig a hole in the road with a pickax, place an explosive round in the hole, and string wires from the hole to a ditch on the side of the road, according to the Air Force.

When it was apparent the insurgents were planting a bomb, the UAV fired the 100-pound missile.

Operation Enduring Freedom—Afghanistan

Casualties

By May 5, a total of 281 Americans had died in Operation Enduring Freedom, primarily in and around Afghanistan. The total includes 280 troops and one Defense Department civilian. Of those fatalities, 144 were killed in action by enemy attack, and 137 died in nonhostile incidents such as accidents.

A total of 718 troops have been wounded in Enduring Freedom. They include 291 who were able to return to duty in three days and 427 who were not.

Operation Mountain Lion

Coalition forces, in cooperation with the Afghan National Army, launched Operation Mountain Lion in Afghanistan on April 11, killing six insurgents. The operation was launched to "establish security, deter the re-emergence of terrorism, and enhance the sovereignty of Afghanistan," according to an American Forces Press Service news release.

Coalition forces provided 24-hour close air support for the operation, beginning with predawn air and ground assaults in the Pech River Valley, an area known for terrorist activity.

USAF A-10s, B-52s, and F-15s and RAF GR-7s aided ground forces as they searched for insurgent sanctuaries and supply networks. Predator and Global Hawk UAVs provided intelligence-surveillance-reconnaissance data. Air Force KC-135 and KC-10 aircraft provided refueling support.

Military officials said the insurgents were killed in the Marawara district of Afghanistan's Kunar Province while coalition forces were conducting antiterrorism offensives. More than 2,500 Afghan National Army and coalition forces were involved in the operation.

ANG Pilot Schmidt Sues USAF

Maj. Harry Schmidt, a former Illinois Air National Guard pilot who, in April 2002, killed four Canadian soldiers and injured eight others in an accidental bombing in Afghanistan, is suing the Air Force for disclosing personal information about his case without his permission. (See "Aerospace World: The Case of the ANG Pilots ...," February 2003, p. 20.)

Schmidt, in a civil lawsuit, alleges that the Air Force violated the federal Privacy Act by releasing a document in which he was reprimanded by Gen. Bruce Carlson, then commander of 8th Air Force and now head of Air Force Materiel Command. Schmidt, according to the *Springfield Journal Register,* maintains that the letter is a confidential document and also charges that its release breaks a plea bargain deal struck with the Air Force in which he accepted nonjudicial punishment from Carlson rather than exercise his right to a court-martial.

Schmidt filed his suit April 7 in the US District Court in Springfield, Ill.

In the Article 15 letter of reprimand, which the Air Force posted on a Web site, Carlson chastised Schmidt for "gross poor judgment" and "arrogance" and said Schmidt "acted shamefully." Carlson fined Schmidt the maximum amount allowable—$5,672—and barred him from flying for the Air Force. Schmidt's appeal was denied. He continues to serve in the Illinois Air National Guard in a nonflying job.

The suit seeks damages from the Air Force for injury to Schmidt's reputation and unauthorized disclosure of his military records.

Russia Plans ICBM Updates

Russia's top nuclear missile designer said in April that his country's ICBM force will be a credible deterrent into the 2040s and that Russia's nuclear arsenal won't drop below 2,000 warheads in the near future.

Yury Solomonov, head and chief designer at the Moscow Institute of Thermal Technology, made the remarks in a rare news conference called to reassure Russians concerned about the status of Russia's nuclear deterrent. According to the *Moscow Times,* analysts have suggested that Russia's arsenal will drop below an effective deterrent level because only five or six single-warhead Topol-M missiles are being deployed every year, but many more older multiwarhead missiles are being retired.

"I assure you that the number of active warheads the strategic nuclear forces will have in 2015 and even in

2020 will be no less than 2,000," said Solomonov.

He announced a plan to adapt the six-warhead Bulava missile, designed for submarine launches, for land-based deployment. All Soviet-era ICBMs will be replaced with newer missiles by 2015, Solomonov said, adding that their design will make them capable of penetrating any missile defenses developed by the United States. The Topol-M and Bulava shed their engines early in the midcourse phase, making them harder to track, he said.

The first land-based mobile Topol-Ms should be commissioned this year to augment the 300 Topol-Ms and Topol missile systems already deployed in land-based silos.

President Bush and Russian President Vladimir Putin signed the Strategic Offensive Reduction Treaty in 2002, which requires both sides to cut their nuclear arsenals to between 1,700 and 2,200 warheads by 2012.

EADS photo

A German "Barracuda" unmanned aircraft test bed takes off on a completely autonomous mission in May. Developed by European Aeronautic Defence and Space Co., the UAV will explore technologies for use in future scout or combat missions.

Cost Overruns Killed B-52 SOJ

Snowballing requirements killed off the B-52 Standoff Jammer program, according to Gen. T. Michael Moseley, Air Force Chief of Staff. At a Capitol Hill seminar in April, he said that the original plan for the B-52 SOJ called for about a $1 billion project, but by December, it had ballooned to $7 billion and was no longer affordable.

Moseley said the SOJ—a modification that would have employed interchangeable jamming pods on the outer wings of B-52s—would only have fulfilled a "very narrow slice" of the overall jamming mission, and the need simply didn't justify the cost. Moseley said he didn't know why the Air Force wasn't able to restrain the cost growth as it was happening.

A podded system, perhaps deployed on F-15Es, is one alternative being considered. Others include partnering with the Navy on the EA-18G Growler or using the F-35 Joint Strike Fighter as an electronic warfare platform. This last approach was suggested by Marine Corps Commandant Gen. Michael W. Hagee. (See "Aerospace World: Electronic Warfare—Mission in Search of a Service," April, p. 17.)

USAF photo by Doug Curran

Airmen salvage cargo and parts from the C-5B Galaxy that crashed at Dover AFB, Del., in April. The nose section, still intact, will be converted to a full-size training device.

A. Scott Crossfield, 1921-2006

A. Scott Crossfield, the first man to fly at twice the speed of sound, died April 20 in the crash of his Cessna aircraft in northwest Georgia. He was 84.

Crossfield, a Navy fighter pilot in World War II and an aeronautical engineer, was picked by the National Advisory Committee for Aeronautics—a forerunner of NASA—to fly the first types of supersonic rocket aircraft. He flew the X-1 and the Douglas D-558-II Skyrocket, among many others.

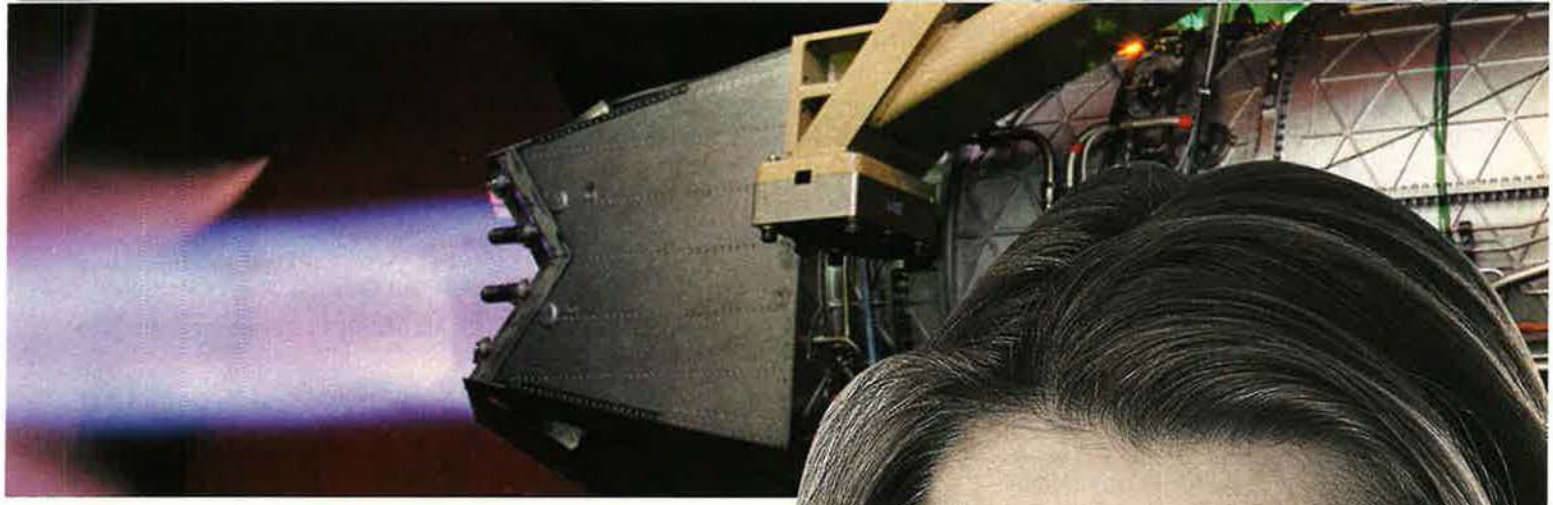
It was in the Skyrocket on Nov. 20, 1953 that Crossfield became the first person to exceed Mach 2, achieving a speed of more than 1,290 mph.

He left NACA to work for North American Aviation in 1955, where he helped develop the X-15 hypersonic research airplane. Among Crossfield's milestones in the X-15 were its first unpowered and powered flights. On one flight, he nudged another Mach milestone by reaching Mach 2.97 at 81,000 feet. He survived one crash-landing of the X-15 as well as an explosion during a ground test.

Crossfield's exploits as a rocket pilot, along with those of fellow pilots and astronauts, were the subject of the best-selling book by Tom Wolfe, *The Right Stuff,* and the subsequent film of the same name, which was nominated for an Academy Award for best picture in 1983.

Crossfield left North American in 1967 to head research and development for Eastern Airlines, working on air traffic control technologies. In 1974, he became vice president of Hawker-Siddeley Aviation. In 1977, he signed on as technical advisor on civil aviation R&D to the House of Representatives Committee on Science and Technology, where he served until his retirement in 1993. He remained active in aviation circles as an advisor and consultant, and as a private pilot, until his death.

Among his many awards, Crossfield received the Collier Trophy and was inducted into both the National Aviation Hall of Fame and the International Space Hall of Fame.



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F-35s—Not F-22s—for Japan

The Air Force would like Japan to consider buying the F-35 Joint Strike Fighter, rather than the F-22 Raptor, according to Pacific Air Forces chief Gen. Paul V. Hester.

The F-35 was designed from the outset to be an exportable aircraft and "shares remarkably" many of the features of the F-22, he told *Inside the Air Force*.

"What I'm seeing," he said, is that the Air Force's "preference would be to encourage them to become interested in the Joint Strike Fighter" rather than the F-22.

As the Air Force has had its planned buy of F-22s slashed in recent years, there has been speculation that foreign sales to Japan could be one way to improve production efficiencies on the F-22 line. However, the F-22's technologies are so advanced that exporting the aircraft would not be an easy matter for Congress to approve. A sale of Aegis warships to Japan in the 1980s prompted heated Congressional debate that Japan would back-engineer the technology and adapt it for commercial advantage.

The Japanese Air Self-Defense Force has expressed interest in purchasing the F-22 to replace its F-4Js and possibly F-15Js.

US Joins in Aces South

Three Air Force B1-B Lancers from the 34th Expeditionary Bomb Squadron at Ellsworth AFB, S.D., flew Down Under in April to join in the Royal Australian Air Force's Aces South exercise.

Aces South is a large-force employment for the RAAF Weapon School. The American B-1s each flew one sortie as simulated enemy bombers conducting antiship strikes off the southeast Australian coast during the three-day exercise, said Lt. Col. Thomas Curran, commander of the 34th EBS. Australian F/A-18 Hornets and F-111 Aardvarks piloted by weapon school students flew against the B-1Bs.

Combined training exercises gave the RAAF a chance to practice in real scenarios with the unfamiliar B-1 aircraft. The training also served to replicate missions the Australians fly in Iraq and Afghanistan.

The B-1s also flew the "Green Lightning" missions, which consisted of 16-hour missions from Andersen AFB, Guam, to Australia while KC-135 Stratotankers from Wisconsin and Mississippi Air National Guard units refueled the bombers in-flight.

The Air Force trains with the RAAF two to four times a year. Aces South was the first exercise during which the B-1s participated in a RAAF exercise in Australian territory. ■

Senior Staff Changes

RETIREMENTS: Brig. Gen. Mark G. **Beesley,** Lt. Gen. Daniel **James III.**

NOMINATIONS: To be General: Kevin P. **Chilton. To be Lieutenant General:** James G. **Roudebush,** Norman R. **Seip. To be Major General:** Dana T. **Atkins. To be Brigadier General:** Lawrence A. **Stutzriem. To be ANG Lieutenant General:** Craig R. **McKinley.**

CHANGES: Maj. Gen. David E. **Clary,** from DCS, Ops., Allied Air Component Command, NATO, Izmir, Turkey, to Dir., Ops. & Tng., DCS, Air, Space, & Info. Ops., P&R, USAF, Pentagon ... Maj. Gen. Kenneth M. **Decuir,** from Dir., Air & Space Ops., ACC, Langley AFB, Va., to Vice Cmdr., ACC, Langley AFB, Va. ... Brig. Gen. Jack B. **Egginton,** from Cmdr., 325th FW, AETC, Tyndall AFB, Fla., to Dep. Dir., Ops., CENTCOM, MacDill AFB, Fla. ... Maj. Gen. Vern M. **Findley II,** from Spec. Asst. to the Asst. DCS, USAF, Pentagon, to Dir., P&P, CENTCOM, MacDill AFB, Fla. ... Lt. Gen. William M. **Fraser III,** from Vice Cmdr., ACC, Langley AFB, Va., to Asst. to the Chairman of the JCS, Pentagon ... Brig. Gen. Frank **Gorenc,** from Cmdr., 332nd Air Expeditionary Wg, ACC, Balad AB, Iraq, to Dir., Operational Plans & Jt. Matters, DCS, Air, Space, & Info. Ops., P&R, USAF, Pentagon ... Maj. Gen. Charles B. **Green,** from Asst. Surgeon Gen., Office of the Surgeon Gen., USAF, Bolling AFB, D.C., to Dep. Surgeon Gen., USAF, Bolling AFB, D.C. ... Maj. Gen. (sel.) William L. **Holland,** from Dir., Ops. & Tng., DCS, Air, Space, & Info. Ops., P&R, USAF, Pentagon, to Dep. Combined Forces Air Component Cmdr., CENTCOM, Al Udeid, Qatar ... Brig. Gen. Stanley T. **Kresge,** from Cmdr., 379th Air Expeditionary Wg., ACC, Al Udeid, Qatar, to Dep. Dir., Policy & Planning, NORTHCOM, Peterson AFB, Colo. ... Brig. Gen. (sel.) Steven J. **Lepper,** from Cmdr., AF Legal Svcs. Agency, Bolling AFB, D.C., to Staff Judge Advocate, AMC, Scott AFB, Ill. ... Maj. Gen. (sel.) Thomas J. **Loftus,** from Command Surgeon, AMC, Scott AFB, Ill., to Dir., Medical Ops., Office of the Surgeon Gen., USAF, Bolling AFB, Washington, D.C. ... Brig. Gen. Kay C. **McClain,** from Cmdr., JTF Sexual Assault Prevention & Response, USD, Personnel & Readiness, Pentagon, to Dep. Dir., Strat. Plans & Future Systems, DCS, Manpower & Personnel, USAF, Pentagon ... Maj. Gen. Craig R. **McKinley,** from Asst. DCS, Strat. P&P, USAF, Pentagon, to Dir., ANG, Arlington, Va. ... Maj. Gen. Allen G. **Peck,** from Dep. Combined Forces Air Component Cmdr., CENTCOM, Al Udeid, Qatar, to Cmdr., AF Doctrine Center, AETC, Maxwell AFB, Ala. ... Maj. Gen. (sel.) Douglas L. **Raaberg,** from Dep. Dir., Ops., CENTCOM, MacDill AFB, Fla., to Dir., P&P, ACC, Langley AFB, Va. ... Maj. Gen. James G. **Roudebush,** from Dep. Surgeon Gen., USAF, Bolling AFB, D.C., to Surgeon Gen. USAF, Bolling AFB, D.C. ... Lt. Gen. (sel.) Norman R. **Seip,** from Asst. DCS, Air, Space, & Info. Ops., P&R, USAF, Pentagon, to Cmdr., 12th AF, ACC, Davis-Monthan AFB, Ariz. ... Brig. Gen. (sel.) Charles K. **Shugg,** from Cmdr., 366th FW, ACC, Mountain Home AFB, Idaho, to Cmdr., 379th Air Expeditionary Wg., ACC, Al Udeid, Qatar ... Maj. Gen. Charles E. **Stenner Jr.,** from Dir., P&P, AFRC, Robins AFB, Ga., to Asst. DCS, Strat. P&P, USAF, Pentagon ... Brig. Gen. (sel.) Alfred J. **Stewart,** from Asst. Dir., Air & Space Ops., USAFE, Ramstein AB, Germany, to Cmdr., 21st Expeditionary Mobility Task Force, AMC, McGuire AFB, N.J. ... Brig. Gen. Thomas W. **Travis,** from Cmdr., 89th Medical Gp., AMC, Andrews AFB, Md., to Command Surgeon, ACC, Langley AFB, Va. ... Brig. Gen. Bobby J. **Wilkes,** from Cmdr., 21st Expeditionary Mobility Task Force, AMC, McGuire AFB, N.J., to Dep. Dir., Politico-Mil. Affairs (Asia-Pacific & Middle East), Jt. Staff, Pentagon ... Brig. Gen. (sel.) Tod D. **Wolters,** from Cmdr., 47th FTW, AETC, Laughlin AFB, Tex., to Cmdr., 325th FW, AETC, Tyndall AFB, Fla. ... Maj. Gen. Roy M. **Worden,** from Dir., Operational Plans & Jt. Matters, DCS, Air, Space, & Info. Ops., P&R, USAF, Pentagon, to Dir., Air & Space Ops., ACC, Langley AFB, Va. ■

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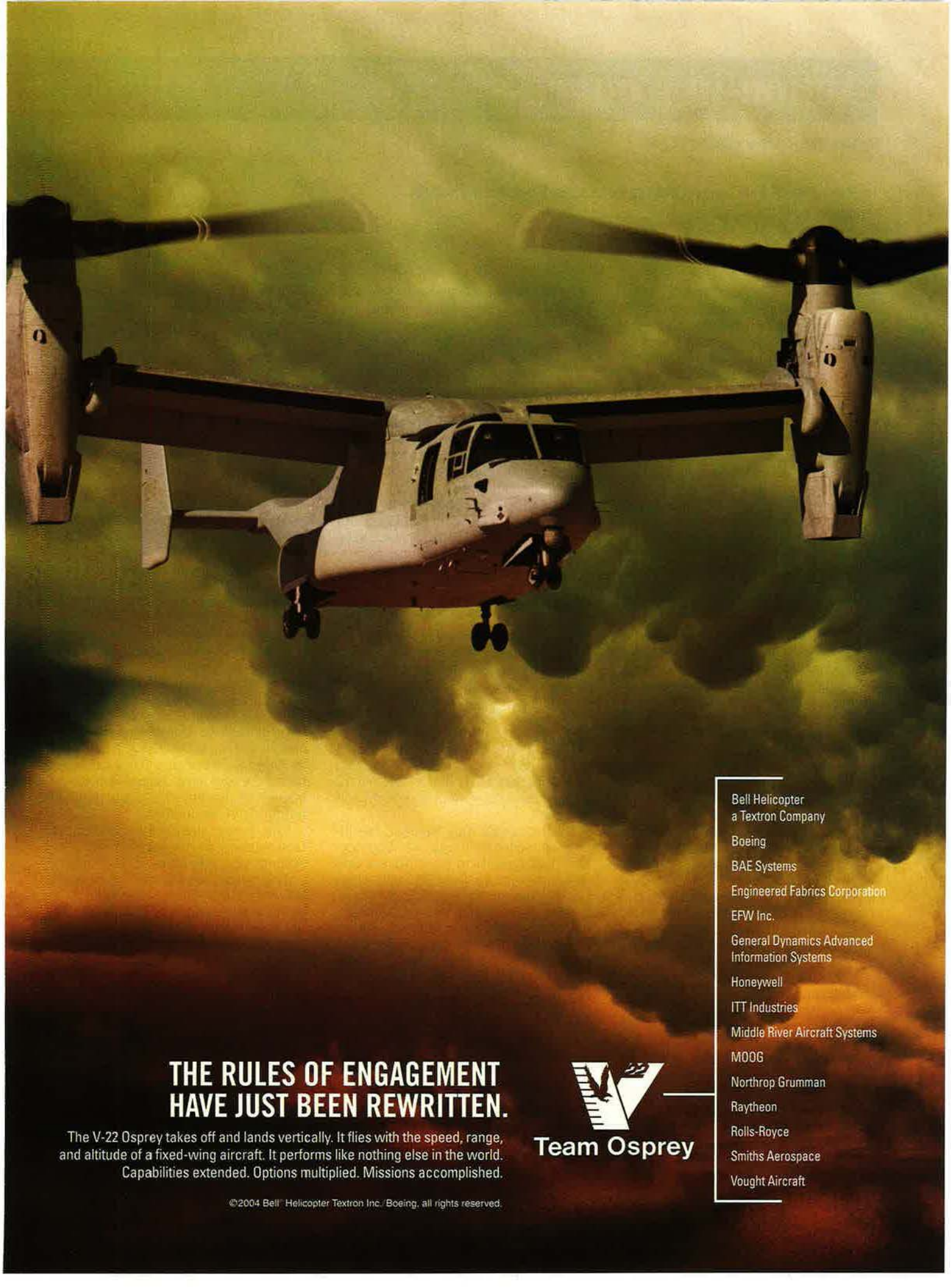
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Action in Congress

By Tom Philpott, Contributing Editor

Is Reserve GI Bill Inequitable?; Pentagon Blinks on Tricare; Pushing for HSAs ....

Fixing the Reserve GI Bill

An inequity in Reserve Montgomery GI Bill benefits, which surfaced during mobilization of tens of thousands of National Guard and Reserve personnel for duty in Iraq and Afghanistan, must be fixed. So says Rep. Vic Snyder (Ark.), ranking Democrat on the House Armed Services military personnel subcommittee.

Snyder, a Vietnam veteran, received 45 months of GI Bill benefits in return for his service, enough to complete two years of college and three years of medical school.

Active duty members today who buy into the Montgomery GI Bill (MGIB) also do well with post-service education benefits. But National Guard and Reserve members who leave service after their commitment is up, even if it included two years of involuntary call up with a year or more in a combat zone, forfeit unused benefits.

"It really is unconscionable how these young men and women are being treated now that have served their nation in a time of war and completed their enlistment contract," said Snyder.

David S.C. Chu, DOD's top manpower official, promised Snyder that the 10th Quadrennial Review of Military Compensation, a year-long study of military pay and benefits, will review the need for modifying reserve GI Bill benefits.

Service associations are pressing for a new Total Force GI Bill, which would give the reserve benefits portability and make other changes. One change would raise the basic reserve benefit to equal half the value of active duty MGIB, vs. only 29 percent today.

DOD Backs Off Tricare Fee Boost

The Defense Department, once determined to raise Tricare fees for under-65 retirees and their families, now says it won't try to do so without an endorsement from Congress. (See "Action in Congress: Tricare Fee Plan Blasted," May, p. 30.)

Some lawmakers see the proposed fees as too high, some worry about the political impact in an election year, and some are uneasy about any perceived cut in benefits while troops are at war.

It seems that no lawmaker has embraced the DOD argument that the planned fees are a necessary "re-norming" of beneficiary costs to protect a first-class health plan.

The House and Senate Armed Services personnel subcommittees held separate hearings on military health care in April. In the House hearing room, one saw boxes filled with some 40,000 letters and telegrams from angry retirees and survivors of retirees.

Chu, the undersecretary of defense for personnel and readiness, and William Winkenwerder Jr., the department's health affairs chief, were not successful in making their case to the lawmakers. Nor were the service vice chiefs, who lined up with the Pentagon leaders on this issue.

Snyder Smacks "Hand-Wringing"

Snyder challenged hand-wringing by military leaders over the widening disparity between Tricare fees and employer insurance premiums.

"We want there to be a disparity, because that's part of what we get for people turning their life over to us 24 hours a day," said Snyder, who added that Congress will "pay for health care for our men and women in uniform and retirees."

DOD projects that "modest" fee increases will encourage 144,000 current retiree users to leave Tricare and discourage more than 350,000 other beneficiaries from moving into Tricare.

What those estimates really mean, quipped Snyder, is that 500,000 retirees don't agree that the fee increases are modest.

New Retiree HSAs

DOD has asked Congress for authority to begin a Health Savings Account (HSA) pilot program for military retirees under age 65. Participants would forfeit their right to Tricare for a chance to build a nest egg and enjoy some tax breaks by combining an HSA with a high-deductible health insurance plan.

Who might be interested? DOD wants to find out. Several of these HSAs began to be offered to federal civilian employees last year. As with conventional health insurance for federal civilians, the government would pay roughly 72 percent of the cost, with plan enrollees paying 28 percent as premiums.

Under HSAs, total contributions often are set to cover beneficiaries' out-of-pocket medical expenses up to the amount of the deductible.

Savings accounts can grow if beneficiaries stayed healthy or used health care services prudently, and when beneficiaries become eligible for Medicare instead, the balances can be converted into individual retirement accounts.

Blocking Funeral Protests

Congress wants to protect grieving service families from the cruelty of protests at the interment of loved ones. At issue are funeral protests by some church members who oppose homosexuals in the military.

Starting last summer, members of the Westboro Baptist Church, Topeka, Kan., have picketed the funerals of troops killed in Iraq and Afghanistan with bitter chants and signs that read "Thank God for Dead Soldiers" and "Thank God for IEDs," the explosive devices planted by insurgents that have killed and maimed hundreds of Americans.

The group claims the bombs are God's justice for the government "condoning" homosexuality in the military.

The House has passed the Respect for America's Fallen Heroes Act to prohibit demonstrations at VA cemeteries or at Arlington National Cemetery, unless approved by the cemetery superintendent or director.

The bill, introduced by a bipartisan group, also would ban demonstrations within 500 feet of a cemetery at which a military funeral or memorial service is to be held, from 60 minutes before until 60 minutes after the ceremony, if the demonstration includes any noise or diversion that disturbs "the peace or good order of the funeral or memorial service."

The protests do not represent a significant movement. The Westboro church has a 75-member congregation. ■

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USAF wants its three components to do at home what they do on deployments: Blend together in a seamless, unified, and integrated whole.

The Totally Integrate Air Force

By Adam J. Hebert, Senior Editor

An F-22 from the 27th Fighter Squadron, Langley AFB, Va., on a training mission with two F-16s assigned to Virginia ANG's 149th Fighter Squadron.

For decades, the vast majority of home-based Air National Guard and Air Force Reserve Command forces operated more or less in parallel with their active duty counterparts, working in unison but only interacting occasionally for exercises and such. The two reserve components also generally made do with older, hand-me-down aircraft.

Those days appear to be drawing to a close.

Things have changed largely because of the perceived success of several Future Total Force test cases USAF launched in 2004. In fact, these successes have spawned nearly 50 new Total Air Force proposals, most of which will be announced in the next few months. They will bring together more and more active, Guard, and Reserve personnel, often for new missions.

Total Force leaders and participating airmen seem sold on the benefits of the new integration arrangement. It produces net financial and combat gains, produces mentors for young active duty airmen, and fosters Guard and Reserve participation in new and emerging missions.

The three components have different cultures, and integrating these cultures

USAF photo by TSgt. Ben Bloker

in peacetime appears to be the hardest part of the Total Force effort. Culture, officials concede, is a challenge because the Air Force needs to preserve the unique characteristics of the Guard and Reserve, components that operate under rules—and even laws—different from the active force.

Fortunately, a new collaborative spirit seems largely to have replaced the tension that existed during last year's Base Realignment and Closure (BRAC) process. (See "Total Force Turbulence," October 2005, p. 44.) At that time, some ANG personnel felt that the Air Force was saddling them with many uncertainties and handicaps.

Uncertainty continues to be the biggest Total Force stumbling block. The Guard leadership remains concerned that its planned missions require more ANG airmen than the 106,800 currently in uniform—not less, as the Air Force envisions.

Similarly, the Guard's adjutants general are concerned that the Phase II Total Force initiatives were recently presented to them as a *fait accompli*—with barely a week to evaluate and comment on the impact.

Some states "are seeing proposals in writing for the first time," noted Maj. Gen. Roger P. Lempke, president of the Adjutants General Association of the US. "Snap assessments" of proposals that will affect the Guard for years are neither "prudent nor possible," Lempke wrote.

Guard headquarters officials say communication is the key. "As long as we are full partners in this process," said Maj. Gen. Charles V. Ickes II, acting ANG director, the Guard will be "engaged and involved in helping make some of these decisions. We understand the need."

"Future" Total Force No More

The Air Force no longer officially uses the nomenclature of "Future Total Force," a term that many, for one reason or another, associate with the recent unpleasantness and division over BRAC. The new term of art today is "Total Force Integration."

The Air and Space Expeditionary Force (AEF) system "totally operationalized the Air Guard," Ickes added, and destroyed any vestige of a "flying club" mentality that may have existed in the past.

Total Force is the future, but shrinking

USAF photo

Phase I initiatives will bring about the blending of two F-16 units located at Hill AFB, Utah—the active duty 388th Fighter Wing and the Reserve 419th Fighter Wing (whose F-16 is pictured). Together, they will form an "integrated fighter associate unit."

aircraft inventories could make greater integration a bumpy ride. Current plans are that, by 2020, USAF will be flying 25 percent fewer fighters and 10 percent fewer aircraft overall.

Traditionally, ANG units have flown older aircraft, partly because the Guard's higher experience levels make it possible. The future of numerous units flying older F-15, F-16, and C-130 aircraft was in question during last year's BRAC negotiations.

Meanwhile, the Air Force is beefing up capabilities in areas such as Predator unmanned aerial vehicle operations and other intelligence-surveillance-reconnaissance missions.

Guard and Reserve units are encouraged to move into these "emerging" mission areas, partly because the fighters will go away and partly because the missions represent the future of the Air Force. Furthermore, modern connectivity and "reachback" capabilities mean many of the emerging missions can be performed at home stations, so the airmen do not have to deploy to add combat power.

Total Force Integration "is about making tough decisions to ensure a successful Air Force of the future," Air Staff officials wrote in a fact sheet. USAF wants "all new mission areas considered, where appropriate," for integration.

"I know of no capability area, no mission area," that the Air Force will not examine for possible Total Force capability, said Gen. John D.W. Corley, vice chief of staff, in recent testimony.

The Air National Guard agrees and will consider Total Force arrangements "every time," said Ickes, though ANG "won't do it every time."

The Guard also wants to avoid taking on a new set of missions and then having to go through another tumultuous reordering in a few years.

Possible initiatives will be judged on a case-by-case basis, and ANG wants to ensure there is no mission "gap" between the point when old aircraft are retired and the point when new missions arrive.

The Air Force is committed to this principle.

"If we have a unit that is going to lose its aircraft and transition to a new mission," explained Lt. Gen. Stephen G. Wood, deputy chief of staff for strategic plans and programs, "we want to bring those aircraft down at the same rate we train for the new mission."

The plans and programs office oversees USAF's Total Force Integration directorate, an office established last year and led by a one-star general. It is focused on combined force structure, basing, and organizational issues.

Integration Not New

The Total Force Integration idea certainly is not new. Starting in 1968, Air Force Reserve associate units have worked in tandem with active units in the mobility field.

A different prototype—the 116th Air Control Wing at Robins AFB, Ga.—was launched in 2002. At the 116th, active and Guard airmen and soldiers operate the only E-8C battle management wing in what is known as a "blended wing." Three months after the blended wing stood up, nine of 11 Joint STARS aircraft and 750 troops deployed during the buildup for Operations Enduring Freedom and Iraqi Freedom.

Guard units also are currently performing F-15 flight training in Florida and assisting with Global Hawk UAV operations at Beale AFB, Calif.

At Langley AFB, Va., 60 members of the Virginia Air National Guard are now working on the F-22 program. This Langley-Richmond integration effort is one of the Total Force test cases the Air Force announced at the end of 2004.

Wood argues that it is time to stop referring to these arrangements as test cases or initiatives. "I think we need to get away from that," he said, because these pilot programs are progressing well and the concept will be greatly expanded.

The Total Force arrangements announced in 2004 are collectively known as the Phase I initiatives. For the record, they are:

- Langley-Richmond integration. In March, two Virginia ANG pilots

In the Battle Space, It's Already a Total Force

The Air Force's reserve components are thoroughly integrated in Air Force operations. In recent testimony, Gen. John D.W. Corley, vice chief of staff, noted how interdependent the components are in wartime.

Since the 9/11 terror attacks, more than 43,000 fighter, aerial refueling, and airborne early warning sorties have been flown for Operation Noble Eagle. More than two-thirds—30,000—of these were Guard and Reserve missions. The Air National Guard also has primary responsibility for maintaining the air defense alert sites that protect US airspace.

"I think about the beans, the bombs, the bullets that are flown into this Global War on Terrorism on an everyday basis," he added during his March 9 testimony.

Half of the C-130 sorties and 45 percent of the C-5 sorties come from the reserve components. Because of this, USAF's reserves "cannot have tiered readiness. Every day they have to be trained and ready to stand up," Corley said.

Today, the Air National Guard flies some of the most advanced targeting pod-equipped F-16 fighters. Reserve component C-130s are often newer than those in the active duty, and Guard A-10s are heavily tasked in Iraq and Afghanistan.

Despite the heavy use of certain assets, Lt. Gen. Stephen G. Wood, deputy chief of staff for strategic plans and programs, says the Air Force has its reserve components balanced about right. He notes that operational tempo, while high, has settled into a steady state, and the demands all along have been met primarily by Guard and Reserve volunteers.

USAF photo by SSgt. Eric T. Shaler

were flying new F-22 Raptors, and a cadre of 60 full-time volunteers made up Det. 3 at Langley, home of the first F-22 wing. Eventually, the ANG's 192nd Fighter Wing will relocate to Langley as its F-16s are redistributed. Guard personnel are involved in every aspect of the F-22 mission. The 192nd was previously known for being one of the first Air Force units with the TARS (theater airborne reconnaissance) targeting system used for strike and tactical intelligence in Iraq. Now it is the first Guard unit to participate in the operational rollout of a front-line fighter.

■ Community basing in Vermont. Twelve active duty airmen are stationed with the Air Guard's 158th Fighter Wing in Burlington, Vt. They are currently all maintenance specialists, primarily first-term airmen, with one officer. Through BRAC, the wing will add three F-16s and expand its active duty presence to perhaps 100 airmen—including a couple of pilots. The young active duty airmen are living in the community as if they were Guardsmen and are expected to benefit from their relationship with their more-experienced counterparts.

■ Guard Predator operations. Arizona, California, North Dakota, and Texas Air National Guard units will fly Predator UAVs as the high-demand reconnaissance and strike drone continues to proliferate. Home-station Guardsmen will operate the MQ-1s through reach-back. Officials say UAV and ISR missions are especially attractive as Total Force operations because Guardsmen and Reservists often can perform the missions without deploying or leaving their home bases.

■ New York State operations. Under the original plan, ANG and AFRC forces were going to staff a distributed intelligence ground station in upstate New York, but this initiative has been shelved for the time being and replaced with another. "After assessing [ISR] requirements and reviewing concepts of operation, Air Force and [ANG] leadership determined the Predator mission would provide a more immediate impact" in the war on terror, officials announced last summer. Thus, New York State's ANG will join the Predator initiative, which eventually will comprise some 15 squadrons across the country.

■ Warfare Center integration. At the USAF Warfare Center in Nevada, Guard and Reserve personnel are being brought into every mission, including Predator combat operations and advanced combat training. The center had a high operating tempo and low experience levels—but in 2003 had only one Reservist and two Guardsmen. By late last year, there were about 350 reserve component airmen available, said Col. Peter McCaffrey, warfare center Reserve advisor, "with nowhere but up to go." Forty-seven Nevada Air Guardsmen currently are supporting Predator ops.

■ F-16 integration in Utah. This initiative will bring about the blending of two F-16 units located at Hill Air Force Base—the active duty 388th FW and the Reserve 419th FW. They will form an "integrated fighter associate unit" with the Reservists supporting the 388th. Bringing together collocated units performing the same or similar missions has been highlighted as a logical way to create Total Force efficiency.

■ C-17 airlifters in the Pacific. Reliable new C-17s allow for Total Force arrangements in the Pacific Theater with higher crew ratios and utilization rates. At Hickam AFB, Hawaii, the first of a planned eight new C-17s was delivered in February by a combined crew from the 15th Airlift Wing and the Hawaii Air National Guard's 154th Wing. The units will operate the C-17s together. Eight more C-17s will be delivered to Elmendorf AFB, Alaska, in 2007; they

USAF photo by TSgt. Ben Bloker

At top, SSgt. Ronald Osburn, SSgt. Andrew Fowler, and SrA. Clinton Postlethwait (l-r) prepare for the shutdown of an F-22 at Langley. At left, Maj. Mark Mitchum of the Virginia ANG's 149th FS, climbs into an F-16 in preparation for a sortie. The Virginia ANG will give up its F-16s and move to Langley to work on the F-22 program.

will be operated by active and Reserve units.

Here Comes Phase II

In addition to these, Ickes noted, there are nearly 50 "Phase II" initiatives currently under consideration. A handful have recently been announced, and the rest will be made public one by one, often by the states, said Lt. Col. Michael Odom of the Total Force Integration office.

Wood said that plans call for Total Force staffing when additional F-22 locations are established at Holloman AFB, N.M., Hickam, and Elmendorf.

Also likely are C-130 active associate units in Colorado and Wyoming, a C-5 flying training unit in Texas, and centralized intermediate repair facilities in eight states. Many of these decisions are driven by recent BRAC moves. Others, such as placing active duty airmen with the Guard units in Burlington and Cheyenne, Wyo., are partly attempts to beef up personnel levels in areas that have small populations and a limited Guard recruiting base.

Officials also noted that the nascent Joint Cargo Aircraft program—in which the Air Force and Army will work together to procure for in-theater lift missions an airlifter larger than a C-23 Sherpa but smaller than a C-130—will inevitably be a Total Force operation. Army Joint Cargo Aircraft may even be based and maintained at Air National Guard locations.

The Missouri Air National Guard will aid in B-2 stealth bomber operations at Whiteman AFB, Mo. The move will pair the 131st FW's "aircrew, maintainers, and support staff" in St. Louis with the active duty 509th Bomb Wing, according to a March announcement.

Integration creates "great new opportunities" for the Guard, Ickes said, though changes have to be made with caution.

The Guard leadership stresses the fact that ANG members are citizens first—members of communities with families, children in schools, and employers that typically expect them to stay put. Some states, because of small populations or booming or depressed local economies, already have difficulty finding or keeping Guardsmen.

Will Guardsmen Move?

If Guard members are asked to move more than 200 miles, the Air Force will probably be looking at "significant losses within that unit," Ickes said. "It's going to be turmoil, there's no doubt about it. There's going to be a challenge here."

It is almost exactly 200 miles from Missouri's Lambert-St. Louis Airport to Whiteman.

How many Guardsmen are willing to relocate is the major unknown. At Langley, Guardsmen from Richmond Airport—70 miles away—have so far all been volunteers. Eventually, however, the entire 192nd FW will close shop and make a permanent change of station (PCS) move to Langley and, at that point, the Virginia Guard will have roughly 300 full-time and 600 traditional Guardsmen at Langley. The "issue" said Col. Jay Pearsall, 192nd commander, is "who will PCS?" All the existing Guardsmen will have an opportunity to move to Langley. So far the jobs are the same (pilots, intelligence, security forces, maintenance, and firefighters), but airmen may have to retrain as the positions at Langley fill.

The Guard does not want to stand up dead-end units. New arrangements must have "all the pieces that would allow a Guardsman to have a life cycle within [that] unit," Ickes said. Total Force Integration cannot create officer-heavy organizations "with one lieutenant colonel at the top," he said, because retention would suffer when younger officers realize they have no opportunity to move up in the unit.

For part-timers, this may not be a problem. The majority of traditional Guardsmen are "basic pilots or basic crew chiefs, as opposed to leadership positions, and they're good at that; that's what they like to do," said Brig. Gen. Burton M. Field, commander of Langley's 1st Fighter Wing.

Most of the Guardsmen at Langley will be part-timers, Field noted. That and a requirement for parallel command structures mean that junior active duty personnel should not be blocked out of career-enhancing jobs by more senior Guardsmen.

For example, Lt. Col. Phil Guy is assistant director of operations for the 27th FS. He is a Guardsman, but the F-22 squadron also has an active duty ADO.

Guy served 14 years on active duty and has about 100 hours in the Raptor. According to Capt. Henry Schantz, an active duty F-22 pilot with 65 hours in the fighter, those 100 hours make Guy "experienced" in the brand-new Raptor.

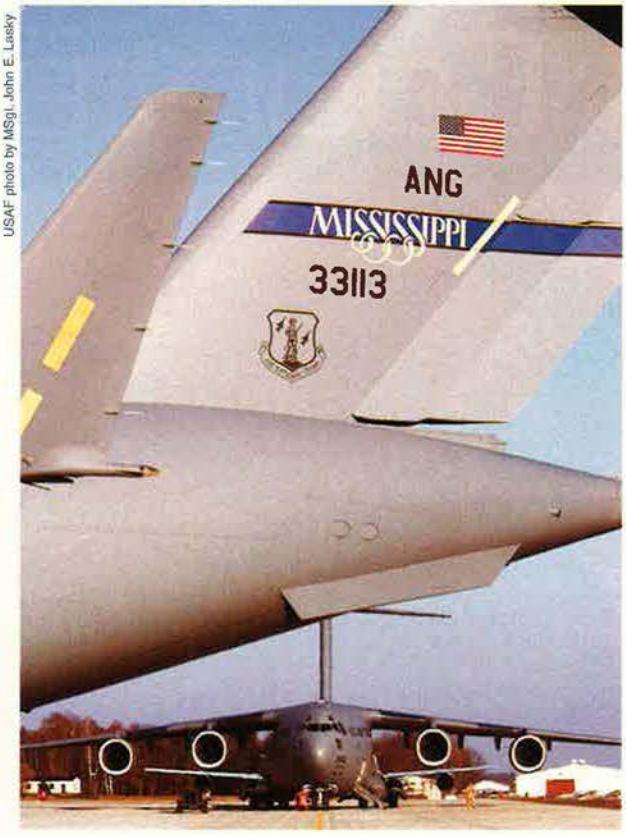
The mingling works both ways, the pilots said. Schantz, who converted from the F-15 and has never deployed in an AEF, can draw on the knowledge base of the older pilots. Guy added that Guard units can get "stale" without an infusion of new talent and ideas, which is exactly what the young active duty pilots bring to the table.

Command Issues Remain

By law, Title 32 Guardsmen—unless and until they are officially mobilized—work for their governors and do not take orders from Title 10 active

USAF photo by TSgt. Dave Buttner

ANG SrA. Mark Richwine disconnects the parachute from a pallet at Edwards AFB, Calif., after a test drop from a C-130J. Active duty, Guard, and Reserve aircrews conducted this airdrop certification test together.



USAF photo by MSgt. John E. Lasky

The Air Force is striving for the same sort of integration at home stations as exists on deployments. At left are C-17s preparing for takeoff from Ramstein AB, Germany.

duty personnel. Likewise, active duty personnel do not take orders from Guardsmen. These rules hold unless the Guardsmen are mobilized and placed under Title 10 rules themselves.

It is the mobilization factor that allows the Total Force to operate together so effectively while deployed. In peacetime, however, the rules of the road get murky. In fact, there is currently only one case of a Reserve Component airman leading a permanent active duty unit. Reserve Lt. Col. John Breeden is commander of the 11th Reconnaissance Squadron at Nellis AFB, Nev.

Active and Guard airmen have separate chains of command, even when they are working at the same base. The airmen working on the F-22 at Langley have a simple solution to what otherwise might have been a thorny legal issue. Rather than worry about who draws a paycheck from what source or who is authorized to give an order, the airmen collaborate informally.

It is a "group effort, as opposed to top-down," noted TSgt. Al Perkins, a Virginia Air Guard avionics specialist at Langley.

The presence of the Raptor also contributes to the cooperative environment. The fighter is new for everybody, and no one has a psychological upper hand.

Field said, "We're still trying to figure out stealth here," and having the Guard on base will preserve what might otherwise be perishable technical expertise. Langley's resident stealth expert is a Guardsman, Field noted, and "he will be here for a long time," with institutional knowledge to pass along to active duty airmen as they rotate in.

The Guardsmen bring "worlds of experience," said SSgt. Daniel Hansen, an active duty avionics specialist, but technicians experienced on the F-16 still will have to learn the F-22.

The guiding philosophy on the Raptor program can be summarized as "we need to get the job done," said SMSgt. Mike Bouley, Guard integration supervisor at Langley. In the Guard, small units mean that airmen do a little bit of everything, and that philosophy has transferred to the new base. Even senior master sergeants are turning wrenches on the F-22, Bouley noted.

"You're going to see Guardsmen that are a little more rank-heavy," said 192nd commander Pearsall. "Crew chief-wise, walking around an airplane, you're going to have a stripe or two more than the average active duty guy," he said. This will take some getting used to, because it is "a little uncomfortable when you've got a senior ranking Guardsman [working] next to a staff sergeant."

Cultural differences between the active duty and reserve components can create friction and are hard to smooth over—especially when everyone is making an effort to prevent the homogenization of the cultures.

"Blending presented challenges for almost everyone involved," noted a release commemorating three years of blended wing operations at Robins. "The two cultures collided and there was little guidance from higher headquarters."

"The biggest difference is culture," agreed Perkins, the avionics specialist. For starters, full-time Guardsmen typically work four 10-hour days, which doesn't align perfectly with the active duty schedule.

Then there are the legal issues. The "single greatest obstacle to our necessary transformation is 'legacy' legislation," Corley testified March 9 before a Congressional commission tasked with recommending changes to the nation's Guard and Reserve structure.

Seeking Legislative Relief

Current law "limits effective use of our Guard and Reserve in training of all components," Corley said. It also limits use of full-time reserve component personnel for support and limits "dual-hat authority for commanders of multicomponent units," such as the 116th ACW.

DOD sent to Congress, as part of the Fiscal 2007 defense budget authorization request, a proposal to modify these restrictive laws. The proposed legislation would allow:

- Full-time Title 32 reserve component personnel to train airmen from other components and train foreign personnel.
- Guard and Reserve commanders to assume dual-hat authority to lead active duty units.
- Reserve component personnel to perform some operational missions that are currently restricted while in Title 32 status.

The Air Force described the Total Force push as a "significant step forward for the Air Force," because it identifies and combines the inherent strengths of the active duty, Air National Guard, and Air Force Reserve. There will be "ups and downs," Wood said, but, in 10 years, the integrated force may be second nature. ■

Space and Counter

Artist's conception by Eric Simonsen

The Pentagon is hoping it can avoid conflict in space. More than any other nation, the United States is heavily dependent on space assets for all manner of enabling functions, from eye-in-the-sky information about adversaries to communications and navigation. The US has the most to lose if space becomes a battleground.

However, it is this very dependency on space that makes those assets such an attractive target. Already, other countries have, on a few occasions, attempted to damage or jam satellites, and the United States has been the mark of some of those attempts. Though it hopes to avoid an arms race in space, the Pentagon nevertheless has to take some steps to prepare for such a clash.

The 2005 Quadrennial Defense Review once again took up the subject. Compared to the QDR conducted in 2001, the 2005 version was mild in tone. The earlier version—coming on the heels of the 2001 report of the Space Commission—stridently insisted that the US must not only exploit the advantages of the "high ground" of space, but that it also should develop a robust means to deny the use of space assets to any adversary.

The new QDR, released in February, simply noted that Washington must have "unfettered, reliable, and secure" access to its space assets, assured, for now, by "improving space situational awareness and protection, and through other space control measures."

The Air Force is taking its cue from the QDR, focusing most of its nonclas-

Space superiority cannot be taken for granted, so the Air Force is making plans to defend it.

By John A. Tirpak, Executive Editor

sified efforts at space superiority on systems that will broadly enhance its knowledge of what's in orbit, as well as its ability to know if American space systems are under attack.

What's Up There?

"We have to know what's up there," said Gen. T. Michael Moseley, Air Force Chief of Staff. "We have to continually modernize the early warning systems to know what is up there, what has been added, what are the orbital paths, and what are the opportunities to see."

This is what the United States must do to avoid "a Pearl Harbor in space," Moseley observed.

The emphasis remains on space situational awareness, rather than attacks of adversary systems, because, as Moseley noted, "There's a 1996 convention on military activities in space, and, as you would expect us to do, we actually live within the law and attempt in every way to stay within the policy guidance. So we, in fact, do that."

The US will certainly develop means "to be able to defend our systems," he added, to "make them survivable and make them so we know where they are [and] where other systems are relative to them."

However, there's not much decided beyond that, he said. "It's going to take a bit more of a policy discussion to move from defensive counterspace and space situational awareness" into offensive counterspace.

Moseley also noted that it's still an open discussion as to how space conflict is directed and coordinated. Strategic Command, he said, has the overall responsibility for coordinating space awareness and action, but the Air Force, as the service with the greatest space infrastructure, is the principal provider of space control capabilities to STRATCOM. Still, USAF must be collaborative with the Missile Defense Agency (MDA), the other services, and other agencies, both military and civilian.

"There are so many players in this," Moseley noted, that "you have to ... bring people in, you have to continue to demonstrate competence, and continue to work this supporting-and-supported [command] relationship."

Moseley asserted, though, that space is fundamentally an Air Force mission.

"It's in my world," he said. "I got it; now let's get all these other people together, so we're not fussing with each other and we can ... move down this path together." He hopes to reduce the number of moving parts in the organization of space control and neck down the number of agencies involved so there aren't "a lot of people launching systems."

Maj. Gen. Mark D. Shackelford, director of plans and requirements at Air Force Space Command, said the relationship between MDA, the Air Force, and the other agencies "is still developing."

Lt. Gen. Frank G. Klotz, Space Command's acting commander, said that, as MDA "becomes more space-oriented, which I suspect they're considering in the future, we will be hand in hand with them through that process, and I suspect they will want us to help them understand what's going on around their satellites."

Not Adequate

In March, Klotz told the House Armed Services Committee's panel on strategic forces that space situational awareness capabilities "are not adequate to counter future threats" and that the Air Force must "know what each new spacecraft is capable of before it is in position to impact our support to the joint warfighter."

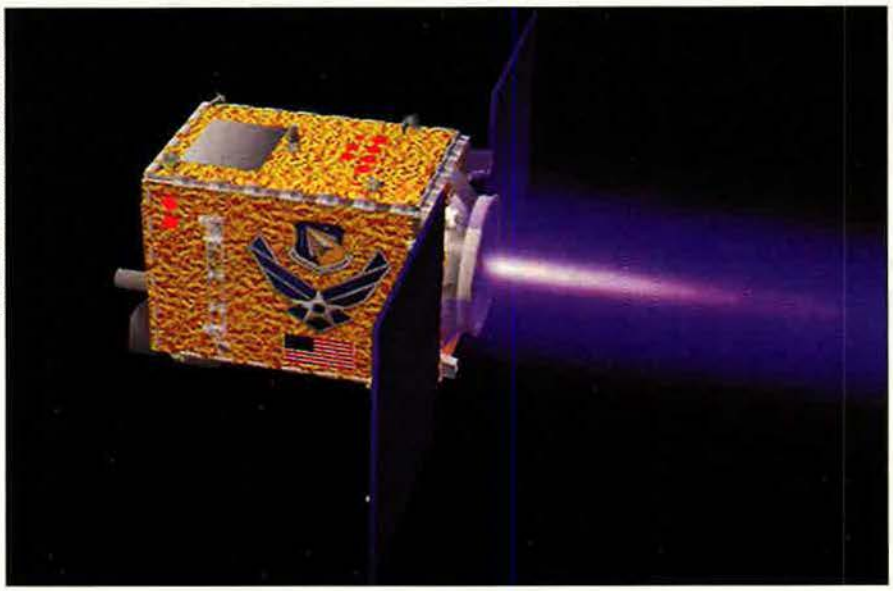
Klotz went on, "We have witnessed attempts to negate [the US space advantage] and understand the need to protect our space systems. Given the opportunity, our adversaries will attempt to exploit any and all weaknesses."

This sentiment is reflected in the basic USAF doctrine document for counterspace operations, written in 2004. Regarding it, Gen. John P. Jumper, then the Chief of Staff, wrote that "adversaries will target space capabilities in an attempt to deny [our] combat advantage. We must also be prepared to deprive an adversary of the benefits of space capabilities when American interests and lives are at stake."

Jumper pointed out that space superiority, "like air superiority, cannot be taken for granted." He declared flatly that "counterspace operations ... is one of the Air Force's air and space power functions."

The level of US vulnerability in space was validated in a QDR exercise last year, in which it was postulated that a concerted physical and information attack on US satellites took out half the systems. The result was a US military forced to fight in much the same manner as it did in the 1970s, having to rely on mass and attrition instead of precision and speed.

To prevent such a situation, the Air Force is charged with enhancing its space surveillance network, so it can watch the orbits where critical US satellites are and detect anything that changes or becomes threatening. It also is putting into place systems that monitor the health and condition of satellites and their output, watching for indications that the spacecraft are



Air Force Research Laboratory artist's conception

being affected by natural or artificial means and whether this constitutes an attack.

Finally, USAF is looking into the means to disable foreign or commercial systems, to deny an adversary the means to use space against the US.

Some of these systems are space-based, while others are ground-based surveillance or jamming devices.

In the Fiscal 2007 budget request, the Air Force is asking for $47.3 million for counterspace systems and $27.1 million for space control technologies. Together, these requests total $29.7 million more than what was requested for the same programs last year.

Air Force budget documents note that "consistent with DOD policy, the negation efforts of this program currently focus on ... technologies which have temporary, localized, and reversible means."

They Have Issues

There's good reason for that, according to Col. Ronald A. Grundman, head of AFSPC's Space Superiority Division.

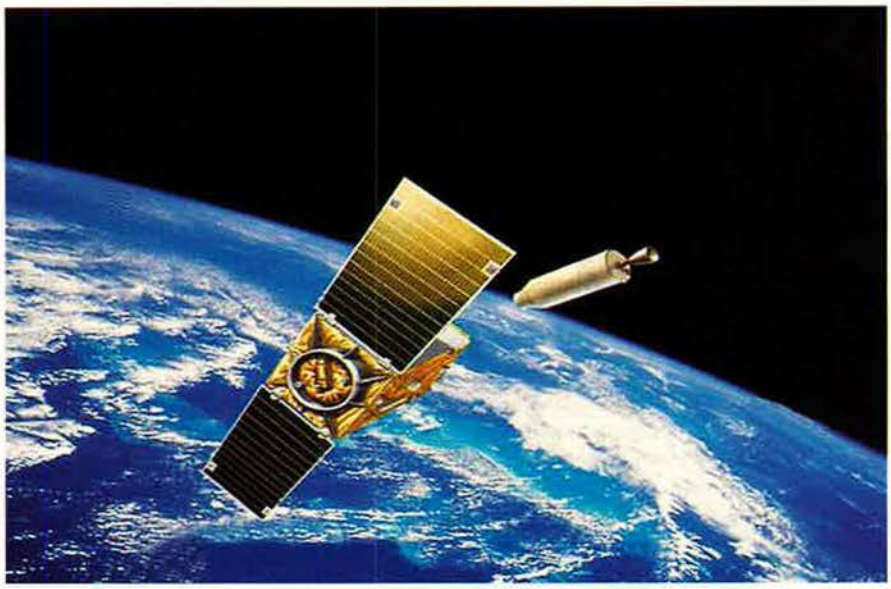
Destructive antisatellite (ASAT) systems "do come along with some issues," Grundman said.

"One of them is, they tend to leave a lot of debris in space, which is an important operating area for us. So there's long been a debate about the advisability of using ASATs for blowing up satellites," Grundman pointed out.

Even minute scraps of debris in space must be cataloged and tracked, because at orbital speeds, the tiniest paint chip can be a powerful missile if it strikes a spacecraft. Items already being tracked range from large spent booster rockets all the way down to nuts and bolts. Newly launched spacecraft must be carefully steered so they don't intersect with the orbit of a piece of space junk that could destroy them—a headache that is worsened any time a space object breaks up.

The Air Force is focusing for now on nondestructive, temporary effects in disabling other satellites because some of those it may want to turn off could be those operated by allies, who will want their expensive hardware to be available again after a conflict.

Former AFSPC vice commander Lt. Gen. Daniel P. Leaf (now deputy head of US Pacific Command) told *Foreign*



AFRL artist's conception

Via AFRL

The XSS-11 experiment is a satellite (top) that can rendezvous with a target and inspect it (middle). The image here, taken by the XSS-11, is of the Minotaur upper stage that launched it. Such a capability is useful for both space situational awareness and any future needs for space intercept.

Policy magazine last August, "You don't have to be a spacefaring nation to have access to space capabilities. All you need is a credit card, and you can get imagery derived from satellites very readily. That's a space capability. Nonstate adversaries that are opposing the United States or its allies could access commercial imagery and use it against us." Some of the targets of counterspace operations could be commercial satellites operated by companies in a friendly nation.

Leaf told *Foreign Policy* that it's important to have these nondestructive means available to disable satellites because the US recognizes that "spurring an arms race [in space] will have more negative consequences than we can stand. ... We appreciate the dangers of space debris." However, he added that "it would be foolish to eliminate from our consideration some capabilities that may be necessary in the future." Leaf asserted that the Air Force's approach so far has been "very responsible and thoughtful."

Grundman observed that the debate over whether and when to use destructive antisatellite systems "will probably continue, but we don't have any programs right now that are funded in that regard."

For now, the Air Force is focused on the space situational awareness aspect and has a number of programs under way that will sharply increase its knowledge of what's going on in orbit.

• Space Fence: Previously known as the Navy Fence, the Air Force took over this program in 2004. (See "Aerospace World: Air Force Takes Over Navy Fence," December 2004, p. 20.) The Space Fence is an array of dispersed radars that track satellites as they pass over the United States. The Air Force is planning a $275 million upgrade over the next five years that will convert the system to S-band radar, allowing greater search capability and faster revisit times. It also will sharpen the resolution of the radar, so that it can see objects from a current minimum of 12 inches in size down to two inches in size. The radars themselves will be distributed over a wider geographical area, giving a better view of the horizon. They will be able to see beyond low earth orbit (LEO) to medium Earth orbit (MEO). Grundman said the old hardware likely will be retired around 2011, because "it's reaching some sustainability limits."

• Space-Based Surveillance System: Planned to be a constellation of five satellites, the SBSS would operate in in LEO to look at satellites and other objects in geosynchronous Earth orbit (GEO), at about 26,000 miles from the Earth's surface. SBSS builds on a missile defense experiment launched in 1996 that looked for ballistic missiles using a visible and an infrared sensor. The IR sensor quit after 18 months, but the visible sensor has continued to function, now for almost 10 years, as proof of concept for a space-based sensor. However, Grundman said, "We think it's probably going to run out of life at any time." A Block 10 version of the SBSS is to be ready to fly in 2009. It will be a "risk reducer" for the objective system—the remaining four satellites—which should be launched between 2013 and 2014. The SBSS will be a visible-spectrum telescope. It will "help us find things" at GEO and MEO "that we don't already know about," Grundman noted, as well as "keep track of things up there that we do know about, and to get more frequent revisit on them." The SBSS will be able to survey an area of interest "a few times a day as opposed to every few days."

• RAIDRS: The Rapid Attack Identification Detection and Reporting System is not a satellite, but a "hybrid architecture" of sensors, comm links, and data processing systems intended to analyze the data from satellites and determine if they are being affected by some external force, Grundman explained. "It's a data situational awareness system" that analyzes the data received at satellite downlinks. RAIDRS detects electromagnetic interference on satellites; "in other words, it's looking to see if our commsats are being jammed by others." Spiral 1 also will be able to pinpoint the source of the jamming. By 2010, full operational capability will be 32 ground-based, deployable RAIDRS with broad capability to analyze radio frequency energy across many bands. Grundman noted that interference or jamming may not always be a hostile act. "It's not that uncommon that we end up interfering with our own communications, sometimes," he noted. However, it's important to find a jamming signal and stop it, no matter the source. Spiral 2 will have more data fusion and more automated connections with space command and control systems.

On the offensive counterspace front is the Counter Communications System. Known as CounterComm for short, this project funds a series of ground-deployable jamming units, each with two antennas, set up in the vicinity of an area where the Air Force wants to interfere with an adversary's satellites. Operational since 2004, the Air Force now has three Block 10 systems and, in the Fiscal 2007 budget, asked for three more. There are plans to upgrade the units to a Block 20 configuration. Further details are classified.

The Counter-Space Reconnaissance System, a shadowy project meant to defeat the intelligence-surveillance-re-

USAF photo

Members of the 527th Space Aggressor Squadron set up a mobile communications rig at NAS Fallon, Nev., during an exercise. Space superiority involves uplinks and downlinks, not just systems in orbit. Ground-based jammers play a big role.

USAF photo

Members of the 26th and 527th Space Aggressor Squadrons, seen through night vision equipment, prepare to do some late-night communications satellite jamming. Adversaries can be expected to interfere with US space access without warning.

connaissance systems of US adversaries with reversible, nonkinetic means, was canceled, Grundman said, even though the Air Force continues to have a validated requirement for it. (See "Securing the Space Arena," July 2004, p. 30.)

"As we are in a very tight budget environment, the decision was made to move those funds toward higher ... Air Force priorities," said Grundman. "And we're going to look at opportunities and approaches towards meeting those mission needs."

The same fate befell the Orbital Deep-Space Imager, a space telescope intended to give high-resolution imagery of objects at GEO. There's a validated requirement, Grundman said, but the Air Force has decided "not to pursue an operational system at this time."

Grundman said he has nothing in his portfolio involving a kinetic ASAT capability. Asked about ASATs that disable a target satellite by spraying their optics or solar panels with paint, Grundman said, "There have been some studies looking at potential concepts in that regard. They're sometimes called 'coaters.' And I think that's about as much as I can say about that."

There are a few concepts and programs outside of AFSPC that are looking at ASAT possibilities, however.

The Air Force Research Laboratory put out a request for information last fall for a program called Autonomous Nanosatellite Guardian for Evaluating Local Space, or ANGELS. This program seeks to launch a small satellite in 2009 into GEO, where it would escort a larger satellite, not yet selected. Its function would be to monitor the space around the host satellite, watching for intruders and threats. ANGELS could be the forerunner of a series of "escort satellites" that would move to intercept an attacking ASAT launched by another country. Contractors will be selected next year; AFRL has about $20 million for the project.

ANGELS will build on experience from XSS-10 and XSS-11, also AFRL projects to explore rendezvous, proximity, and station-keeping techniques with very small satellites. The heaviest of the spacecraft weighs in at just 220 pounds. The XSS-10 was used to rendezvous with the Delta II booster that brought it to orbit, flying around the booster and inspecting it visually, sending TV images back to ground controllers from less than 100 yards away.

The XSS-11 was steered to a rendezvous with a spent booster last November, getting within about one mile of it. The satellite orbits at about 500 miles and is also a test bed for miniaturized optics and communications gear. Air Force officials also report that the craft will experiment with techniques for on-orbit refueling of spacecraft propellant systems.

Ready To Act

Although never mentioned in any of the official descriptions of the XSS-11's mission, the satellite is able to do everything necessary to intercept and destroy an enemy satellite. The craft's small size and maneuvering capability suggest that low-cost clones could be manufactured rapidly and inexpensively for a variety of ASAT missions, should the Air Force be tasked to provide such a capability.

Setting aside the external steps that can be taken to protect satellites, can anything be done so they can defend themselves? There are techniques, Grundman said, that include radiation hardening, on-board sensors, and armoring.

Until now, such self-protection measures usually have lost out in the zero-sum trade-off analysis about what goes on a spacecraft and what doesn't.

"There has been, historically, a preference to put as much emphasis as you can on performance of the spacecraft," Grundman explained. "So, if you're trading off weight, ... you usually have to give up some mission capability, and ... program offices have wanted to emphasize their mission performance."

Now, however, "as we recognize more of a threat, you'll probably see the trade tipping more in the other direction." That won't always be true, but on a case-by-case basis, "defensive measures" may start to claim more of a satellite's weight allowance.

Grundman said recognition of the importance of space superiority "is rising, due to the fact that we know we have the most to lose in space. And we have prioritized that the most important thing we need to do ... is improved space situational awareness." The ability to defend space assets will come next, he said, followed by the capability of denying the advantages of space-based capabilities to others. However, he acknowledged that some of that capability is already present. ■

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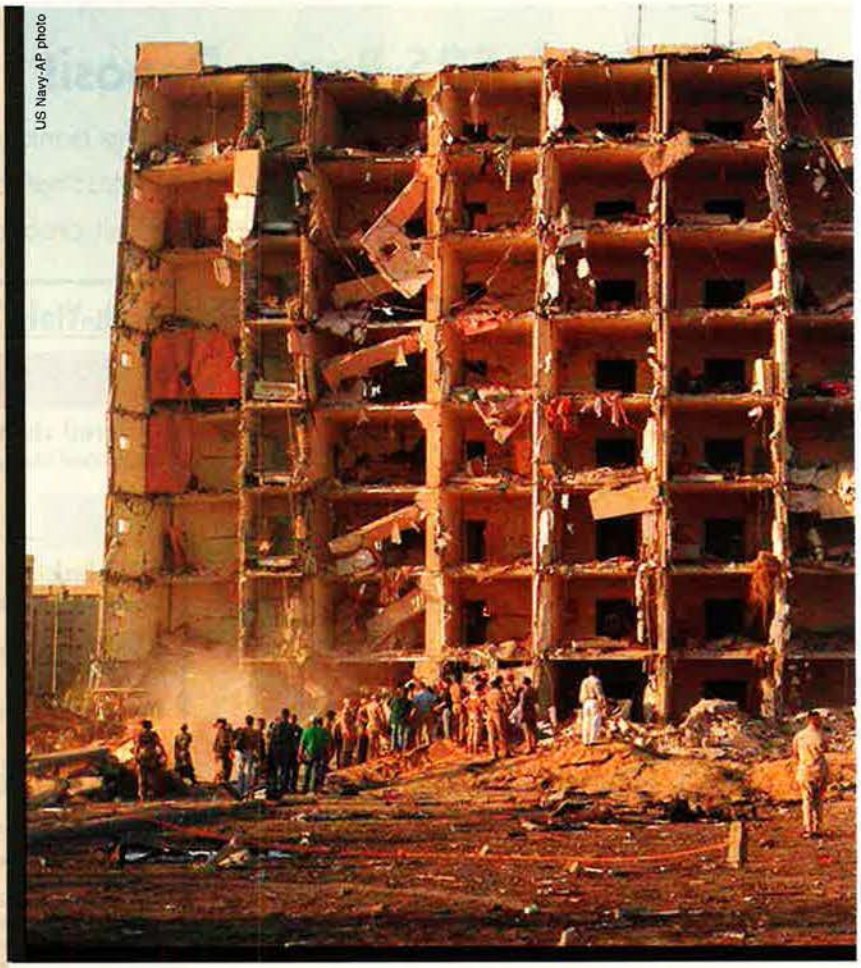
For US airmen, the Long War with terrorists began on June 25, 1996 in a place called Khobar Towers.

Death in the Desert



US Navy-AP photo

By Rebecca Grant

Top: The scene on Wednesday, June 26, 1996, one day after a deadly truck bomb exploded at a US military facility in Dhahran, Saudi Arabia. The Khobar Towers apartment block housed US servicemen based at King Abdul Aziz Air Base. At right: An aerial view of the destroyed Khobar Towers complex. Note the enormous crater caused by the blast.

Ten years have passed since terrorists detonated a massive truck bomb parked just outside the north perimeter fence of the Khobar Towers military billet in Dhahran, Saudi Arabia. The force of the blast, which could be heard 20 miles away, sheared off the face of Building 131 and killed 19 Air Force airmen. Hundreds more were injured, many of them grievously.

Americans now are no strangers to terrorism, having lived through subsequent terror strikes against the US embassies in Kenya and Tanzania, the US Navy destroyer *Cole* in Aden harbor, and the Pentagon and the World Trade Center towers in the United States. These and other outrages have left America deeply engaged in a global war against terrorists, which Secretary of Defense Donald H. Rumsfeld has dubbed "the Long War."

For airmen, the Long War, in many ways, began on a specific night—June 25, 1996, a decade ago this month. (See "Khobar Towers," June 1998, p. 41.)

Most of the terrorists who attacked that night were Saudi nationals. They had military and intelligence connections with Iran, and some had ties to a shadowy group known as the Islamic Movement for Change. They shared with al Qaeda, Osama bin Laden's terrorist organization, a desire to cleanse the Saudi kingdom of the American military presence.

In June 2001, a US federal grand jury indicted 14 of these operatives on charges stemming from the Khobar Towers attack. A few have been punished for

their crimes, including some executed by Saudi Arabia. However, the presumed ringleaders, Abdel Karim Hussein Mohamed Al-Nasser and Ahmed Ibrahim Al-Mughassil, are still at large and are featured prominently on the FBI's Most Wanted Terrorists list.

The Hour of Attack

The air was almost cool enough for jogging as the hour of 10 p.m. approached on June 25, 1996. Beyond Khobar Towers, the final Muslim prayer call of the day was just ending. Most of the residents of Khobar Towers were in their rooms.

They were airmen of the 4404th Wing (Provisional). Their mission was to enforce the no-fly zone over southern Iraq, as mandated by several United Nations resolutions. Since shortly after the end of the Gulf War in 1991, Air Force units flying from the base in the kingdom's Eastern Province had provided the bulk of the airpower used to keep Saddam's military in check. Most rotated through on 90-day temporary duty assignments.

On that night, the 4404th's wing commander was Brig. Gen. Terryl J. Schwalier—but not for long. Schwalier had just finished his one-year tour and was sitting at the desk in his room, on his last night in Saudi Arabia, writing a note to Brig. Gen. Daniel M. Dick, who was taking over the wing in the morning.

Elsewhere, the commander of the 79th Fighter Squadron, out of Shaw AFB, S.C., was filling out promotion recommendation forms in Building 133. Members of the 33rd Fighter Wing from Eglin AFB, Fla., in Building 127 and Building 131, were packing to go home.

Others were keeping watch. SSgt. Alfredo R. Guerrero was the security forces shift supervisor on duty that evening. He went up to the rooftop of Building 131 to check in with the two sentries posted there.

While Guerrero was on the roof, the three security forces troops noticed a sewage tanker truck and a car enter the parking lot adjacent to Building 131. They watched the driver wheel the truck to the second-to-last row and then turn left, as if to depart the lot. Then, however, the truck slowed, stopped, and began backing up to the fence line, stopping again right in front of the center of Building 131's north side. The driver and passenger got out and jumped into the waiting car.

Even as the suspicious car sped out of the parking lot, the three USAF security forces personnel were in motion. They radioed in an alert and started the evacuation plan from the top floor. As one floor was departing, its residents

would notify residents on the floor just below. Thus was Building 131 to be emptied in a "waterfall" fashion. They managed to notify residents on the top three floors, many of whom were fleeing down the building's stairwell.

At 9:50 p.m., four minutes after the alert, the bomb contained inside the tanker truck exploded with a force that shook the surrounding area.

It was a blast like no other in the Gulf region—ever. In November 1995, a terrorist car bomb had exploded in Riyadh, but it featured only a few hundred pounds of explosives. More recently, a few small package bombs had exploded in the nearby nation of Bahrain. The Khobar Towers weapon, however, exploded with a force equal to at least 20,000 pounds, and perhaps as much as 30,000 pounds, of TNT. The power of the blast was magnified several ways. The truck itself shaped the charge by directing the blast toward the building. Moreover, the relatively wide clearance between the truck and the ground gave it the more lethal characteristics of an airburst.

Flying Concrete

The blast wave struck, full force, against the north face of Building 131. In an earlier measure designed to protect the building, authorities had placed jersey barriers between the parking lot and the structure. The bomb's explosive

The Nineteen Airmen

These US Air Force members fell in the June 25, 1996 terrorist attack on the Khobar Towers billet in eastern Saudi Arabia.

Capt. Christopher J. Adams
Rescue HC-130 pilot

Born: April 18, 1966
Home: Massapequa Park, N.Y.
Unit: 45th Space Wing, 71st Rescue Squadron
Based: Patrick AFB, Fla.

SSgt. Daniel B. Cafourek
Dedicated crew chief

Born: Aug. 12, 1965
Home: Watertown, S.D.
Unit: 33rd Fighter Wing, 58th Fighter Squadron
Based: Eglin AFB, Fla.

Sgt. Millard D. Campbell
Asst. NCOIC operations resource management

Born: Sept. 20, 1965
Home: Angleton, Tex.
Unit: 33rd Fighter Wing, 58th Fighter Squadron
Based: Eglin AFB, Fla.

SrA. Earl F. Cartrette Jr.
Support section technician

Born: March 2, 1974
Home: Sellersburg, Ind.
Unit: 33rd Fighter Wing, 58th Fighter Squadron
Based: Eglin AFB, Fla.

SSgt. Kevin J. Johnson
Rescue HC-130 aircraft flight engineer

Born: June 25, 1960
Home: Shreveport, La.
Unit: 45th Space Wing, 71st Rescue Squadron
Based: Patrick AFB, Fla.

SSgt. Ronald L. King
Contracting specialist

Born: Dec. 7, 1957
Home: Battle Creek, Mich.
Unit: 55th Wing, 55th Contracting Squadron
Based: Offutt AFB, Neb.

MSgt. Kendall K. Kitson Jr.
Production superintendent

Born: Oct. 11, 1956
Home: Yukon, Okla.
Unit: 33rd Fighter Wing, 58th Fighter Squadron
Based: Eglin AFB, Fla.

A1C Peter J. Morgera
End-of-runway crew member

Born: Nov. 3, 1971
Home: Stratham, N.H.
Unit: 33rd Fighter Wing, 33rd Operations Support Squadron
Based: Eglin AFB, Fla.

TSgt. Thanh V. Nguyen
Gold Flag manager

Born: May 7, 1959
Home: Panama City, Fla.
Unit: 33rd Fighter Wing, 33rd Logistics Group
Based: Eglin AFB, Fla.

A1C Joseph E. Rimkus
Weapons load crew member

Born: April 13, 1974
Home: Edwardsville, Ill.
Unit: 33rd Fighter Wing, 58th Fighter Squadron
Based: Eglin AFB, Fla.

force slammed pieces of the jersey barriers into the first four floors. The outer walls of the bottom floors were blown inward into the rooms. With their structural support now blown away, the facades of the top three floors sheared off and fell into a pile of rubble and bodies. Walls on the east and west ends were blasted four feet from their original positions. Marble floors in several bedrooms buckled and collapsed. Steel elevator doors were ripped away.

Building 131 did not cave in completely, but that was only because it was made of prefabricated cubicles that had been bolted together. Had the apartment building been built in a more traditional manner with cross-support beams, the blast might have leveled it, causing the deaths of most residents.

The first memories for many of the survivors in buildings nearest the blast began when they found themselves in the dark, thrown across their rooms or out into hallways. Now, as they struggled to understand where they were and what had happened, they shouted and called to each other, trying to discover who was alive and who was dead.

In Building 131, a sergeant had been cleaning dust from under his bed. The mattress fell on him, partially shielding and protecting him. In Building 127, a squadron commander found a squadron mate sitting in a pool of blood

Images courtesy of Eglin AFB, Patrick AFB, Offutt AFB, Melissa L. Mackiewicz, and www.joshuawoody.com

TSgt. Patrick P. Fennig
Flight line expeditor

Born: April 17, 1962
Home: Greendale, Wis.
Unit: 33rd Fighter Wing, 60th Fighter Squadron
Based: Eglin AFB, Fla.

Capt. Leland T. Haun
Rescue HC-130 navigator

Born: April 25, 1963
Home: Clovis, Calif.
Unit: 45th Space Wing, 71st Rescue Squadron
Based: Patrick AFB, Fla.

MSgt. Michael G. Heiser
Communications system operator

Born: Sept. 20, 1960
Home: Palm Coast, Fla.
Unit: 45th Space Wing, 71st Rescue Squadron
Based: Patrick AFB, Fla.

A1C Christopher B. Lester
Civil engineering specialist

Born: Feb. 15, 1977
Home: Pineville, W.Va.
Unit: 88th Air Base Wing, 88th Civil Engineering Group
Based: Wright-Patterson AFB, Ohio

A1C Brent E. Marthaler
Assistant dedicated crew chief

Born: June 11, 1976
Home: Cambridge, Minn.
Unit: 33rd Fighter Wing, 58th Fighter Squadron
Based: Eglin AFB, Fla.

A1C Brian W. McVeigh
Assistant dedicated crew chief

Born: March 27, 1975
Home: Debary, Fla.
Unit: 33rd Fighter Wing, 58th Fighter Squadron
Based: Eglin AFB, Fla.

SrA. Jeremy A. Taylor
Jet engine technician

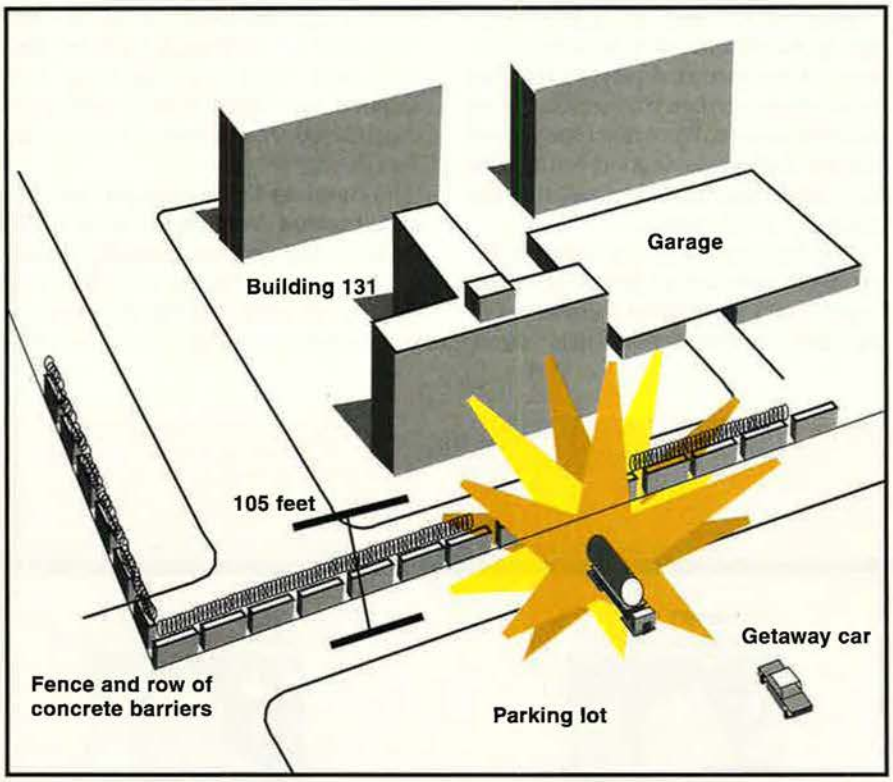
Born: Jan. 24, 1973
Home: Rosehill, Kan.
Unit: 33rd Fighter Wing, 33rd Maintenance Squadron
Based: Eglin AFB, Fla.

A1C Justin R. Wood
Rescue HC-130 loadmaster

Born: July 16, 1976
Home: Modesto, Calif.
Unit: 45th Space Wing, 71st Rescue Squadron
Based: Patrick AFB, Fla.

A1C Joshua E. Woody
Weapons load crew member

Born: Oct. 6, 1975
Home: Corning, Calif.
Unit: 33rd Fighter Wing, 58th Fighter Squadron
Based: Eglin AFB, Fla.



This diagram depicts the location of the truck carrying the explosives. As the truck pulled into the parking lot outside the perimeter fence, three USAF security personnel were on the roof of Building 131.

with a dagger of glass in his thigh. In Building 133, nearly 400 feet from the explosion's center, one of the officers who had been writing promotion forms was thrown 30 feet into the hallway. He looked up to see the roiling dust, fire, and smoke coming from the direction of Building 131.

Oak doors were blown off their hinges, and furniture was jumbled. All windows and frames within 1,500 feet of the blast crater were blown out.

Fears of another explosion, gas attack, or building collapse darted in and out of the minds of the airmen. When occupants of the most severely damaged buildings attempted to move, they felt the shards of glass crunch around them. Nearly all of the hundreds of injuries that night included lacerations from broken glass.

The airmen had to get out of the dark and devastated buildings. Alerted by Guerrero and his team, many were already moving in the stairwells when the bomb went off.

Ubiquitous Blood

In the dark, people called to each other as they groped their way out through the stairwells. "You could see the bloody palm prints streaked along the walls, and you could tell they belonged to people who were injured and trying to get away," recalled FBI agent Sue Hillard, who arrived as part of the team to investigate the disaster.

Across the compound, Schwalier felt plate glass shatter over his back as the blast wave blew out his window, frame, and heavy curtains. Through the hole in the wall he saw the fireball and smoke. He pounded on the door of the joint task force commander, Maj. Gen. Kurt B. Anderson, who had traveled to Dhahran for the next day's change of command ceremony. Then he raced out of the building to assess the damage.

Hundreds of people were moving away from the northeast corner.

"They're coming through the wall," squawked an unknown voice over the wing's FM radio bricks. Observers near the north perimeter saw figures in white robes moving through the compound in the chaos. A hundred yards back, at Building 127, airmen began picking up the wounded and moved them toward the interior of the compound for safety.

The first casualties arrived at the clinic just a few minutes after 10 p.m. Ten minutes later the clinic was deluged. Outside the buildings, the wounded overwhelmed the flight surgeons in the small clinic. One flight doctor treated casualties until he himself was forced to seek attention for his own wounds. Intravenous drips were hooked over the uprights of covered walkways as victims were laid out on the sidewalk. Dozens were sent to Saudi hospitals in ambulances. Soon after midnight, Saudi doctors and nurses arrived at Khobar Towers to help with the long process of treating the hundreds of people who needed glass removed from their faces and skin and stitches to sew up lacerations.

At 3 a.m., medical emergency logs listed 16 fatalities. Two more bodies would be found in the rubble by morning and the 19th a few hours after that.

For a time, Khobar Towers had Washington's full attention. President Clinton vowed that the United States would pursue and punish the killers and any helpers. Dignitaries, beginning with Secretary of State Warren M. Christopher, traveled to Dhahran to show their support and concern.

Gen. Ronald R. Fogleman, the Air Force Chief of Staff, spent a day talking with airmen and visiting the wounded. At one of the small dispensaries, a young airman was so intent on removing stitches that she didn't even look up at the hubbub when the Chief stopped in. Fogleman gave her a spot promotion.

In mid-July, retired Army Gen. Wayne A. Downing, a former commander of US Special Operations Command, arrived to head up an investigation at Defense Secretary William J. Perry's request. Schwalier showed him the devastated buildings. It was hot, with temperatures in the buildings near 112 degrees and a horrible smell rising out of the heat and rubble. "A smell of death," Schwalier called it. "Literally."

Different Directions

The investigations of the Khobar Towers bombing went in two directions.

The first, which attracted much publicity, was the so-called hunt for "accountability." The House National Security Committee had a team on the ground quickly, and it produced its report within weeks. Downing's probe was the first of three major investigations conducted by the military. Downing's report found fault with Schwalier and others, made numerous recommendations, and called for leaving disciplinary actions to the chain of

command. Two subsequent Air Force reports followed up with additional force protection tasks. Neither of those two USAF investigations held any single individual responsible. Ultimately, Pentagon leadership, in the person of new Secretary of Defense William S. Cohen, focused on the commander, Schwalier, who was blamed for, in effect, failing to prevent an act of war. He took the fall and resigned on July 31, 1997. (See "The Second Sacking of Terryl Schwalier," April, p. 38.)

The second question—who did the foul deed—was investigated along an entirely different path. Within days, 70 FBI agents were in Saudi Arabia working on the case. FBI Director Louis J. Freeh visited the site on July 2, 1996. Freeh would later describe the Khobar Towers investigation as a personal mission.

However, the Saudi leadership was intensely sensitive about allowing outside investigators to dig around for clues. It was not until November 1998 that the FBI gained the access it wanted to suspects held by Saudi Arabia. And it was not until June 21, 2001—six months after departure from office of the Clinton Administration—that a court in Northern Virginia handed down an indictment.

When it came, the federal indictment spelled out a compelling story. Thirteen members of Hezbollah cells based in Saudi Arabia (and one from Lebanese Hezbollah) worked together to carry out the attack. They had been planning the Khobar Towers attack for years.

At the time of the Hezbollah planning, however, US interest was focused on a different place—Riyadh, where the US military mission's compound had been bombed in November 1995. Five Americans died. US forces in the region, including the 4404th Wing, took it as a sign of an increased threat.

In January 1996, Schwalier and his commanders evaluated security at Khobar Towers and began to carry out a number of improvements. More than 130 separate security enhancements were completed. The 4404th had turned Khobar Towers into one of the best-guarded bases in the kingdom. The Air Force put guards on the roofs of the buildings, even though US Army, British, and French military living in other buildings in the Khobar Towers compound did not install rooftop guards of their own.

But as the FBI found, plans for the attack were thorough and sophisticated. Leaders of the military wing of the Saudi branch of Hezbollah began to prepare a bomb plot in 1993, and the plotting intensified over the next three years.

Step one was to initiate surveillance of American activities in the kingdom. In 1994, the terrorists narrowed down the target list to several installations in eastern Saudi Arabia; Khobar Towers was singled out as one of the key sites. According to the indictment, the terrorists then began looking for a place to hoard and store explosives.

The Iran Connection

Hezbollah was outlawed in Saudi Arabia, but the widespread organization had strong support from Iran in the form of the Iranian Revolutionary Guards, or IRG. Ahmed Al-Mughassil was one of the leaders. He directed others in their surveillance missions and supplied some of the money for surveillance expenses. Al-Mughassil had ties to Iranian officers and had trained with Hezbollah in Lebanon.

The FBI found that it was Al-Mughassil who chose Khobar Towers as the site for the attack. He reached that decision in fall 1995. Regular surveillance continued. The next challenge was to obtain a tanker truck, modify it, and bring in the sophisticated plastic explosives to transform it into a lethal truck bomb. Another conspirator, Saleh Ramadan, ferried one carload of explosives from Beirut to Qatif, an oasis town in eastern Saudi Arabia, in February 1996.

Then their plan almost went awry. Another operative, Fadel Al-Alawe, tried to bring in more explosives from Lebanon in March. Saudi border guards stopped and searched the car and arrested him. Al-Alawe talked, and the Saudis picked up Ali Al-Marhoun, Mustafa Al-Mu'alem, and Ramadan in April 1996.

Even with a diminished team of terrorists, however, Al-Mughassil had enough people and enough plastic explosives to go ahead with the attack. As listed in the indictment, a group of nine carried it out. In addition to Al-Mughassil, they were Ali Al-Houri, Hani Al-Sayegh, Ibrahim Al-Yacoub, Abdel Karim Al-Nasser, Mustafa Al-Qassab, Abdallah Al-Jarash, Hussein Al-Mughis, and an unidentified Lebanese man.

No specific word of the Hezbollah group's plans reached the Americans trying to defend Khobar Towers.

Then-Secretary of Defense William Perry later acknowledged that the Khobar Towers attack caught the Pentagon by surprise. Intelligence, Perry told the Senate Armed Services Committee, was "voluminous." However, it was also "fragmentary and inconclusive," he said.

"It did not provide the user with any specific threat, but rather laid out a wide variety of threat alternatives," Perry went on. "My assessment is that our commanders were trying to do right, but, given the inconclusive nature of the intelligence, had a difficult task to know what to plan for."

Stiffened Protection

Army Gen. J.H. Binford Peay III, who was then the commander of US Central Command, testified that more than 130 separate actions had been taken to beef up security at Khobar Towers between November 1995 and June 1996. "I can tell you in talking with Norm Schwarzkopf several times, the facility today at the time of the bombing was in considerably greater protection than it was throughout the Gulf War," Peay told the Senate.

The indictment makes clear that the Saudi terrorist cell had been closely watching the Khobar Towers site for at least two years, and, at some point, the northern perimeter fence must have attracted Al-Mughassil's notice. Saudi residents lived on the southern end, but to the north lay an empty parking lot. Buildings 131 and 133 sat about 80 feet back from the northern perimeter fence. In front of the buildings was a paved parking lot with neatly tended tamarind trees marking the rows. Schwalier had arrived in 1995 to find the fence had holes in several places. Crews repaired them. Extra jersey wall barriers went up, aimed at preventing an intruder from ramming the building.

In late March, the new security forces chief, Lt. Col. James J. Traister, and a small group walked the perimeter with a Royal Saudi military police officer. Traister asked for the barriers on the Saudi side of the fence to be moved five feet out to prevent people from climbing up the barriers and onto the fence. The Saudis also gave permission to place rows of concertina wire at the top and bottom of the fence.

Traister asked if the plants and vines could be removed. The Saudis said no. Airmen cut back the vines on their side of the fence anyway.

In May, a suspicious incident caught the attention of the airmen at Khobar Towers. A car drove across the

dusty median on the eastern side of the compound. It banged against the triple row of solid concrete jersey wall barriers, backed up, and nudged them again before driving away. Residents of Building 127 spotted the unusual event and reported it to wing security forces.

Also in May, the support group commander, Col. Gary S. Boyle, asked his Saudi counterpart about moving the fence out to extend the perimeter. But the fence was not an arbitrary marker in the middle of an undeveloped field. The public parking lot was used often by Saudis visiting the city park. In addition, the Saudi police had the responsibility to patrol the fence around the compound. The fence was not moved, but at the wing's request, the Saudis increased their patrols of the fence line.

It was not enough to deter the terrorists.

Al-Mughassil, Al-Houri, Al-Sayegh, Al-Qassab, and the unidentified Lebanese man bought a tanker truck in early June 1996. Over a two-week period they converted it into a truck bomb. The group now had about 5,000 pounds of advanced, high-grade plastic explosives, enough to produce a shaped charge that detonated with the force of at least 20,000 pounds of TNT, according to a later assessment of the Defense Special Weapons Agency.

Then came the evening of June 25, 1996. Al-Sayegh, with Al-Jarash in the passenger seat, drove a Datsun into the empty parking lot just outside the north fence of Khobar Towers. The Datsun was the scout vehicle. Al-Sayegh flicked the headlights to signal all clear. Al-Mughis had a borrowed white Caprice waiting as a getaway car.

Author Signs His Work

Just before 10 p.m., Al-Mughassil drove the tanker truck into the parking lot, positioning it for the attack. Four minutes later, the horrendous deed was done.

The US indictment that told the details of this story was filed June 21, 2001, just days before a five-year statute of limitations was due to expire. Despite Clinton's vow to pursue the matter, the indictment was not brought during his time in office.

"As a legal matter, important charges arising out of the Khobar attack, if not filed promptly, might have been lost under our statute of limitations on the fifth anniversary of this tragedy, which is next Monday," said Attorney General John Ashcroft on June 21. Ashcroft also commented that "the indictment returned today means that next week's five-year anniversary of this tragedy will come with some assurance to victims' family members and to the wounded that they are not forgotten."

What had taken so long? The Saudis already had four of the conspirators in custody before the bomb went off.

International politics and the changing US stance in the region certainly played a role. The Iran connection that leapt out of the indictments had created a sticky situation for the Clinton Administration on three counts. Iran and certain factions in Saudi society shared a goal in driving the US out of the region.

First, as reported by Elsa Walsh in *The New Yorker* in 2001, the Saudis had evidence of Iranian involvement early on. But the Saudis were concerned about what the US might do to Iran if the link was made—and in turn, what Iran might do to Saudi Arabia. This made the Saudis cautious.

For example, Mustafa Al-Qassab, a member of the main team, was caught in Syria and returned to Saudi Arabia. In November 1998, he told the FBI with Saudi authorities present that an Iranian Revolutionary Guard official had picked the Khobar Towers site and supported and financed the attack, according to Walsh.

The second factor was a shifting relationship with Iran. By 1997, Iran had a new, more moderate government and Clinton was eager to improve relations. During the run-up to Khobar Towers, Iran was under the political leadership of Akbar Hashemi Rafsanjani. Then in 1997 the more moderate Mohammad Khatami was elected. The Clinton Administration wanted a chance to improve relations.

Meanwhile, the US-Saudi relationship was fraying. The Saudi royal family sought support from hard-line clerics, including the Wahhabi sect, to justify inviting Western troops into the kingdom after Iraq invaded Kuwait in 1990. Now, the religious elements were vocally criticizing the continued presence of American and other Western military forces. On a separate level, the Khobar Towers attack happened at the beginning of a downward spiral that would lead by 1998 to a Saudi ban on using their airfields to launch strikes against Iraq during Operation Desert Fox.

The Crown Prince's Visit

The concerns about Iran and Saudi Arabia were all in play when Crown Prince Abdullah visited Washington in the fall of 1998. The crown prince had become Saudi Arabia's most powerful leader after a stroke incapacitated King Fahd.

During the visit, Clinton and Crown Prince Abdullah talked about more cooperation on the Khobar Towers case. Former FBI Director Freeh later charged that Clinton did not press the issue hard enough with the prince. Then-National Security Advisor Samuel R. Berger had a different account. According to Berger, Clinton told the prince that Americans wanted more Saudi cooperation in the investigation or else the American public would not support the US defense of Saudi Arabia from Iraq. Freeh also asked former President George H.W. Bush to intercede with the Saudis.

Whatever swung the balance, the Saudis agreed to let the FBI interview the Khobar Towers suspects in November 1998. Those interviews eventually led to the indictment in mid-2001, after Clinton had left office.

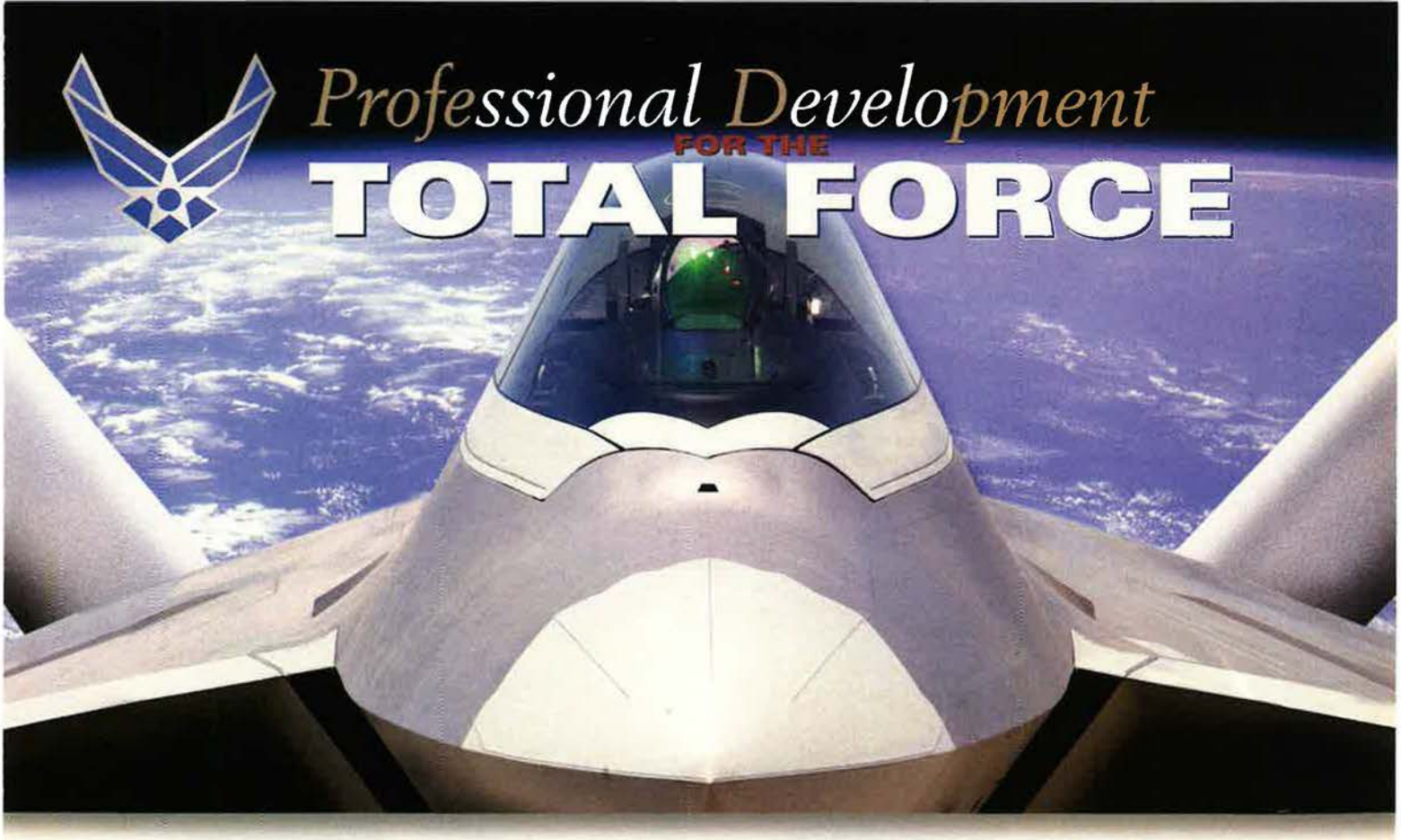
The Clinton Administration made one more push in the summer of 1999. Clinton sent a request for help with the Khobar Towers investigation to President Khatami. The letter, delivered through a third party, somehow leaked out to the press. No help came from Iran.

By then, the 4404th had long since moved to Prince Sultan Air Base in Saudi Arabia. (See "Miracle in the Desert," January 1997, p. 60.) A granite memorial at Eglin AFB, Fla., and another memorial at Gunter Annex, Maxwell AFB, Ala., commemorated those lost in the attack.

In the fall of 1997, with no fanfare, Building 131 at Khobar Towers was razed by its Saudi owners.

The State Department's Rewards For Justice program is still offering $5 million for information leading to the arrest of four of the Khobar Towers terrorists, most of whom are still at large. ■

Rebecca Grant is a contributing editor of Air Force *Magazine. She is president of IRIS Independent Research in Washington, D.C., and has worked for RAND, the Secretary of the Air Force, and the Chief of Staff of the Air Force. Grant is a fellow of the Eaker Institute for Aerospace Concepts, the public policy and research arm of the Air Force Association. Her most recent article, "The Second Sacking of Terryl Schwalier," appeared in the April issue.*



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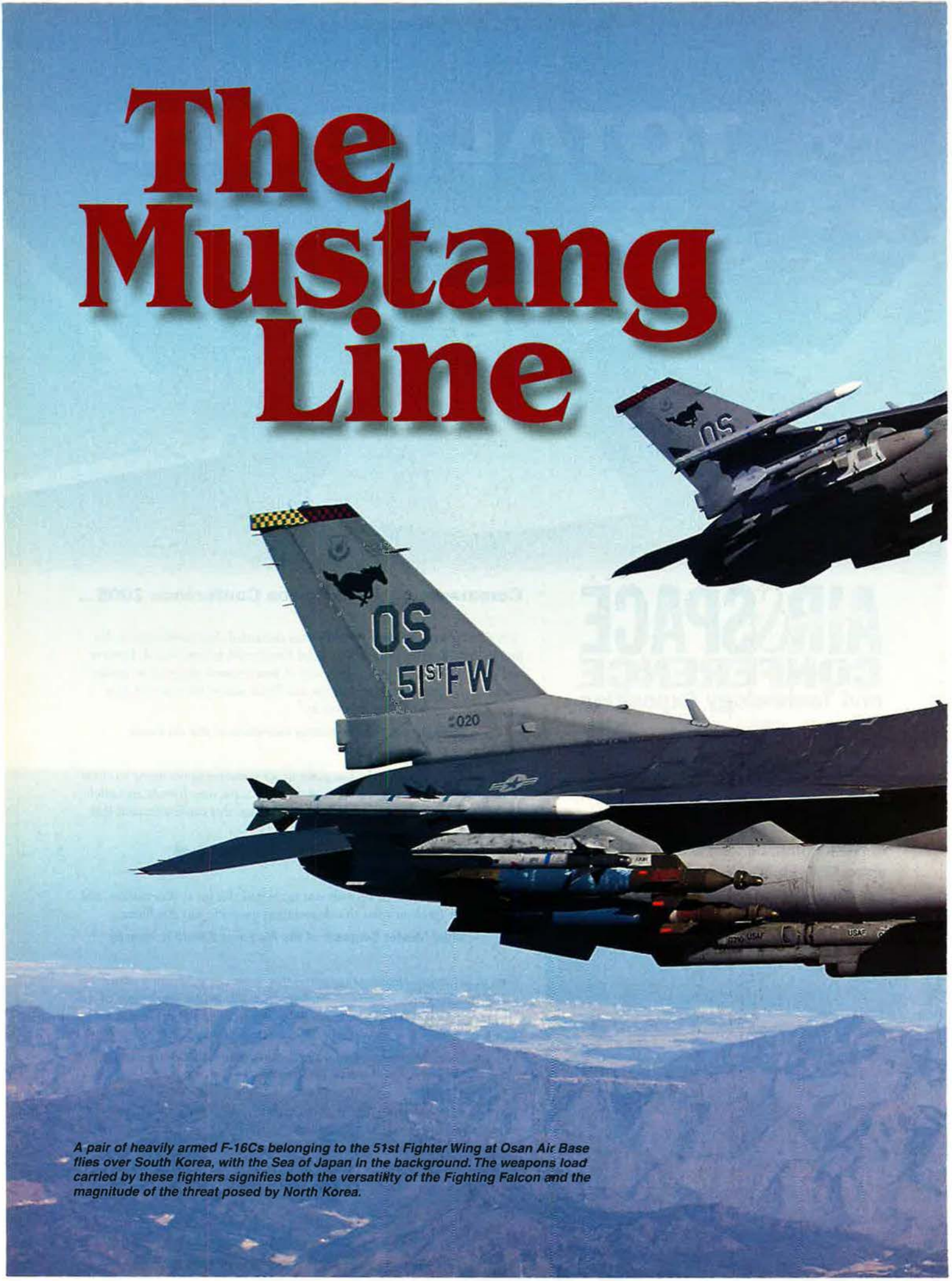
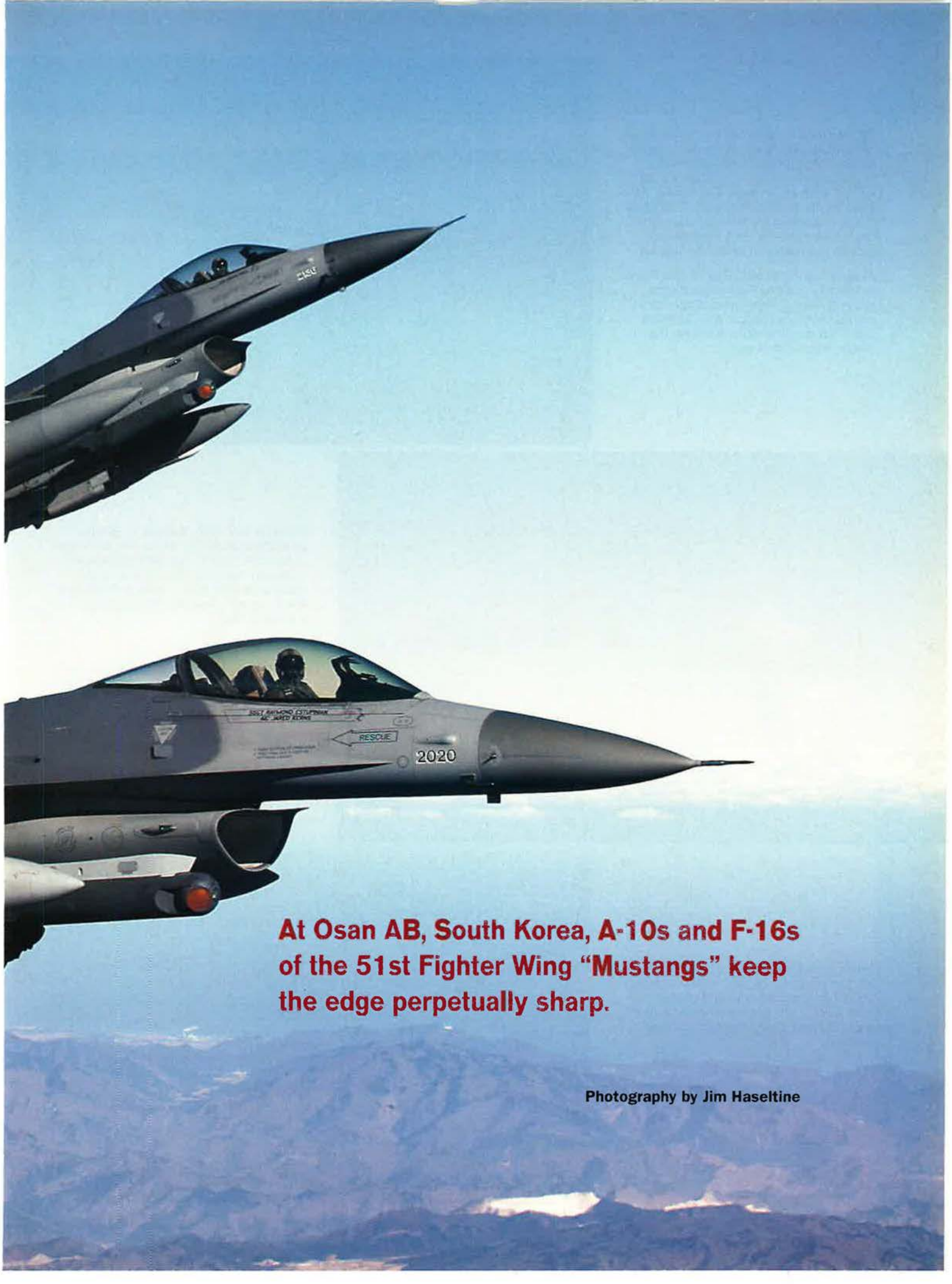
The Mustang Line



A pair of heavily armed F-16Cs belonging to the 51st Fighter Wing at Osan Air Base flies over South Korea, with the Sea of Japan in the background. The weapons load carried by these fighters signifies both the versatility of the Fighting Falcon and the magnitude of the threat posed by North Korea.



At Osan AB, South Korea, A-10s and F-16s of the 51st Fighter Wing "Mustangs" keep the edge perpetually sharp.

Photography by Jim Haseltine

The United States has been committed to defending South Korea since North Korea's 1950 invasion. The Air Force today maintains a force of roughly 9,000 airmen at Osan Air Base and Kunsan Air Base on the Korean Peninsula. This helps to demonstrate commitment, deter communist North Korea, and, if necessary, provide the means to defeat an invasion.

At right, two F-16s with Osan's 51st Fighter Wing fly over the Pyongtaek Bridge, south of Inchon Airport near Seoul. Both the South Korean capital and Osan are just a few minutes' flight time from the border with North Korea.

The 51st flies both multirole F-16s and ground-attack A-10s. At left, two Warthogs of the 25th Fighter Squadron embark on a training exercise. The A-10 at far left releases a flare while breaking away from the formation, showing its impressive ordnance load.

Best known for its 30 mm, nose-mounted, armor-piercing Gatling gun, the Warthog also has 11 hardpoints on which to mount pods, fuel tanks, and weapons.

At right, A-10s and F-16s traverse South Korean mountain ranges. Airmen typically deploy to Korea for one-year unaccompanied tours. Their relative isolation allows them to focus single-mindedly on their mission.

Security forces personnel SrA. Casey Bennett (foreground) and A1C Jacob Sprick (in Humvee) stand watch in front of a US Army Patriot missile air defense artillery battery. Osan is within range of North Korean ballistic missiles.

Below, fuel technicians refuel an F-16 parked inside a hardened aircraft shelter.

Above, a ground crew member marshals fighters into the postflight inspection area.

At right, an A-10 undergoes postflight inspection. Ground crews are searching for any damage incurred on the sortie and will "safe" any weapons still hanging on the aircraft.

Four A-10 Warthogs of the 25th FS prepare to head out on another mission. The pilots and maintainers at Osan turn in a high sortie rate to keep their skills sharp.

At right, an F-16 releases a flare as it peels away from its partner. Should a war break out on the Korean Peninsula, the 36th Fighter Squadron's multirole "Vipers" would be among the first aircraft to see combat.

A pair of F-16s patrol South Korean skies near Seoul. In the foreground is the 51st FW's flag aircraft. The F-16's versatility is illustrated by the AIM-120 AMRAAM missiles that offer beyond-visual-range air-to-air capability and the large, external fuel tanks that extend the aircraft's range and endurance.

The ground crew member below places a pin in an A-10's Maverick air-to-ground missile, indicating the AGM-65 has been safed after flight. The rocket-powered Maverick is highly regarded as a close air support and interdiction weapon.

Above, an A-10 taxis back for its post-mission check.

Above, an F-16 and A-10 dispense flares while performing evasive maneuvers on training missions. Flares are a defensive countermeasure to defeat heat-seeking missiles.

At right, an A-10 crew chief prepares the egress ladder as the pilot shuts down his engines. Visible in the foreground is the front of an ALQ-184 electronic countermeasures pod, used to foil radar guided missiles.

Far left, a pilot inspects the ALQ-184 ECM pod hanging beneath his F-16.

Airman at left is performing an inspection on an F-16's short-range AIM-9 Sidewinder air-to-air missile.

The F-16 at right has just released a 2,000-pound satellite guided GBU-31 Joint Direct Attack Munition. The Air Force is counting on such precision guided weapons to counter the vast North Korean military. Global Positioning System accuracy means that JDAMs are unaffected by the frequent clouds and rain on the Korean Peninsula.

At left, A-10s return to Osan after a training mission. Maintaining access to quality live-fire training ranges is a challenge in Korea, much as it is in the US, but the crews pride themselves on keeping a high level of proficiency.

Below, Capt. Brett Rurka (l) and Capt. Chris Olsen, both of the 36th FS, head toward their F-16s parked in hardened aircraft shelters.

The white-clad airman above is entering the air intake of an F-16 to check for engine blade damage.

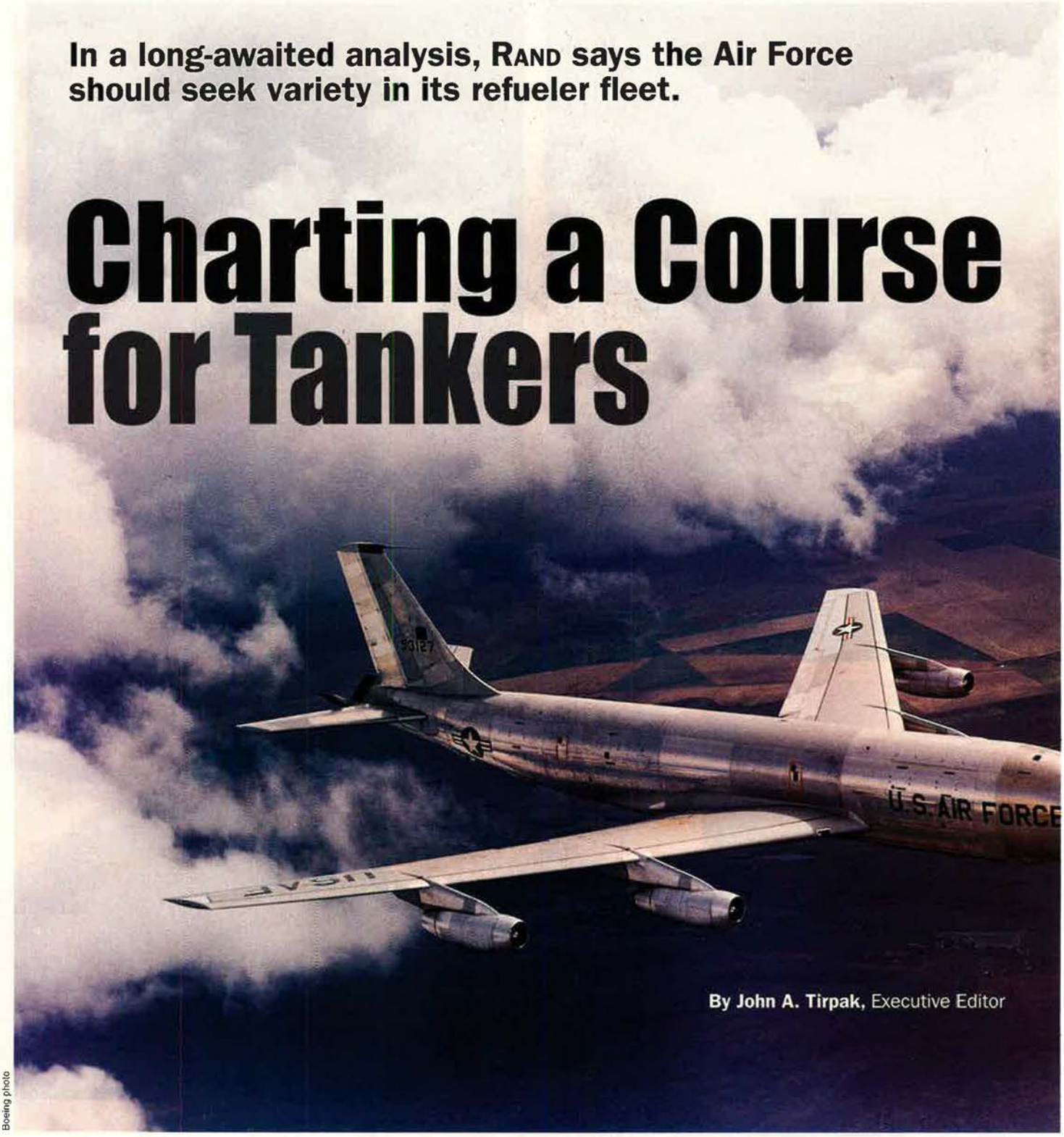
At top left, an F-16 shows off its arsenal, including JDAMs. Top right, an F-16 releases 500-pound Paveway II laser guided bombs.

Osan is the Air Force's permanent base closest to a "front line." It is just 48 miles from the Demilitarized Zone that separates North and South Korea. As such, Osan must be able to accommodate resupply, such as from the C-5 Galaxy above.

Hardened aircraft shelters (above and left) help protect against enemy attack. With a belligerent and heavily armed adversary just to the north, the airmen with the 51st FW pride themselves on being "ready to fight tonight." ■

In a long-awaited analysis, RAND says the Air Force should seek variety in its refueler fleet.

Charting a Course for Tankers



Boeing photo

By John A. Tirpak, Executive Editor

When it modernizes its aerial tanker fleet, the Air Force should buy a mix of large- and medium-size aircraft, all of which would be commercial designs converted to meet military requirements.

That is the conclusion stated by RAND Corp. in a long-awaited and much-delayed analysis of alternatives for replacing USAF's collection of Eisenhower-era refuelers.

According to the RAND study, buying and converting commercial airplanes offers the most cost-effective modernization option. The think tank analysts turned thumbs down on the notion of procuring a new-design military aircraft for the task.

RAND's study was some two years in the making. Its release marks the start of a fresh Air Force effort to replace its fleet of KC-135s, most of which are at least 45 years old. The AOA also backs up the Air Force's contention that a multimission aircraft, rather than a pure tanker, is its best choice to support national strategy.

The tanker AOA was part of a broader Mobility Capabilities Study, which was

The new RAND study marks the beginning of a fresh effort to replace KC-135 tankers, such as the one shown here. Most of the venerable refuelers are at least 45 years old.

conducted by the Joint Staff and completed late last year but which remains classified. The MCS determined that a new tanker, or tanker-cargo combination, is needed more than additional C-17 airlifters.

With the AOA in hand, Air Force leaders in April issued a request for information to industry. In the fall, they will issue a full request for proposal with an eye toward launching a tanker acquisition program within the next fiscal year. The RFI seeks industry data on what aircraft will be available, and when, for a possible tanker competition.

Michael W. Wynne, Air Force Secretary, said he hopes to get a formal acquisition program going in Fiscal 2008.

According to RAND, the price of buying new aircraft converted to the refueling role is more cost-effective, by far, than all other options. The field of discarded possibilities included launching an all-new military program which included development, using unmanned tankers, outsourcing the mission to private companies, using smaller or much larger aircraft, or buying used aircraft and refitting them with tanker gear.

The More the Merrier

RAND's acceptable options include Boeing's 747, 767, 777, and 787 aircraft as well as the Airbus A330 and A340. The life-cycle cost of various mixes of these aircraft were similar, so much so that RAND found "no reason" to exclude any from the tanker competition.

Boeing has long offered the KC-767, which it already has sold to Japan and Italy, as its top candidate, although company officials have said they would be willing to militarize the 777 if the Air Force wants to buy it.

RAND said the 787 is as good as any other option, though Boeing officials have said the new airliner does not have sufficient structural strength to handle the rigors of the air refueling mission. It makes heavy use of composites and other lightweight materials because it was designed for maximum efficiency in transporting passengers, not cargo or fuel.

The full AOA ran to some 1,800 pages. Because the full report included large amounts of proprietary technical data from various companies and manufacturers, only a 17-page executive summary was released. The rest is classified.

The study found "good arguments" to hurry up and get the tanker replacement program rolling. It noted that the KC-135s already average 46 years old, and the challenges of maintaining such an aged fleet really can't be predicted.

"There is considerable uncertainty about the future technical condition and sustainment cost of the KC-135," said the RAND study.

It suggested the Air Force do full-scale fatigue testing and a teardown analysis of representative aircraft to get a better idea of what problems lie ahead for keeping the fleet going.

Through process improvements, the Air Force has managed to slash the amount of time KC-135s have had to spend in depot maintenance, suggesting USAF has solved some of the problems of maintaining such an old airplane. Air Force officials have said that, in the early 2000s, so much work was required on the old airplanes that depot maintenance practically amounted to a "remanufacturing" program.

Secondly, RAND noted, if financial considerations require spreading tanker recapitalization out over a long period of time—as seems to be the case, judging by the 2007 Pentagon budget request—then starting earlier will help reduce the expense in any one year.

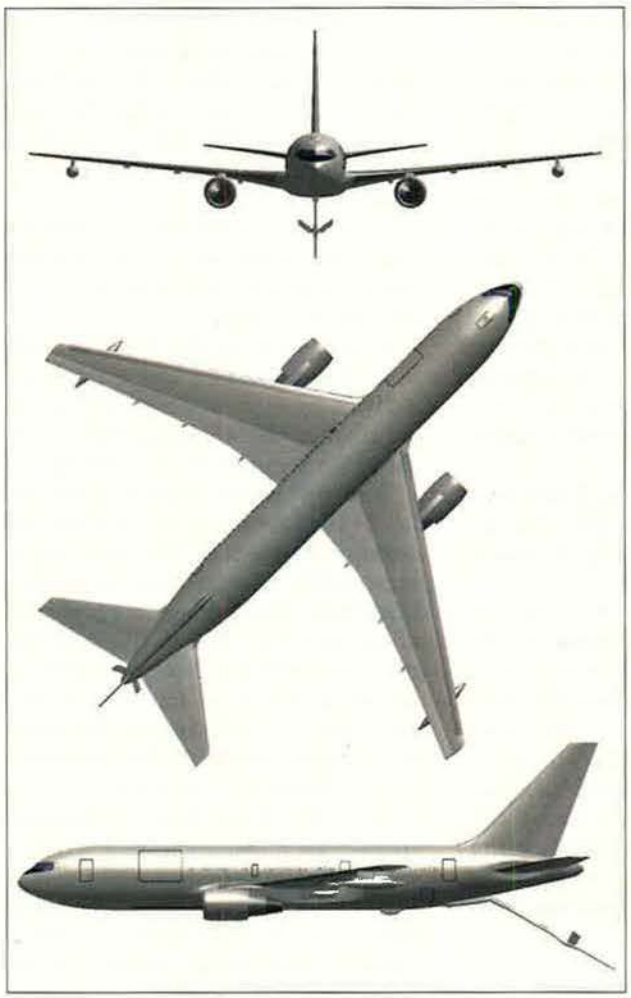
Finally, RAND noted, the KC-135 doesn't have many of the additional capabilities a new aircraft could have. It could not, for example, serve as a communications relay, receive fuel as well as refuel other aircraft, or refuel multiple aircraft simultaneously at a rate faster than possible today. RAND didn't examine the military value or cost-effectiveness of adding these other capabilities to the tanker fleet.

Need for Judgment

Adding the options mentioned above is a military consideration and "a matter for senior decision-maker judgment," said the study.

RAND allowed that future conditions could change in ways that would lessen the need for tankers. Fewer aircraft needing air refueling could reduce the requirement; so could "a change in the geopolitical situation" or "technical developments that made a new-design aircraft a more attractive tanker alternative." Another reason to wait simply would be to use the money for another pressing need.

"The decision of when to recapitalize should be based on considerations



Boeing has long offered the KC-767, shown here in drawings by a Boeing artist, as a KC-135 replacement. The aircraft has already been sold to Japan and Italy.

other than the present value of life-cycle costs," RAND said. However, this finding also is dependent on the KC-135 fleet not developing any fatal problems in the meantime.

RAND also found that it would cost about six percent more to replace the KC-135s with aircraft that could carry cargo and passengers rather than with "pure" tankers with no floors and only cross-bracing inside the fuselage.

Gen. Norton A. Schwartz, head of US Transportation Command, told the House Armed Services Committee in March that buying a combination tanker-cargo aircraft would ease pressure on what he acknowledged is an overworked C-17 fleet.

"If I had a properly configured tanker that had doors and floors, could carry passengers, and [had] defensive systems, I could ... return the C-17 either to moving cargo or reduce the [operating] tempo," said Schwartz.

Lt. Gen. Christopher A. Kelly, the vice commander of Air Mobility Command, told a House panel in February he would prefer that the Air Force buy a mix of aircraft for the tanker mission. Kelly said a mix would offer operational benefits of flexibility. It also would offer a hedge against a problem that could ground the entire fleet. With two types, a problem that grounded one would likely not affect the other.

Kelly also lifted some of the secrecy enshrouding the Mobility Capabilities Study. He said the MCS put the new tanker requirement at "520 to 640 total aircraft inventory" and that AMC believes 520 is the "minimum requirement." The MCS said the existing tanker fleet "shows a ... shortfall in all scenarios except for one."

However, Lt. Gen Donald J. Hoffman, the military deputy in the service's acquisition office, told the same House panel that he thinks USAF should buy only one type of tanker. Hoffman noted it would be cheaper to develop one type of aircraft rather than two, and it would be less costly to buy just one set of unique ground equipment.

He also pointed out that recent legislation requires that the first 100 aircraft ought to "all look the same" and be of the "medium" class. He added that, with the KC-135 and KC-10, USAF already has a "high-low mix" of tankers.

USAF photo by SSgt. Jeanette Copeland

Proposed rates of replacement could well force the Air Force to keep some KC-135s in the inventory for another 45 years. A 90-year-old fleet would certainly result in maintenance challenges. Here, KC-135s line up for takeoff at RAF Mildenhall, Britain.

A KC-10 in flight. Recent legislation requires that the first 100 new tanker aircraft "look the same" and be of medium class. With the KC-135 and KC-10, the Air Force already has a high-low mix of tankers.

What about used aircraft? RAND said a survey of suitable aircraft available for purchase would still only meet between 10 and 25 percent of the total requirement, and so they would have to be part of a mixed fleet anyway. Because used aircraft won't meet the whole requirement, at least some portion of the recapitalized fleet will have to be new airframes.

90-Year-Old Aircraft?

In any case, proposed rates of replacement could well force the Air Force to keep some KC-135s in the inventory another 45 years. "The average age of the fleet in 2006 is 46 years, and continued operation to 2050 would result in a 90-year-old fleet. A fleet of this age and size is unprecedented in aviation history," RAND found, and will surely present maintenance challenges.

RAND defined the optimum-sized aircraft as between 300,000 and one million pounds gross maximum takeoff weight. Because both Boeing and Airbus have a number of models in this range, and at comparable lifecycle costs, there is no reason to rule out a mixed buy of aircraft from both companies, RAND said.

Moreover, because the cost of the basic, or "green," aircraft played such a huge role in overall cost effectiveness, head-to-head competition would probably be a good thing, to get the cost of the aircraft itself as low as possible, according to the AOA. Under some proposals, Boeing and Airbus would compete for 100-airplane lots of new tankers, so that each round would be large enough to justify the corporate expense of competing.

In a blow to Boeing, which has proposed an all-new design called a Blended Wing Body as an answer to the tanker requirement and also as a future cargo airlifter, RAND determined that the expense of a new start would be far higher than adapting an existing design, even though the new design could be optimized for military wishes such as stealth and speed.

A new design suffers in cost analysis because "there are no shared production-learning economies with a commercial version." Boeing, however, also has proposed the BWB as the basis of a next generation super-jumbo airliner.

The study team did say, however, that a stealthy tanker, while "significantly more expensive" than a standard airframe, does offer "some effectiveness benefits," such as survivability and providing the means to escort strike aircraft into enemy territory. RAND said it would be "a military judgment" whether "the expense of penetrating tankers" outweigh the much higher costs.

RAND ruled out unmanned tankers because the reliability of current unmanned aircraft is well below that of manned aircraft. Any savings from reducing crew costs would be wiped out by the expense and danger of losing aircraft in crashes. Tankers are "too critical a combat resource in wartime, and too costly to replace in the longer run, to be generally used in ways that risk substantial attrition," according to the AOA.

RAND said outsourcing the tanker mission was so fraught with problems that it wasn't worth considering.

Kelly told the House panel that each of six recent tanker studies reached a common conclusion: Recapitalization is needed. Most said it should begin at once, and most recommended against upgrading the KC-135. Passing up that option would free up to $6 billion for new tankers, Kelly said. ■

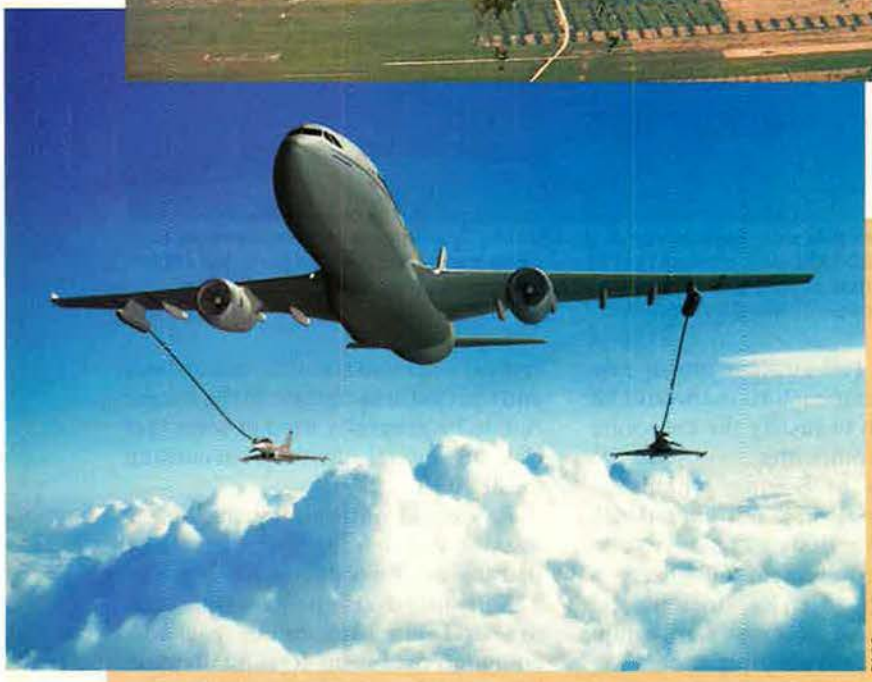
Photos by Ted Carlson

C-17s, such as this one, have become workhorses. It would be more expensive to replace the KC-135s with aircraft that could carry cargo and passengers, but USAF officials say that buying a combination tanker-cargo aircraft could bring some needed reduction of the C-17 optempo.

The US now has become the target market for some of Europe's biggest defense firms.

The European Invasion

EADS photo



EADS artist's conception

The CN-235 (left), a joint EADS and Raytheon aircraft currently built in Spain, is competing for the Army-Air Force Joint Cargo Aircraft contract. EADS also is developing a military tanker concept (below) based on the Airbus A310 or A330 airliner.

By Richard J. Newman

The name "EADS"—for European Aeronautic Defence and Space Co.—is not exactly synonymous with "United States Air Force." Just a few years ago, its prospects for selling to USAF many billions of dollars' worth of tankers seemed nil.

First, Boeing seemed to have a lock on military aircraft derived from commercial types. Second, EADS' Airbus-based tankers were built in France and Germany—two nations seemingly held in low esteem by the Bush Administration. Third, the EADS entry seemed to be technically unsuited; it didn't even have a boom compatible with US Air Force aircraft.

Then a series of extraordinary events created an opening. The Boeing contracting scandal caused an unraveling of a plan for USAF to lease Boeing 767s and convert them to tankers. Congress wanted other options, and EADS responded aggressively. It now is competing strongly for the prize.

EADS is not alone. With big boosts in the Pentagon's spending profile since the Sept. 11, 2001 terrorist attacks, and

with budgets in Europe flat or declining, the United States has become the target market for some of Europe's biggest defense firms.

The EADS case is instructive. To compete for the tanker contract, the company created a North American subsidiary, under senior executive Ralph D. Crosby Jr., that would allow it to bid on US contracts not otherwise open to foreign-based firms. Crosby formed plans to open new EADS facilities in a number of states and expand others, generating political support in Congress.

Then, last fall, the company announced a partnership with Northrop Grumman. The US firm became the prime contractor on a new tanker proposal designed to compete with Boeing. (See "Aerospace World: EADS, Northrop Team Up ... " November 2005, p. 19.)

"We recognized foreign ownership was an issue," said Crosby. "My activities since the first day have been focused on creating citizenship for us here in the US."

Making Inroads

Many are taking the same path. The US has historically been a tough market for foreign contractors to break in to, but several are making new inroads.

BAE Systems, based in England, has become the seventh-largest US defense contractor, mainly by acquiring a number of American firms, including United Defense Industries in 2005. BAE Systems is building the aft section of the F-35 Joint Strike Fighter, due to fly in production standard late this year. The BAE portfolio also includes the Army's Bradley Fighting Vehicle and other land, naval, and electronic systems.

BAE's plans to sell its 20 percent stake in Airbus could even produce billions in cash for further US acquisitions.

Meanwhile, AgustaWestland was a key part of a Lockheed Martin-led team that the Navy selected in 2005 to build the next model of Marine One, the Presidential helicopter. That aircraft, a variant of AgustaWestland's EH101 multimission helicopter, will be assembled at plants in Texas and New York. The consortium also is competing to win the Air Force's next generation combat search and rescue helicopter award, which calls for more than 140 new rotorcraft to replace worn-out HH-60s.

AgustaWestland is not American, however—it is a division of the Italian firm Finmeccanica.

EADS could become the biggest European insider. Its North American division remains a second-tier defense supplier in the United States, with a smattering of aircraft components, test systems, and software, plus a healthy commercial helicopter business.

What EADS does have is the wherewithal to grow rapidly.

The company is an industrial conglomerate headquartered in Munich and Paris and is similar in scale to Boeing.

EADS owns 80 percent of Airbus, Boeing's commercial-aircraft rival, and is negotiating with BAE to buy the other 20 percent. Its defense business includes transport and fighter aircraft, missiles, satellites and space systems, electronics, UAVs, and many other kinds of weaponry, purchased mainly by European nations.

Overall revenue for EADS totals roughly $40 billion, compared with about $53 billion for Boeing.

Two of EADS' biggest customers—Germany and Spain—have shrinking defense budgets, however. In the United States, the Air Force's increasingly urgent need for replacement tankers fits neatly with EADS' capabilities—and a deal could be worth as much as $3 billion a year for 20 years or more.

Most of the Air Force's fleet of 500-plus refueling tankers are KC-135s derived from the Boeing 707. They were delivered to the Air Force from the mid-1950s to the mid-1960s. By the 1980s, structural corrosion began to require expensive upgrades, which ultimately led the Air Force to conclude in recent years that about 100 of the oldest tankers needed to be retired soon. The whole fleet may need to be replaced by about 2040. (See "100 Tankers," August 2003, p. 64.)

The Lease Deal

After the Sept. 11 terrorist attacks, an opportunity came to the fore. Orders for Boeing's commercial aircraft fell, as air travel constricted and carriers canceled orders.

That led to a plan, encouraged by Congress, for the Air Force to lease 100 767s for conversion to tanker duty. They would replace the oldest KC-135s in the fleet.

The original price tag was about $16 billion, but various audits found the cost could end up nearly twice that. Critics, led by Republican Sen. John McCain of Arizona, complained that the Air Force had failed to consider alternatives that could have been far cheaper, including buying the airplanes outright, considering another airplane for the mission, or further upgrading the existing fleet. (See "Tanker Twilight Zone," February 2004, p. 46.)

Then Boeing revealed that Darleen A. Druyun, a former top Air Force acquisition official it had hired, had sought a job and other favors from Boeing in exchange for steering business toward the company while she was still an Air Force employee. This included influence on the tanker program. The Defense Department canceled the deal and Druyun served time in prison.

The Air Force went back to the drawing board, among other things commissioning a formal analysis of alternatives from RAND Corp.

That study, released this spring, gave a boost to EADS' prospects, finding that military variants of the Airbus A330 and A340 could be as capable and cost-effective as a number of Boeing aircraft. (See "Charting a Course for Tankers," p. 64.)

EADS, meanwhile, had been developing military tankers based on the A310 and A330 airliners, with firm orders from Germany, Canada, Australia, and the United Kingdom.

The company has been busy building domestic political support for a program that would ultimately involve billions of dollars and thousands of jobs. In 2005, EADS bought a facility in Mobile, Ala., close to a port that can handle oversize cargo. The company has pledged to convert the plant into an Airbus assembly line if the Air Force buys the A330 tanker.

The aircraft components—wings, fuselage, and tail assembly—would still be built in Europe, but final assembly would take place in Alabama, providing up to 1,000 American jobs.

EADS also broke ground on an Airbus engineering center in Mobile earlier this year in a ceremony populated with politicians. That center will employ 150 engineers working on interior aircraft designs when it opens in 2007.

The company also has been recruiting talent with the technical know-how (and political connections) to get deals done in Washington. In 2004, EADS hired retired Air Force Lt. Gen. Charles H. Coolidge Jr., who had just retired as vice commander of Air Force Materiel Command at Wright-Patterson AFB, Ohio, to oversee the tanker program and other Air Force efforts.

Other retired military officers have come on board. Last year, the company

Boeing photo

Boeing photo

At top, a Boeing 767-ER destined to become the third of four KC-767A tankers for the Italian Air Force nears completion at Boeing's plant in Washington state. Above, a 767-ER embarks on a test flight. Boeing is trying to fend off EADS for future Air Force tanker business.

elected Les Brownlee, former Senate Armed Services Committee staff director, and acting Secretary of the Army for 18 months, to the EADS North America board of directors.

Front Organization?

Then came the partnership with Northrop Grumman, officially the prime contractor on the Airbus tanker program. Some critics have labeled Northrop Grumman a front organization for a foreign-based operation, as it will be Airbus providing the airplane. Plans call for Northrop to supply avionics and electronics and to integrate all the military components into the commercial airframe.

Crosby argues that in addition to hauling fuel and cargo, the Air Force's next tanker also will serve as an intelligence-gathering platform and a communications link and perhaps even an airborne command and control post. Such sensor and networking capabilities have long been Northrop Grumman specialties, through programs such as the E-8 Joint STARS ground surveillance aircraft and the Global Hawk unmanned reconnaissance aircraft.

"They're the premier platform integration guys," said Crosby. "That's why we have Northrop Grumman."

Politics aside, the KC-30, as the Airbus tanker would be known, may have some advantages over a Boeing KC-767. Since the A330 debuted in the late 1990s, the airframe technology is more advanced than the 767, which dates to the late 1970s. The KC-30 is more efficient, and bigger, with longer range and greater capacity for fuel, cargo, and passengers. With the entire US military shifting toward rapid deployment and expeditionary capabilities, such flexibility could be a key factor.

Boeing, of course, believes its model is the better alternative. The KC-767 would be similar to the KC-135s being retired and would fit smoothly into the Air Force's concept of operations, with minimal change required. The KC-30, by contrast, would require longer runways and more ramp space than most current tankers, which could be a crucial limitation in a war with scarce air bases in theater. Boeing also points out that it is currently building a fifth generation boom, whereas EADS has had to develop an Air Force-compatible boom from scratch, because European aircraft use a different mechanism to refuel.

The RAND analysis also named Boeing's newer 777 and 787 models as tanker options.

Politics, of course, will become a major factor in any decision. EADS has generated support not just from the Congressional delegation in Alabama, but also in Mississippi, Texas, and other states where the company builds and services helicopters and other types of aircraft.

Boeing retains formidable support among influential members of Congress, such as Republican Rep. Duncan Hunter (Calif.), chairman of the House Armed Services Committee, and Democratic Rep. Norman D. Dicks (Wash.), who sits on the House Committee on Appropriations. And Boeing claims that a KC-767 tanker would generate up to 20,000 US jobs, 20 times what EADS is promising.

"A European Product"

While the Airbus aircraft could be Americanized somewhat—by, for example, adding General Electric engines—the Airbus A330 "is largely a European product supporting European jobs," said Steve East, an equity analyst with Credit Suisse who covers European defense contractors out of London. "The core of the 767 is made and assembled in the US."

EADS is not gambling its entire North American future on a tanker deal. Instead, like BAE, the company is pursuing a number of different avenues toward becoming an indigenous US contractor deeply embedded in the Pentagon's supply chain.

For starters, the company hopes to leverage its successful Eurocopter franchise, which has sold 1,500 helicopters

AgustaWestland artist's conception

AgustaWestland, Lockheed Martin, and Bell Helicopter are teaming up to produce an Americanized version of AgustaWestland's EH101 multimission helicopter to be the next generation Marine One Presidential transport.

avionics and other components similar to those on the most modern J version of the C-130. The Defense Department should pick a winner later this year.

Still possible for EADS are mergers and acquisitions, such as those that helped BAE grow into a sizable American contractor. Crosby said that EADS North America is interested in purchasing midsize defense companies valued in the range of $300 million to $400 million. For the time being, however, a strengthening dollar and the less-than-spectacular debut of the forthcoming Airbus A380 have crimped the cash flow at EADS in Europe.

The French-German company also may face barriers that Britain-based BAE does not. After several years of consolidation, there are fewer defense firms available for purchase in the US.

in the United States to the Coast Guard, law enforcement agencies, and commercial outfits, to a contract for a new light utility helicopter for the Army. In conjunction with Sikorsky, EADS is competing against Bell Helicopter, among other companies, for a contract that could call for more than 300 helicopters, valued at about $1.2 billion, to replace Vietnam-era UH-1s and OH-58s performing logistical and transport duties at US military bases.

If the EADS team wins, the company plans to deliver the first few military versions of its EC-145 helicopter from an assembly line in Germany to satisfy the Army's demand for quick delivery, then transfer assembly to a US plant in Mississippi.

The Army is expected to publish requirements this spring, with the first delivery by 2008.

EADS executives also believe they have a good shot at winning another program, the Army-Air Force Joint Cargo Aircraft. The JCA will be a tactical transport smaller than a C-130, but with more capacity than the CH-47 Chinook helicopter that Army officials say is being overtaxed in Iraq. The airlifter will replace worn-out Army C-23 Sherpas and will represent a new capability for the Air Force.

Early plans call for the Army to purchase roughly 75 JCAs, with the Air Force adding about 70 more. Because of the need for efficient intratheater lift in Iraq and Afghanistan, there is strong incentive to seek a commercial airplane that quickly can be militarized.

Lockheed Martin photo

BAE Systems, a British-based firm, is building the aft section of the F-35 Joint Strike Fighter in Samlesbury, England (X-35 prototype shown here).

EADS, teamed with Raytheon, has two offerings in the $1.3 billion competition: The CN-235, already purchased by the Coast Guard as a maritime patrol aircraft, and the similar but longer C-295. Both are built in Spain, but EADS says it will do final assembly in Mobile if it wins the deal.

The JCA competition includes the C-27J, built in Italy by the Italian company Alenia, in conjunction with Lockheed Martin, which is supplying

Despite a huge Pentagon budget, spending on weapons procurement is expected to decline in coming years, and there may be a long-lasting impulse in Washington to check EADS' growth.

"The problem is the political links at the top," one analyst pointed out. "The US and the UK fight together. You can't really say that about Germany and France." That may make EADS the ultimate test of whether commerce brings nations together. ■

Richard J. Newman is a former Washington, D.C.-based defense correspondent and senior editor for US News & World Report. *His most recent article for* Air Force Magazine, *"Upheaval at the Academy," appeared in the January 2004 issue.*

The Air Force is thinking about laser gunships and other amazing things.

Boeing artist's conception

Toward a New Laser Era

By Hampton Stephens

If the challenging technology can be developed as planned, the YAL-1A Airborne Laser will become USAF's first operational airborne laser weapon. Plans call for the ABL to take its first realistic test shot at the end of 2008. The ABL is, essentially, a 747-type cargo aircraft equipped with a powerful chemical laser weapon, primed for shooting down ballistic missiles in their boost phase.

The ABL, however, probably will mark just the start of a broader laser era. Service officials believe the combat potential of lasers—for offensive and defensive weapons, protective systems, sensors, and myriad other military applications—goes well beyond the multibillion-dollar ABL program itself. (See "Attack at the Speed of Light," December 2002, p. 26.)

The massive megawatt-class laser crammed into the ABL takes up every inch of space in the 747. However, the Air Force has begun preparing for the day when much smaller "kilowatt-class" lasers can be fitted into smaller aircraft. Although no such program is now funded, service officials are enthusiastic about the capabilities that would flow from a 100-kilowatt laser mounted into an F-35 fighter, for example.

Those capabilities include attack at light speed, dead-on accuracies, and uncompromised lethality, according to Col. Gail Wojtowicz, chief of the Future Concepts and Transformation Division in the Office of the Deputy Chief of Staff for Plans and Programs.

The laser beam can reach a target 23 miles away instantly. An AIM-120 air-combat missile, on the other hand, would take more than 30 seconds to reach a target at the same distance.

Lasers also would be significantly more accurate than even the most precise laser guided bombs. The laser's circular error probable—the radius of a circle within which 50 percent of all of the target shots would fall—is less than an inch, according to Wojtowicz.

Finally, lasers are not explosive, even though the heat they generate can have destructive effects.

An ABL beam that is aimed for just two seconds at a ballistic missile or fuel tank, for example, would have about the same effect as one pound of high explosives on those targets. At the same time, because the heat energy lasers generate can (theoretically) be adjusted, they could be more flexibly employed. There are "lots of different dimensions for how ... we would use this in the future," said Wojtowicz.

Master Plan

To prepare, the future concepts division recently completed work on an Air Force directed energy master plan that examines how lasers and other directed energy technologies could be integrated with Air Force platforms. The master plan was ordered after a 2004 wargame demonstrated the battlefield potential of a number of directed energy capabilities, said Wojtowicz. Potential directed energy capabilities, including lasers, were a focus in the follow-on Future Capabilities Assessment '05 wargame, held last October.

The directed energy master plan has helped Air Force officials identify at least six directed energy programs that might be accelerated to develop promising technologies sooner.

Among those are three laser-related programs. Although service officials declined to name specific programs, they did give examples of the kinds of capabilities they are most interested in. Officials express interest in laser-equipped F-35 Joint Strike Fighters; lasers aboard gunships; and "relay mirrors" to increase laser ranges.

One laser capability service officials are eyeing for acceleration is a 100-kilowatt solid-state laser on a combat aircraft, said Wojtowicz. Although no funding has yet gone into putting such a laser on a fighter, a "sample S&T roadmap" document estimates that the Air Force may have to make a procurement decision in 2016. Solid-state laser technology could be sufficiently mature by then to begin buying a laser-equipped F-35.

Funding for integrating the laser on the F-35 would have to be provided before that date if laser technology continues to mature as expected.

"The integration [with] the airframe is the challenge. ... Anytime you go and change an airframe, the spiral on the airframe itself gets pretty expensive," said Wojtowicz. "But again, the warfighter should try to keep that in mind as the development of the JSF goes along."

It is already too late in the F-22A program, for example, to consider adding a laser weapon and the associated power, beam control, and subsystems. The structural modifications would be prohibitively costly.

However, a design characteristic of one version of the F-35 could make the future integration of a laser on the joint fighter much easier, said Howard Meyer of the Air Staff's operational capability requirements electronic warfare division. Removing the lift fan from the short takeoff, vertical-landing version of the F-35 would provide "a tremendous amount of room" to house the components of a laser system, Meyer said.

Laser Gunships?

Another capability the Air Force would like to see developed quickly is an aircraft-mounted tactical laser. Since 2001, US Special Operations Command has sponsored an Advanced Tactical Laser concept demonstration. Such a system, if it proved out, could eventually be mounted on an AC-130 Gunship for use against ground targets.

The Advanced Tactical Laser program has so far focused on using a chemical oxygen-iodine laser (COIL) similar to that which is being developed for the ABL. However, the Air Force also is watching closely the progress of a 25-kilowatt solid-state tactical laser test bed funded by the Air Force Research Laboratory and DOD.

Both Raytheon and Northrop Grumman have recently demonstrated 25-kilowatt solid-state lasers using the test bed, according to Roy Hamil of AFRL's Directed Energy Directorate in Albuquerque, N.M. Two teams have been

Boeing photo

Shown here in preparation for flight testing in Wichita, Kan., the ABL may take its first realistic test shot in 2008. The 747-type aircraft is equipped with a powerful chemical laser weapon for shooting down ballistic missiles in their boost phase.

selected to participate in a follow-on 100-kilowatt solid-state laser test bed, Meyer said.

In a final laser-related program, the Air Force is considering a relay mirror that could be mounted on an airship or other "near-space" platform, to extend the range of laser beams to more effective ranges.

Many are skeptical that such technology is feasible, Wojtowicz said, but benefits would be substantial. Such a system would allow laser-equipped aircraft to stand off farther from potential targets.

Relay mirrors also could preserve laser beam quality, which is degraded by atmospheric disturbances. A relay mirror would be high in the atmosphere, so a laser's path from its source to the mirror and then to a target would be through thinner air, reducing degradation. In addition, a relay mirror could be equipped with an "optics bench" to clean up laser beams and make them "pristine" for the duration of their route to a target, Meyer said.

The development of such a capability depends in part on host platforms, such as the High Altitude Airship advanced concept technology demonstration and other fledgling near-space projects.

Developing a deployable solid-state 100-kilowatt laser is the informal goal of much of the science and technology development that AFRL is now undertaking or sponsoring.

Solids Vs. Chemicals

Chemical lasers are able to achieve much greater power than solid-state lasers, as the ABL's megawatt-class COIL demonstrates. However, because they are powered by large volumes of toxic chemicals, they present obvious logistical problems.

ABL, for example, is powered by six SUV-sized chemical "batteries" that must be housed in the back of the 747. Solid-state lasers, however, are powered by electricity, which is used to produce energy that is passed through a variety of solid media—usually crystal or a glass compound—to produce a laser. On an aircraft, electricity for powering a solid-state laser can be generated by burning jet fuel.

In addition to being lighter, the fact that they are electric means that solid-state lasers have a "deep-magazine," requiring only aircraft refueling in order to rearm.

However, there are two primary problems that solid-state lasers pose: efficiency and thermal management. Most current solid-state lasers are 10 to 20 percent efficient. To produce a 100-kilowatt laser beam, for example, between 500 kilowatts and a megawatt of electricity must be produced.

This inefficiency leads to another problem—getting rid of the excess heat generated by the electricity that does not go toward powering the laser. In the case of a 10 percent efficient 100-kilowatt laser, 900 kilowatts of electricity are wasted. If the heat is not dispersed, it will be absorbed by the laser medium and cause beam distortion.

"Any sort of nonuniform deposition of heat in the medium results in distortion, [which] degrades the laser beam so it's not really useful for focusing on a target at long distances," Hamil said.

For this reason, much of AFRL's solid-state laser research is focused on improving efficiency. "If we find something that's more efficient, it pays great dividends," he said, because you have to generate less power and there is less "thermal residue, which shows up in the worst places, right in your medium, which distorts the beam."

AFRL and private researchers are exploring a number of solutions to the problem.

Fiber optic lasers are among the most promising potential solutions. Such lasers use glass fibers rather than traditional solid-state media and recently have demonstrated efficiencies in excess of 30 percent, according to Hamil. In addition, a single fiber has been shown capable of producing laser output radiation in excess of two kilowatts.

The main problem with fiber optic lasers is that grouping together several fibers to produce a powerful weapons-caliber laser—50 fibers to produce a 100-kilowatt laser, for example—has proved difficult.

"Locking those together is no small feat," Hamil said. "It requires very sophisticated sensing and control of these fibers to be able to match each one of the phases so they look like one single aperture." Despite this, AFRL has "great hopes" for fiber lasers as the answer to the efficiency and thermal management quandaries, Hamil said.

Yet another technological obstacle to the near-term deployment of laser weapons is beam control—ensuring a laser beam maintains its strength and quality as it shoots through the atmosphere. There are a number of optical approaches to beam control. The ABL program, for example, uses an atmospheric compensation system consisting of a tracking laser and a computer-controlled bendable mirror. The tracking laser gauges atmospheric conditions and the mirror predistorts the laser before it leaves the aircraft.

The laser is adjusted thousands of times a second, and the atmosphere then acts to focus the laser onto the target.

No Simple Answer

AFRL also has experimented with "beam conjugation," which involves reflecting a beam that already has been distorted by the atmosphere back on itself. The resulting beam is "180 degrees out of phase" with the original beam,

and the atmosphere serves to focus it perfectly, Hamil said.

The bottom line is that there is no simple solution to guarantee beam control. Though AFRL is making progress on all technological fronts, Hamil predicts it will be at least 10 years "and probably 20 years" before solid-state laser weapons are flying around, usable in combat.

Military utility of lasers extends well beyond kinetic weapons. Uses range from defensive systems for countering man-portable anti-aircraft weapons, to nonlethal crowd-control devices, to sensor systems that use lasers to detect enemy weapons or infrastructure through foliage or other concealment. The directed energy master plan looks at all such potential uses for lasers.

The Air Force is particularly intrigued by the possibility of fielding nonlethal lasers and directed energy capabilities. If USAF had access to "dial-a-yield" weapons or directed energy weapons with temporary or reversible effects, the range of capabilities the service could offer to the national command authority would be greatly expanded, said service officials.

"I would suggest to you that in the long term, 15 years plus, directed energy [will have] the greatest transformational effect on how we fight wars," Wojtowicz said.

While Wojtowicz's office is attempting to see what the future holds for directed energy, the service's Directed Energy Task Force is making sure the Air Force is preparing for that future. Headed by Maj. Gen. Stanley Gorenc, director of operational capability requirements, the task force is looking across all Air Force functions—doctrine, organization, training, materiel, leadership, personnel, and facilities—to make sure directed energy is being considered.

This includes everything from ensuring that eye-protection against laser weapons is institutionalized in service training and operations, to examining legal issues relating to the use of directed energy weapons.

Defenses against directed energy capabilities are a special concern of the task force, because US enemies are known to be pursuing such technology. That's one reason the Air Force Secretary and Chief of Staff decided to establish the task force, even before requirements for DE-related capabilities existed in many cases.

"In this case, our leadership had the foresight to understand that this was on the horizon," said Col. Mike Edwards of the Directed Energy Task Force. Planning now against enemy use of directed energy can mitigate the threat and "allow protection of people first, then assets, then capabilities."

The task force has at least a two-star general or senior executive service participant from each headquarters directorate, each major command, and each direct reporting unit. Major commands such as Air Force Materiel Command whose responsibilities relate very heavily to directed energy may have more than one member.

In May 2005, as a result of the task force's work, then-Chief of Staff Gen. John P. Jumper signed out 75 "taskers," assigning offices of primary responsibility and requesting further feedback for various directed energy issues, according to Edwards.

If the Air Force performs an analysis of alternatives for a specific requirement, the task force wants to ensure that directed energy alternatives are considered. In other cases, the task force is looking at field-testing promising directed energy technologies.

For example, a "ground-based laser test emitter" called LAZARUS is now being used to test various defenses against lasers. Until directed energy considerations are "fully institutionalized, the task force will stay around," Edwards said.

In the meantime, the advancement of the state of the art in laser capabilities continues. ABL, the most advanced laser weapons program in the Defense Department, is progressing toward a planned shootdown of a missile in flight, scheduled for 2008.

Officials are keeping close watch on its development. In March, Lt. Gen. Henry A. Obering III, Missile Defense Agency director, said if ABL proves to be prohibitively expensive or unsupportable in a combat environment, it will not be pursued.

Last December, the program completed a major milestone, lighting its megawatt-class laser (the specific power of the weapon is classified) for more than 10 seconds in a lab at Edwards AFB, Calif.

The ABL program's 747 is now being modified in Wichita, Kan., for installation of the laser. The program had a "very successful year" in 2005, said program director Col. John A. Daniels.

The ABL is a technology "pathfinder," and success would bode well for future directed energy systems. Operational weapons may still be years away, but the future of laser and directed energy technology looks promising. ■

Boeing photo

A member of Team ABL works on a scaled laser control system in Palo Alto, Calif. The laser beam can reach a target 23 miles away and will have a circular error probable of less than one inch.

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The Ride of the Valkyrie

The futuristic XB-70 combined advanced technologies with massive power.

The B-70 project lasted only a few years, but the airplane itself was the stuff of legend.

By Walter J. Boyne

When Strategic Air Command drew up its B-70 plans a half-century ago, the Valkyrie was projected to become the centerpiece of the most advanced fleet of manned bombers ever assembled. The North American aircraft boasted a sleek, sculpted beauty, while it was still massively powerful, the largest aircraft ever to attain the speed of Mach 3.

Yet this dream was not to be. The Air Force never did acquire the huge fleet of B-70s that it so plainly coveted. The Pentagon in fact bought only two.

The program was done in by its own ambitious goals, with the technological envelope pushed too far, too fast. What's more, the B-70 was based on an operational theology—fly faster and higher—that became obsolete in the 1960s.

The Air Force signed the contract for the Mach 3 bomber in 1959. The big bomber made its first flight five years later, and it was SAC's top priority despite numerous attempts to kill it. The Valkyrie ultimately went down in flames, literally and figuratively, when one of the two XB-70s broke up and crashed following a midair collision.

US bomber production has been dead for a long time, and so it is refreshing to remember the post-World War II era, when the jet engine was opening up new performance frontiers. Bombers appeared in swift succession and were built in relatively large numbers. Given the growing threat of the Soviet Union, with its ever stronger air defenses, the Air Force always seemed to be planning the next generation aircraft.

The B-70 was supposed to replace the B-52 Stratofortress, built primarily in the 1950s. Gen. Curtis E. LeMay, commander in chief of Strategic Air Command, envisioned an aircraft with the B-52's range and payload and the supersonic speed of the B-58 Hustler.

Powered by Nukes?

LeMay knew that Boeing, Convair, and North American were developing a variety of promising—if often exotic—proposals. In fact, he asked for a parallel bomber project in which both a chemically powered Weapons System-110A and a nuclear powered WS-125A would be investigated. There were some rosy but unfounded hopes that the two fantastically expensive systems could share some subsystems to reduce overall costs.

WS-125A drew heavily on the 1946 Nuclear Energy for the Propulsion of Aircraft program. After 15 years and more than a billion dollars in development costs, WS-125A was canceled on March 28, 1961. The program for the conventionally powered WS-110A moved ahead with amazing speed, given that the airframe, engines, and subsystems all had to be developed simultaneously.

Boeing and North American each

NASA photo

were awarded letter contracts in November 1955 to begin development of a piloted strategic intercontinental bombardment system capable of carrying a 20,000-pound load of high-yield nuclear weapons.

The new bomber was to have a sustained cruise speed of Mach 0.9. For a final, 1,000-mile penetrating dash, the bomber was to have "maximum possible" speed. The target date for the first operational wing was set for October 1964.

There also was a requirement for a reconnaissance version, the WS-110L, but this was canceled as a result of the secret success of the Corona satellite project.

The initial phases of the competition for the WS-110A were characterized by wild excursions by the Boeing and the North American design teams. Beset by the same difficult requirements, both firms came up with a series of complex designs reminiscent of the fanciful projections of the last days of Luftwaffe R&D. These ranged from what looked like a B-52 on steroids to Star Wars-like creations with complex, articulated "floating" wings.

On seeing one of the latter proposals, LeMay archly noted that it wasn't a bomber, but a three-ship formation.

The intractable laws of aerodynamics made both companies realize the inefficiencies of the original mission profile, which called for a subsonic cruise approach and a long supersonic dash to the target. A superior aircraft, smaller in size, could be built if the mission profile was changed to all-supersonic.

Engine manufacturers agreed and also offered the prospect of superior performance through the use of a boron-based high-energy fuel. They held out the prospect of achieving a 15 percent increase in range with such fuel.

Attractive as that concept was, it led to a long and expensive effort that not only failed to produce useful results but also was ultimately unnecessary. Years later, the availability of JP-6 jet fuel provided virtually the same boost in performance that boron-based fuel promised, while not requiring a specialized fuel system for its use.

Compression Lift

As the competition evolved, North American exploited an aerodynamic advance that gave it the determining edge. A supersonic aircraft could have its lift-over-drag ratio increased by positioning its wing to take advantage of the pressure field that occurs behind the shock wave generated by the protruding fuselage. In North American's design, this phenomenon—called compression lift—provided a 30 percent increase in lift with no drag penalty.

Compression lift appeared to contravene the engineering rule that you never get something for nothing, but it worked.

Bombers were not the only requirement at the time, for the Air Force also was seeking a long-range Mach 3 fighter. North American won that competition with its F-108 Rapier.

This was pertinent because North American proposed the use of the same engine in both the F-108 and the WS-110, giving the company an overall cost advantage in the competition for the bomber. The designs also would share escape-capsule components.

On Dec. 23, 1957, the Air Force announced that North American had won the B-70 competition. Its design, while far less extreme than some previously proposed, was still absolutely futuristic. The B-70 featured a long protruding nose section with the canopy placed well forward. A flap-equipped canard surface, intended as a trimming device, was positioned just behind the cockpit. The huge delta wings were mounted well aft, over the fuselage underbody that contained the six engines. Two tall vertical surfaces were placed just above the engine bay.

Attaining Mach 3 speeds meant that everything about the aircraft was complex. The very structure itself had to be built to withstand not only high pressures but also the 630-degree temperatures of high-speed flight. The shape of the engine housing had to be optimized to maximize the benefits of compression lift.

In the final version of the aircraft, the wingtips folded down, not to assist with compression lift, but to provide additional stability at high speeds.

Winning a competition was one thing. Building an airplane that would do what the proposal promised was another.

The aircraft portion of WS-110A became the B-70 project in February 1958. The Air Force accelerated the program by 18 months, a move that added another $165 million to the projected program cost, according to noted aviation author Dennis R. Jenkins. And the Air Force canceled the F-108 program, with a stated requirement for 480 aircraft, eliminating projected cost savings from using the same engine.

A bewildering series of changes in requirements and specifications followed. Jenkins noted that the Air Force issued 761 requests for design alterations during program reviews.

North American's engineers constantly massaged the B-70 design. Changes included an increase in projected gross weight to more than 537,000 pounds; an additional weapons bay; a redesigned canard; and an increase in range to more than 6,500 miles.

A significant change was the relocation of the wing fold-lines, to improve aerodynamic stability at high speeds. This meant the vertical stabilizer could be reduced by half, cutting weight and drag.

Bows and Arrows

Political winds were shifting faster than North American workers could cut metal for the B-70. President Eisenhower was an advocate of the emerging intercontinental-range ballistic missile. These ICBMs, he said, made talking about building the B-70 very much like talking about bows and arrows in the era of gunpowder.

Eisenhower's opinion was doubtless shaped by the growing awareness of Soviet surface-to-air missile systems. With these new SAMs coming on line throughout the Soviet bloc, simply flying higher and faster than before would not be good enough.

The full B-70 program was canceled on Dec. 1, 1959. Pentagon officials authorized the production of a single B-70 to serve as a research vehicle, to salvage something from the $360 million already spent.

The program then entered a yo-yo phase, as hopes were dashed, then raised, then dashed again.

Disagreeing with prevailing pro-missile/antibomber sentiment of the Eisenhower Administration, top Air Force leaders, including Gen. Thomas S. Power, SAC commander, persisted in support. In August 1960, the B-70 program was reinstated to provide for one prototype plus 11 YB-70s as test units and to demonstrate the aircraft's combat capability.

The production plans were in place for less than a year. Newly elected President Kennedy was advised by Defense Secretary Robert S. McNamara not to pursue the manned bomber, and the contract was cut to three XB-70 prototypes. A final glimmer of hope was raised in March 1962, when a massive program of 210 RS-70 reconnaissance aircraft was proposed at a $10 billion cost. McNamara

Gen. Thomas Power (l), SAC commander 1957-64, was a strong B-70 proponent. He is shown here at his 1964 retirement ceremony with Gen. Curtis LeMay (c), USAF Chief of Staff, and Gen. John Ryan, Power's successor at SAC.

was unyielding, however, and ruled out any prospect of production.

Despite the numerous setbacks, North American built two aircraft. NASA offered funding for instrumentation to provide data for use in the future American Supersonic Transport (SST), intended to fly at Mach 3.

North American might have been forgiven if, by this point, it had had its fill of the program. The Valkyrie was already laden with millions of dollars in unrecoverable expenses. Even more important were the opportunity costs of pursuing a system that had lost its primary mission and was now only a research vehicle for the still-speculative SST program.

Yet North American never wavered, assigning some of its finest personnel to the program. Four Air Force and four civilian test officials immersed themselves in the program, and their combined knowledge saved the aircraft from destruction on numerous occasions as they pushed it through its flight program. For example, NASA's Joseph A. Walker contributed his knowledge from Mach 3 flights in the North American X-15.

Disbelief

The first XB-70 rolled out of its Palmdale, Calif., hangar on May 11, 1964 to an unbelieving crowd. The huge aircraft, with its 105-foot span, 186-foot length, and maximum takeoff weight of more than half a million pounds, was simply overwhelming. Nothing like it existed anywhere.

The XB-70 suffered mechanical problems from the very start. It began with difficulties in fabricating the exotic honeycomb sandwich stainless steel skin selected to withstand the tremendous aerodynamic heat. Then the new hydraulic system malfunctioned on the first taxi tests. Even learning to taxi the aircraft was difficult, as the pilot was 65 feet in front of the nose gear.

The first flight came on Sept. 21, 1964. North American's Alvin S. White was the pilot, with USAF Col. Joseph F. Cotton in the copilot's seat. Although the aircraft was "light" at 387,620 pounds, the one-hour, seven-minute flight was eventful. The Air Force had promised a $250,000 bonus if the XB-70 went supersonic on its first flight, but the complex, articulated landing gear refused to cooperate. The nose wheel retracted, but the main gear stopped midway in the process.

Fortunately, when White placed the gear handle down again, the wheels descended properly and locked.

To add a little more spice to the first flight, the No. 3 engine began to overspeed, and White shut it down.

The first landing was hazardous. White was seated about 110 feet in front of the main gears, which were designed to touch rear wheel first. When he touched down, the left main bogie did not pivot, causing a minor fire as the airplane rolled two miles down the runway pursued by fire trucks and ambulances. During this process, the No. 2 engine suffered foreign object damage and had to be replaced.

Equipment failures dogged the XB-70, with further hydraulic trouble encountered on the second flight.

The Valkyrie went supersonic on the third flight, peeling patches of its gleaming white paint away as it did so.

On flight No. 4, the Valkyrie completed its initial airworthiness testing while setting a new record for sustained supersonic speed, flying above Mach 1 for 40 minutes. It also partially lowered its wing outer panels for the first time, with the pilots noting an improvement in stability.

The XB-70 then was returned to the plant for inspection, testing, and updating and did not return to flight until February 1965. From that point on, flight testing was conducted on a regular basis, despite hair-raising incidents occurring on almost every mission.

The pilot workload was heavy, for the aircraft had different flight characteristics in subsonic and supersonic flight. The inlet duct controls had to be monitored continuously as flight conditions changed.

The XB-70 continued to set records. Mach 2.14 was reached on the eighth flight on March 24. Air vehicle No. 2 made its first flight July 17, 1965. On Oct. 14, White pushed AV-1 to Mach 3.02, its fastest speed.

The second article, AV-2, was substantially improved with a revised hydraulic system that prevented many of the problems that had hampered the first airplane. AV-2 reached Mach 3.05 at 70,000 feet on Jan. 3, 1966.

After 30 minutes, the temperatures of the aircraft structure and systems stabilized, so that with a full fuel load, the XB-70 could have flown for 2.5 hours at Mach 3. However, there were unique problems flying the aircraft at that speed, as the altimeter and rate of climb instruments fluctuated as the aircraft sped through different atmospheric pressure fields.

Disaster Strikes

Disaster struck on June 8, 1966. With White as pilot and copilot Maj. Carl Cross making his first flight, the second XB-70 rendezvoused at 20,000 feet with four aircraft for a formation flight. The flight was arranged to photograph five military airplanes powered by General Electric engines.

The Valkyrie led the formation with a Lockheed F-104N piloted by NASA's Joe Walker on its right wing. To the right and to the rear of Walker was an F-5A. Off the XB-70's left wing was an F-4B Phantom II, and a

and completed 34 more flights, most of them with NASA. The aircraft was delivered to Wright-Patterson AFB, Ohio, in 1969 for installation in the National Museum of the US Air Force. The final flight brought the total flying time for XB-70 aircraft to 252 hours and 38 minutes.

The XB-70A program cost the Air Force $1.48 billion. No military systems, such as bombsights or electronic countermeasures, were ever carried.

Nonetheless, the aircraft bestowed a technical legacy on a number of disciplines. The program advanced the large-scale use of exotic metals, such as titanium, in aircraft, and it demonstrated the need for en-route

T-38A Talon, flown by Capt. Peter C. Hoag, was to the left and rear of the Phantom. Cotton, who had flown so many flights with White, was in the back seat of the Talon.

The formation moved up to 25,000 feet, flying a racetrack pattern between Mojave and Barstow, Calif. The photographers asked for the formation to close up several times, to obtain better photos.

With the photography completed, the formation was flying east when, aboard the Valkyrie, White and Cross heard a thump and the cry "Mid-air, mid-air" came across the radio.

The T-tail of Walker's F-104 had contacted the drooped XB-70 wingtip. The F-104 pitched up, then rolled out of control, passing inverted along the XB-70's wing. The collision sheared off part of the bomber's right vertical stabilizer and most of the left stabilizer.

Walker was killed almost instantly, and his F-104 plunged in flames to the desert floor.

The XB-70 continued to fly straight and level for 16 seconds, then began to roll. White attempted to correct, but the XB-70 was mortally wounded and yawed violently to the right. The veteran White, with more than 60 flights in the XB-70 under his belt, fought to control the airplane with power, but it rolled, breaking up. Cotton, helpless in the backseat of the Talon, yelled, "Bail out!"

The XB-70 featured an advanced escape system in which the pilots were individually encapsulated before ejecting.

White's arm was trapped in the encapsulation process, but he eventually managed to eject. His chute opened, but he slammed into the ground with

AFFTC History Office photos via Dennis R. Jenkins

The XB-70 went supersonic on its third flight, peeling away much of its paint in the process (top). When the No. 2 Valkyrie flew for in-flight publicity photos, the F-104 (in photo, with red tail) collided with the bomber, causing both aircraft to crash.

tremendous force, estimated at 44 times the force of gravity. The collapse of the capsule structure absorbed enough of the force for him to survive, terribly bruised, but without any broken bones.

Cross was apparently unable to actuate the encapsulation procedure successfully, in part due to the forces from the spinning aircraft and in part because a mechanical component failed. He crashed to his death with the aircraft.

AV-1 resumed flying that November atmospheric predictions for long-range supersonic aircraft. The XB-70 also demonstrated sustained Mach 3 flight without the benefit of modern digital flight-control and engine management computers.

The Valkyrie was a glorious experiment, redolent of a time when funds were plentiful, horizons were broad, and adventure was in the air. The B-52 it was to replace remains in service to this day, and the Air Force did not field another new heavy bomber until the B-1B entered service in 1986. ■

Walter J. Boyne, former director of the National Air and Space Museum in Washington, D.C., is a retired Air Force colonel and author. He has written more than 400 articles about aviation topics and 40 books, the most recent of which is Roaring Thunder. *His most recent article for* Air Force *Magazine, "The Rise and Fall of Donald Douglas," appeared in the March issue.*

Development of realistic radar bomb scoring opened up new vistas for bomber effectiveness.

Bombing With the Beam

By Sigmund Alexander

Success in wartime depends heavily on proper training in peacetime. In pre-World War II training drills, B-17 bomber crews with Norden bombsights could drop bombs into a "pickle barrel" some 25,000 feet below. The skies were clear, targets were visible, and bombers were unmolested by defenders. However, this was unrealistic.

In actual combat over Germany, bombing accuracy was often abysmal, and no wonder. Faced with cloudy European skies, smoke-shrouded targets, enemy flak, and air defense fighters, America's incoming bombers often were unable to see the ground or pick a target out of the clutter below.

After World War II, the Air Force mission list grew to include delivery of nuclear weapons on the Soviet Union. Masses of heavy bombers no longer would be required to attack. Against the Soviet homeland, single bombers armed with a nuclear weapon were powerful enough to destroy specific targets.

Air Force planners did not contemplate fighting a war of gradual escalation against Moscow. Instead, they envisioned a war in which USAF would mount one overwhelming, simultaneous "Sunday punch" attack on all designated targets from the outset of hostilities.

All combat crews, not just a select few, had to be capable of finding and destroying assigned targets at any given time. The consequences of this fact were far-reaching.

Indeed, claimed Lt. Gen. Hoyt S. Vandenberg, "Reliance on visual bombing could be discarded altogether." Vandenberg, in a 1946 memorandum to Lt. Gen. Ira C. Eaker, maintained that "accurate radar bombing can and must be attained and relied upon as a primary method of dropping."

Motive and Means

The means to carry out realistic radar bombing training was developed at the end of the war. An experimental radar station in Jacksonville, Fla., proved that bombing missions could be run against specific targets with the projected impact point of the bomb accurately plotted.

The success of the experimental site at Jacksonville led directly to the establishment of radar bomb scoring (RBS) sites near five other cities—Fort Worth, Tex., Kansas City, Mo., Albuquer-

B-17s fly over Neumunster, Germany, on April 8, 1945.

que, N.M., Los Angeles, and Omaha, Neb. With these sites in operation, it became possible to conduct realistic but economical bombing training in peacetime.

Strategic Air Command was created in 1946. During its first year of existence, SAC crews made 880 bomber runs specifically for the purpose of radar scoring. SAC was in rough shape: Morale was low, maintenance and crew readiness were poor, and SAC bombing was deplorably inaccurate.

On April 30, 1948, Vandenberg, by then a four-star general, was named Chief of Staff of the Air Force. Vandenberg soon asked retired Col. Charles A. Lindbergh, the pioneering aviator, to survey all aspects of SAC operations and propose ways to boost the command's combat readiness.

Once he had completed his survey, Lindbergh produced a lengthy list of ways to improve things. He suggested recognizing crew duty as a career field; emphasizing crew integrity; reducing the training of crew members to perform other duties (i.e. pilot, navigator, bombardier, radar operator, and flight engineer duties); more realistic peacetime bombing missions; and improving living conditions for SAC personnel.

Lindbergh's recommendations were avidly embraced by SAC's second commander in chief, Gen. Curtis E. LeMay, who took command in October 1948. Three months after his elevation, LeMay ordered a mock generation of the entire command for the purpose of mounting a simulated bomb attack in the vicinity of Wright-Patterson AFB, Ohio. The bombing results were extremely poor, with an average bombing error of 10,900 feet.

LeMay was determined to correct this shortcoming. He directed the establishment of a combat crew training school whose purpose was to train lead crews that would then train others. All crews other than lead crews were required to fly several radar bombing missions a week. Training became more realistic with the addition of combat breakaways and electronic countermeasure jamming.

In 1948, SAC crews turned in more than 12,000 radar bomb scoring training runs. The next year saw the number of RBS events rise to 28,049, or an average of about 76 runs per day. As a result of this new emphasis on realistic, radar supported bomb practice, errors decreased in dramatic fashion.

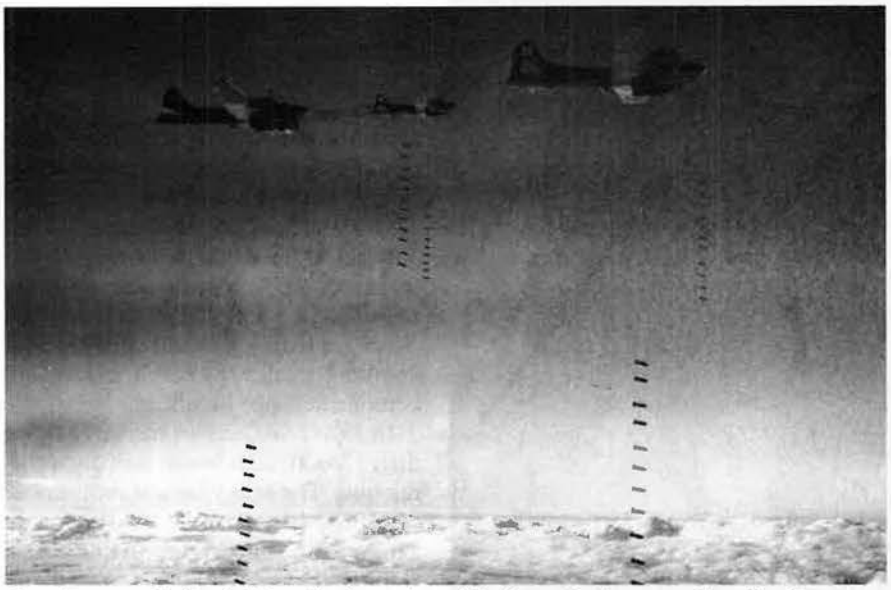
(For a contemporary account of such a radar bombing training event, see "SAC's Achilles Heel," by John G. Norris, in the April 1956 issue of *Air Force* Magazine. It is available online at http://www.afa.org/magazine/April1956/0456achilles.asp.)

Back to the Past

Soon came a test of the SAC force. On June 25, 1950, communist North Korea invaded South Korea, suddenly thrusting SAC crews—which had trained principally for atomic war—into a fast-moving conventional conflict featuring World War II-style daylight formation-bombing tactics. Even so, SAC bombers quickly destroyed all the North Korean strategic targets, and, in October, two B-29 groups were sent home while two other Stateside groups remained in the Far East.

In August, three bomb scoring detachments arrived in Korea, and soon they were in Pyongyang directing American attacks against Chinese forces that had entered the war. Following the withdrawal of UN forces from the North in early 1951, RBS detachments were assigned to each of the three Army corps, where they directed bomb drops in support of tactical forces.

These detachments guided the bomb drops of all of the military aircraft arrayed along the line of conflict. The ground-based radars would pick up the incoming bombers, and controllers would use landmarks to "talk" pilots to their bomb-release points. These RBS-directed drops were critically



Over Europe, B-17s (pictured) often missed their marks because the attacking bombers had to contend with obscured targets and enemy attack. Radar bomb scoring eliminated the need to see the target.

important in helping to turn back the Chinese attacks against Heartbreak Ridge and the Punch Bowl while the armistice talks were going on.

Following the end of combat in Korea, SAC expanded once again, and, by 1964, the command's striking force consisted of 1,111 bombers and 831 intercontinental ballistic missiles. For well over a decade, SAC trained for a nuclear war, but soon it was directed to provide conventional bombing support in South Vietnam.

Once again, there was no relationship between SAC's regular peacetime training and what it was directed to do in combat.

Initially, B-52s were used to bomb suspected Viet Cong jungle bases in South Vietnam. The rain of bombs from the B-52s devastated the countryside and led to the bombers being called "Monkey Killers" and "Toothpick Makers." To hit a target, the B-52 required an identifiable aiming point. Unfortunately, in South Vietnam, there were only a few readily identifiable aiming points in the jungle.

When they lacked natural aiming points, the B-52s often would turn to what was called an "offset aiming point," or OAP. An OAP was a nearby, clearly identifiable point that could be used for synchronization. Distance and direction from the OAP to a target would be set in the bombing computer—the run would be made on the aiming point, and the bombs would fall on the target. A low-powered radar beacon on a known location also could be used as an OAP in the absence of any identifiable targets.

The mission of the RBS sites changed during Vietnam as the purpose evolved from scoring bomb runs to directing aircraft bomb drops even when visual reference points were not available.

Doing this required a reversal of the training process. Radar was used to track a bomber's position relative to a desired release point. Ground controllers could direct the aircraft and order weapons release even if the crew had no view of the landscape or the target. Accuracy was much improved, even compared to the RBS operations in Korea.

Sky Spots

By 1967, the Air Force deployed to South Vietnam and Thailand six RBS sites called Sky Spots, each equipped with MSQ-77 radars. These sites provided RBS coverage over all of South Vietnam, the eastern part of Cambodia, southern Laos, and the southern part of North Vietnam. Sky Spot could accurately direct bomb drops against targets at a distance of 200 miles.

The sites were critically important in directing strikes at night, in inclement weather, and in support of Special Forces camps and friendly outposts. Sky Spot was at times the only means of providing air support to friendly forces under attack. In adverse weather, F-4s, F-100s, and A-4s, none of which had a ground target acquisition radar, had to rely on Sky Spot to get the kind of information they needed to hit their targets.

The F-105s and F-4s that flew over North Vietnam also lacked an all-weather bombing capability, and, as a result, the North could not be bombed with any degree of accuracy during the monsoon season.

To overcome this shortcoming, Gen. Hunter Harris Jr., Pacific Air Forces commander, obtained permission to install a TSQ-81 radar (a transportable version of the MSQ-77) in Laos.

The site selected was atop the Phou Pha Thi ridge, known as Lima Site 85, where a tactical aircraft navigation system was located. The site was 15 miles from the North Vietnamese border, and radar there offered the proximity and clear line of sight that would make it possible to accurately bomb Hanoi from high altitude in any type of weather. (See "The Fall of Lima Site 85," April, p. 66.)

In Vietnam, new radar systems allowed fighters without ground target acquisition radars, such as this F-100, to accurately provide air support. Sky Spot would track the attack aircraft's position relative to a desired release point.

Photo courtesy of retired Col. Gerald Clayton

During the 1968 Tet Offensive, the communist forces sought to inflict a Dien Bien Phu-style defeat on the Marine garrison at Khe Sanh. The inclement weather favored the NV in their quest.

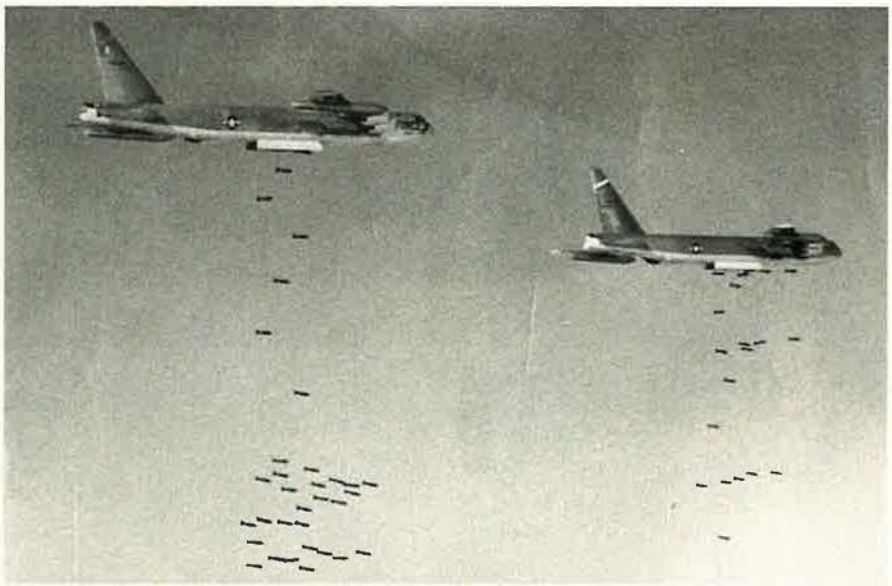
Sky Spot, in coordination with the B-52s, helped prevent the North Vietnamese Army from achieving its goal. Initially, B-52 crews were not allowed to drop bombs within 3,000 yards of any friendly force. Sky Spot allowed the Air Force to shrink this margin of safety to 300 yards. (See "Airpower at Khe Sanh," August 1998, p. 82.)

B-52s flew 2,548 sorties and dropped 54,000 tons of explosives on the North Vietnamese forces that surrounded the marines. In an address to 3rd Air Division personnel on Guam, Army Gen. William C. Westmoreland, commander of forces in Vietnam, stated, "The thing that broke their back, basically, was the fire of the B-52s." Those giant bombers were greatly aided by Sky Spot.

In the spring of 1972, North Vietnam hoped to achieve a major military victory over the South by attacking Quang Tri and Kontum Provinces. Once again the B-52 was called on to provide close air support. Gen. John W. Vogt Jr., 7th Air Force commander, stated that the B-52 was "absolutely central" to the successful defense efforts against the invading forces. He added that its massive firepower "made the difference" in such key areas as An Loc and Kontum.

As at Khe Sanh, it was the coordinated efforts of B-52s aided by Sky Spot targeting that provided the big stick.

Following the failure of the North Vietnamese invasion of the South in the spring of 1972, President Nixon hoped that peace talks might be rapidly concluded. However, he recognized that Hanoi might be more inclined to protract the talks rather than end them.



Transportable TSQ-81 systems (top) provided radar tracking coverage over the Hanoi area. This allowed B-52s (above) to accurately strike targets and minimize collateral damage by flying to specific bomb drop locations.

Radar Reconnaissance

In August, a B-52 escorted by F-4 Phantoms flew a radar reconnaissance mission over Hanoi. The mission was to obtain radar footage of suitable aiming points that would be used in a bombing campaign against the military targets around the capital city.

The Linebacker II campaign kicked off on Dec. 18, 1972. Three bombers were lost on the first day. (See "Linebacker II," November 1997, p. 50.) All went well the second day. On the third day, two B-52Ds and four B-52Gs were shot down, and other B-52s were severely damaged. The predictable bomber stream made the B-52s sitting ducks for the North Vietnamese SAMs.

On the fourth day, tactics were changed. Hanoi would be attacked from all directions at once, with greater use of chaff and including more supporting tactical aircraft. The changes brought success.

Despite defects in mission planning, the bombing results were spectacularly successful. The aiming points identified as a result of the August reconnaissance mission enabled the B-52 bombardiers to find and hit their assigned targets. Collateral damage was held to a minimum.

The shortcomings revealed during Linebacker II partly led to establishment of the Red Flag training program, the objective of which was to provide greater realism to peacetime training. Brig. Gen. James R. McCarthy (now retired), who served as a B-52 mission commander in Linebacker II, later judged a low-level B-52 Red Flag mission as being 75 percent realistic.

That peacetime preparation is a far cry from what it used to be, and the shift toward realistic training tactics all began with radar bomb scoring after World War II. ■

Sigmund Alexander, a retired colonel, is a former B-47 navigator and past president of the B-47 Stratojet Association. This is his first article for Air Force *Magazine.*

Finding and marking targets was dangerous business, as Charlie Neel and Guy Gruters learned firsthand.

A Day in the Life of the Misty FACs

By Rick Newman and Don Shepperd

Photo courtesy of Don Jones

The Mistys in 1967 pause for a photo in front of an F-100F. Guy Gruters (standing, third from left) and Charlie Neel (kneeling, second from left) were on a top secret mission that year when they were both shot down over the South China Sea, only a few hundred yards from the shore of North Vietnam.

It was a true odd couple walking out to the F-100F on the tarmac at Phu Cat AB, South Vietnam, on Nov. 8, 1967. Air Force Capt. Guy D. Gruters was a hulking athlete—six feet three inches, 205 pounds, almost all muscle. At the Air Force Academy, he had been a member of the Judo Club, and he was as aggressive in the cockpit as his fearsome visage suggested. Yet Gruters was also quiet and religious and gentle as a lamb when not flying.

Capt. Charlie Neel, on the other hand, was small and scrappy, so short that, when he applied for entrance to the Air Force Academy, he had put layers of clear tape on the bottom of his feet to boost his height by one-sixteenth of an inch in order to reach the minimum requirement. Squadron mates liked to joke that Charlie was the only pilot who had to get a 10-yard running start to jump onto the first rung of the aircraft cockpit ladder. Yet Charlie always managed to leave an impression.

Their mission was top secret. Gruters and Neel were part of what was known as Operation Commando Sabre, formed at the direction of 7th Air Force in the summer of 1967. At that time, the group's membership numbered only about 12 aviators and a couple of intelligence officers. It quickly became known as "Misty," the call sign the pilots used, chosen because the Johnny Mathis song by that name was a favorite of the unit's first commander.

Misty had been developing a repu-

tation for aggressive, dangerous, and highly successful flying. The Mistys were forward air controllers, flying extended sorties of four hours or more over the Ho Chi Minh Trail that snaked from North Vietnam through Laos and into South Vietnam and Cambodia. (See "The Ho Chi Minh Trail," November 2005, p. 62.) The Misty airmen were looking for any scrap of war materiel being moved south. When they found targets, they would "mark" them with white phosphorous "Willie Pete" rockets, then call in attack aircraft with the invitation to "hit my smoke."

This particular job used to belong to pilots flying slow-moving prop airplanes such as the O-1 "Bird Dog," but, as the North Vietnamese air defenses thickened, the slow movers were getting blown out of the sky. Fast movers were needed, and that marked the birth of the Mistys.

Volunteers Only

Even so, the job was still risky. Maj. George E. Day, who formed the unit and was its first commander, had already been shot down and captured. (See "The Strength of Bud Day," December 2005, p. 50.) Aircraft routinely returned to Phu Cat filled with holes from anti-aircraft artillery fire. Because of the great danger, all the pilots in the small unit had to be volunteers.

Yet the risk of the venture seemed to be paying off. While other units had been turning in vague, probably embellished bomb-damage reports, the Mistys had been able to document truck kills, road closures, and other successes by the dozens.

For the Nov. 8 flight, the diminutive Neel would be in the front seat flying the airplane. As he climbed in, he pressed the electric seat control and cranked it up as high as it would go. In the back, Gruters did the opposite, adjusting the seat to its lowest position. Still, his helmet barely cleared the Plexiglass canopy. As the "guy in back," Gruters would be handling the maps, scouting for targets, and shooting any pictures he could get with the 35 mm camera he carried.

As was often the case, the North Vietnamese jungle looked peaceful and serene from 4,500 feet. The morning fog lingered in a few valleys, but, otherwise, the view was unusually clear. The two pilots peered into the foliage below, scanning the terrain for targets along the trail.

Suddenly Gruters blurted out from the back seat, "Did you see that?"

"What?" asked Neel.

"I don't know," replied Gruters, "but it was something different. A bunch of big low humps covered with what looked like camouflage. Both sides of the road."

The unusual formation described by Gruters was a dead giveaway. Misty operations had taught them both that anything so odd looking—so out of place—in the middle of the jungle had to have some connection to the men and weapons flowing down the trail. They also had learned to play it cool. Instead of swinging around quickly for another look and setting off a swarm of anti-aircraft gunfire, the pilots decided to keep moving away from the target and and come back later.

Best to whistle past the graveyard nonchalantly, thought Neel. Maybe the "gomers"—the bad guys—will think you're just passing by.

When they came around for another pass, Neel flew low—really low—and as fast as possible, to get a good look at the humps and then scramble up and away. With the sun higher, the humps produced fewer shadows and less contrast and were harder to spot. But that first glimpse had helped them know what to look for, and sure enough, there they were—dozens of mounds in the earth that had to be fuel tanks, or bunkers, or huge storage containers of some type, almost completely buried on their sides. Grass and shrubs were thrown on top of them as camouflage. The humps lined both sides of the road, with trees swaying over them, providing more cover.

Could This Be It?

Neel and Gruters were flying near the spot on the map where the trail split into different directions. Intelligence analysts in Saigon had been wondering for months where trucks coming from the North refueled on this part of the trail, and this could be the place. Gruters called in the find to a command and control aircraft, flying in safer skies to the west, and asked them to scramble or divert any available fighters for an impromptu, high-priority attack mission.

If the target turned out to be what they thought it was, it was big enough to justify several hours' worth of bombing.

That done, Neel and Gruters began searching for the inevitable AAA emplacements. On one side of the target area, the two pilots spotted three triple-A batteries, each packing six 37 mm guns. On the other side, they found two identical batteries. That came to a total of 30 guns—a formidable menace to the aircraft. They knew that other, better-hidden anti-aircraft weapons would probably join the fight once the bomb droppers came rolling in. These were serious defenses, they thought, erasing all doubt that there was something very hot below.

Soon, there came onto the scene four Da Nang-based F-4 Phantom fighters—part of a unit known as the "Gunfighters." The Phantoms were laden with bombs. Moreover, another four were on the way. Neel and Gruters would lead the strike, firing smoke rockets at the targets to mark them for the bomb droppers.

Gruters contacted the fighters on the radio and briefed them. "Gunfighters, this is Misty one-one. We've got what appears to be a large fuel storage area on both sides of a north-south road. Lots of guns on both sides. Two sets

Photo courtesy of Don Morse

Visible beneath the wings of this F-100F aircraft are rocket pods, each of which carry seven phosphorous rockets. The phosphorous smoke was used by Misty crews to mark targets over enemy territory.

of 37s on the east side, three on the west. Best bailout is to the east, feet wet." The final two words meant "over the ocean."

From his vantage point in the F-100's front seat, Neel took over. "I'm rolling in for a mark," he told the others. "Keep your eye on me. I'll put down two smokes. Anywhere between the smokes on both sides of the road is OK. Alternate the bombs on both sides. Expect secondary explosions."

Starting the assault on the target, Neel jinked left, then right, to throw off any AAA gunners tracking his airplane. He pulled the nose sharply down toward the target and fired two 2.75-inch white phosphorous smoke rockets. They hit the aim point exactly, and dense smoke gushed up from the ground. It was a perfect mark for the fighters.

Then, Neel pulled out and away hard, with the F-100 fighter rotating into a steep climb. Both pilots groaned as high G-forces crushed them into their seats.

"You're On Fire!"

They were gaining altitude when a sickening "thump" echoed from the belly of the fighter. The aircraft shuddered and several warning lights flared on the instrument panel. One warned "fire," and the other "engine overheat." Acrid smoke and fumes filled both cockpit areas. They had been hit, probably by an unseen 37 mm gunner directly beneath them.

The nearby Phantom pilots spit out urgent radio calls: "Misty, you're on fire! Get out!"

"Don't listen to them, Guy," Neel said. "Let's stay with it to the coast."

The two pilots weren't about to bail out into the hostile nest of North Vietnamese gunners and other angry troops that they had just attacked. There was a chance they could make it to the water and eject feet wet, where a rescue should be far easier.

In back, Gruters said nothing, his silence signaling he agreed with Neel about the course to take. "Stow your stuff," said Neel. "Put your glasses in your pocket." Both pilots wore eyeglasses that, unless removed, could puncture their eyes during ejection. They pushed their helmet visors down, preparing to punch out. Neel coaxed as much altitude as he could out of the damaged aircraft for the short ride east to the water. "Come on, baby, hold together for us," he urged. "Don't blow yet!"

More warnings came over the radio. "Misty, you're really burning now. Big pieces are coming off. Eject! Eject! Before she blows!"

A 100-foot-long flame trailed the crippled aircraft. Their problems multiplied. Every gunner in North Vietnam seemed to be shooting at them now, hungry to kill a crippled American fighter. Most of the flak fell harmlessly behind, but some shells streaked past the canopy. The shock waves beat against the fuselage. The rounds were coming close.

The water was five miles away. "Oh, baby, just give me a few more seconds," Neel prayed. As the coastline passed underneath, the airplane's controls began to fade. Neel knew they would seize completely once enough hydraulic fluid had spilled out. As the jet started to roll uncontrollably to the left, Gruters, in the back, yanked his ejection seat handles upward.

The canopy flew off. In the front seat, the blowing dust and debris suddenly blinded Neel. He felt the heat and saw the flash as Gruters fired his back-seat rocket. Neel struggled to hold the aircraft level, so he wouldn't slam into the rolling wings or fuselage when the rocket motor beneath his seat shot him out of the cockpit. But the "Hun" stopped responding. It was dead. Neel then pulled his ejection seat trigger.

Gruters soon found himself drifting peacefully toward the ocean. He checked his parachute panels—they were all intact. His inflated life raft hung 15 feet below on a cord. He activated his underarm "water wings" that would keep him afloat despite the 90 pounds of gear he carried on every combat mission, stuffed into every available pocket in his flying suit, G-suit, and survival vest.

Meanwhile, Neel was unconscious. After he punched out, something—probably his 300-pound ejection seat—smacked his head and broke his helmet into two pieces that hung on either side of his head. He was out cold, descending toward the South China Sea, his parachute deployed, only a few hundred yards from the shore of North Vietnam.

Hot Targets

The pilots were still hot targets. North Vietnamese gunners ashore shot at them as they drifted downward. Bullets whipped past, reverberating as they cut through the air. None hit.

Neel awoke about 1,000 feet above the water, his head pounding. "Holy s—!," he thought. "Where am I?" He got oriented just seconds before he hit the water at what seemed like 50 miles per hour. He plunged 30 feet below the surface because he had not inflated his water wings. Moreover, he had failed to take a deep breath before entering the water.

He now had a long swim up, with his gear weighing him down like an anchor. "Dammit, I'll never carry extra s— again," he thought, as he struggled gasping, coughing, and spitting to the surface. He could breathe now, but he was tangled in a web of spaghetti-like nylon parachute shrouds.

The two pilots had splashed down about 200 yards apart, into waters full of sharks and deadly sea snakes. They clambered into the rafts after they

Photo courtesy of Don Jones

Trucks discovered in March 1968 by Mistys Lanny Lancaster and Don Shepperd north of Mu Gia Pass. The attacks that followed destroyed at least 60 vehicles.

disentangled themselves from their parachute lines. The water was choppy and they couldn't see each other above the wave tops, and they practically had to hug their rafts, since the air above them was full of lead.

Despite ejecting successfully from a crippled aircraft, and getting into their life rafts, they were by no means home free. They weren't far from a hostile beach and shore gunners continued to shoot at them, adding mortar rounds to the onslaught. The shells arced in and exploded menacingly close to the rafts. Hot metal fragments flew in all directions.

Neel used his radio to contact the F-4s overhead. He said, "Gunfighters, Misty one-one Alpha. They're shooting at us a lot. Do you have one-one Bravo in sight? Can you give us some help?"

One of the pilots responded, "We have you both."

The contact with the F-4s was a tremendous relief. It meant the Air Force knew they were down and a rescue was under way. One of the F-4s quizzed Neel about the incoming fire. "Where are they shooting from?" he asked.

"Just put something on the beach about 100 yards inland, right opposite us, and I'll talk you into where I think it's coming from," Neel replied.

The Gunfighters bombed the shore area. Smoke obscured the coastline and the firing began to subside. The first set of F-4s left to get gas from a tanker and were quickly replaced by a new flight of four that continued bombing along the beach. Neel listened anxiously on his radio for the rescue helicopters, as the waves and winds pushed both rafts rapidly toward land.

"Hey, That's Me!"

An F-4 rolled in on Neel. He thought it was just making a friendly "keep-up-the-morale" pass to signal that they saw him. The aircraft got closer. Uncomfortably close. The nose of the airplane was pointing right at him, when it suddenly launched two pods of 19 rockets each. The rockets screamed just over Neel's head, their black exhaust blocking his view of the F-4. The airplane pulled out so low it almost hit the water, kicking up ocean spray that blinded Neel in his tiny raft. The aircraft's shock wave tossed the raft like a cork as Neel hung on for dear life.

Neel howled curses into his radio. "Hey, ... that's me in the raft! You're supposed to rescue me, not shoot me."

His rant was interrupted by important news. A transmission came over the radio from one of two "Jolly Green" rescue helicopters: "Misty, this is Jolly. Two birds coming in toward your position now. Get ready!"

A Jolly Green splashed down right behind him in a high-speed water landing and taxied toward the raft. Neel slipped out of his parachute harness as the water spray kicked up by the helo's rotor wash stung his eyes.

A pararescue jumper reached out while the helicopter was still moving, grabbed Neel by the collar of his flight suit, and in one motion yanked him out of his raft and into the chopper. The other Jolly Green picked up Gruters, and the two were reunited at the nearest Air Force base.

On the ramp at Da Nang, they were met by some of the F-4 pilots. Neel asked about the "imbecile" who had nearly killed him with rockets and almost pancaked into the water. It turned out that the Phantom pilot was an old friend, Jerry Nabors. Just after Neel and Gruters had hit the water, the F-4s spotted about a dozen North Vietnamese sampans racing out of the mouth of a river to capture the downed pilots. The F-4s sank four of the sampans near the shoreline, but one had slipped through the air attack unnoticed until it was less than 100 yards from Neel's raft. Neel couldn't see it because of the choppy water, but Nabors could. He blew the sampan out of the water at the last minute, firing from point-blank range, saving both pilots from almost certain capture.

Gruters was badly hurt, and he was whisked to a Navy hospital. Neel was OK, but he had developed a whopping headache, no doubt the result of the bang on his head during ejection.

Up in North Vietnam, meanwhile, the huge stash of valuable fuel, or ammunition, or whatever it was that Neel and Gruters had originally spotted, was gone but not destroyed. Once the two pilots had ejected, the rescue effort had quickly overtaken the strike on the storage containers. The North Vietnamese always had alternate plans when storage areas were discovered, and they promptly moved the containers to new locations.

By the next morning, when other Mistys went to check out the find, there was no sight of the humps Neel and Gruters had seen the previous morning. It was as if they had never existed. ■

Photo courtesy of Don Jones

A Misty F-100F is refueled by a KC-135 during a mission over Vietnam. The Mistys flew aggressive, dangerous, and extended sorties over the Ho Chi Minh Trail, looking for war materiel moving south.

Rick Newman is a former defense correspondent for US News & World Report *and a longtime contributor to* Air Force *Magazine. Air Force Maj. Gen. Don Shepperd retired in 1998 as head of the Air National Guard. He is a CNN military analyst, provides commentary on ABC radio, and flew as Misty 34 during the Vietnam War. This article was adapted from their book,* Bury Us Upside Down: The Misty Pilots and the Secret Battle for the Ho Chi Minh Trail *(Ballantine Books: 2006).*

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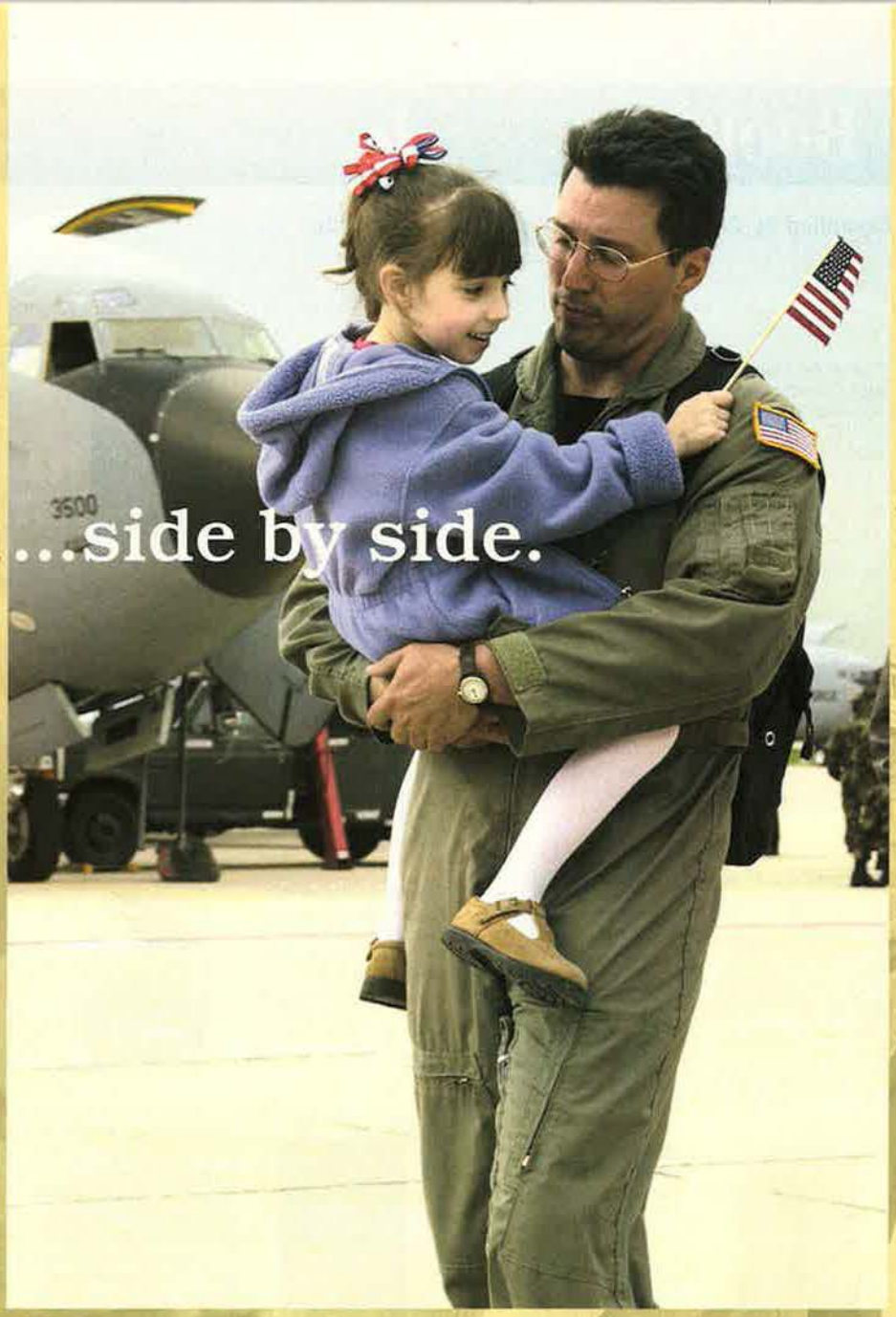

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Books

Compiled by Chequita Wood, Media Research Editor

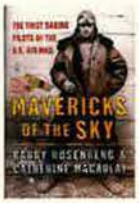
The 467th Bombardment Group (H) in World War II: In Combat With the B-24 Liberator Over Europe. Perry Watts. Schiffer Publishing Ltd., Atglen, PA (610-593-1777). 424 pages. $59.95.

Combat Corpsman: The Vietnam Memoir of a Navy SEALs Medic. Greg McPartlin. Berkley Caliber, New York (800-631-8571). 319 pages. $15.00.

The Long Campaign: The History of the 15th Fighter Group in World War II. John W. Lambert. Schiffer Publishing Ltd., Atglen, PA (610-593-1777). 186 pages. $49.95.

An Ordinary Guy in Extraordinary Times: Memoirs of a WWII Fighter Pilot. Lt. Col. Robert H. McCampbell, USAF (Ret.). SecondWind BookWorks, Ventura, CA (805-650-6998). 288 pages. $18.95.

DEFCON-2: Standing on the Brink of Nuclear War During the Cuban Missile Crisis. Norman Polmar and John D. Gresham. John Wiley & Sons Inc., Hoboken, NJ (800-225-5945). 384 pages. $27.95.



Mavericks of the Sky: The First Daring Pilots of the US Air Mail. Barry Rosenberg and Catherine Macaulay. William Morrow, New York (212-207-7000). 341 pages. $25.95.

Aviation Century: Wings of Change. Ron Dick and Dan Patterson. Firefly Books, Buffalo, NY (519-833-2407). 288 pages. $39.95.

The Dutch Naval Air Force Against Japan: The Defense of the Netherlands East Indies, 1941-1942. Tom Womack. McFarland & Co., Inc., Jefferson, NC (800-253-2187). 207 pages. $35.00.

Realizing the Dream of Flight: Biographical Essays in Honor of the Centennial of Flight, 1903-2003. Virginia P. Dawson and Mark D. Bowles, eds. NASA Center for Aerospace Information, Hanover, MD (301-621-0390). 310 pages. $20.00 (download at http://history.nasa.gov/sp4112.pdf).

Beyond Band of Brothers: The War Memoirs of Major Dick Winters. Maj. Dick Winters with Col. Cole C. Kingseed. Berkley Caliber, New York (800-631-8571). 304 pages. $24.95.

The E-Bomb: How America's New Directed Energy Weapons Will Change the Way Future Wars Will Be Fought. Col. Doug Beason, USAF (Ret.). Da Capo Press, Cambridge, MA (800-371-1669). 256 pages. $26.00.

State and Local Intelligence in the War on Terrorism. K. Jack Riley, Gregory F. Treverton, Jeremey M. Wilson, and Lois M. Davis. RAND, Santa Monica, CA (877-584-8642). 68 pages. $20.00 (download at http://www.rand.org/pubs/monographs/MG394/index.html).

Beyond Shock and Awe: Warfare in the 21st Century. Eric L. Haney with Brian M. Thomsen, eds. Berkley Caliber, New York (800-631-8571). 258 pages. $24.95.

Estimating Terrorism Risk. Henry H. Willis, Andrew R. Morral, Terrence K. Kelly, and Jamison Jo Medby. RAND, Santa Monica, CA (877-584-8642). 66 pages. $20.00 (download at http://www.rand.org/pubs/monographs/MG388/index.htm).

Texas Aggies Go to War: In Service of Their Country. Henry C. Dethloff with John A. Adams Jr. Texas A&M University Press, College Station, TX (800-826-8911). 449 pages. $35.00.

Bury Us Upside Down: The Misty Pilots and the Secret Battle for the Ho Chi Minh Trail. Rick Newman and Don Shepperd. Ballantine Books, New York (800-733-3000). 480 pages. $29.95.

Fly High/Fly Low. Floyd A. Peede Jr. Order from: AuthorHouse, Bloomington, IN (300-839-8640). 128 pages. $16.60.

While They're at War: The True Story of American Families on the Homefront. Kristin Henderson. Houghton Mifflin, Boston (800-225-3362). 317 pages. $23.00.

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For information on the Air Force Association, see **www.afa.org**

AFA National Report

natrep@afa.org

By Frances McKenney, Assistant Managing Editor

A National Conclave

Air Force Association Chairman of the Board Stephen P. "Pat" Condon, Vice Chairman of the Board L. Boyd Anderson, and National President Robert E. "Bob" Largent attended the Arnold Air Society-Silver Wings National Conclave held in April in Lake Buena Vista, Fla.

Arnold Air Society is a college-level honorary service organization for Air Force officer candidates. It is affiliated with AFA. Silver Wings, in turn, is affiliated with AAS and has a similar goal of developing college students into leaders knowledgeable about national defense.

During the two organizations' four-day national convention, the AFA Awards Luncheon had a prominent role. Condon was master of ceremonies for the event, held at the Buena Vista Palace Hotel, and Largent served as guest speaker. He emphasized the mission and goals of AFA and described what the students can do to support Air Force missions and personnel.

Among the awards presented were the Mary Anne Thompson Award, named for a former AFA National Secretary (1994-97), and awards named for W. Randolph Lovelace II, who was AFA Board Chairman 1964-65.

State AFA officials at the gathering were John Timothy Brock, executive VP, Tommy G. Harrison, treasurer, and Richard A. Ortega, aerospace education VP—all from the **Central Florida Chapter.** Ortega reported that the AFA luncheon at the AAS-SW National Conclave drew more than 1,500 guests.

Staff photo by Patrick Reidy

AFA Chairman of the Board Pat Condon, Secretary of the Air Force Michael Wynne, AFA National President Bob Largent, and Executive Director Donald Peterson (l-r) recently attended a joint-services reception on Capitol Hill, meeting members of Congress and professional staff.

Heritage Representative

When **Bill Harris Chapter** officers helped sponsor a dinner in Klamath Falls, Ore., for the visiting head of Air Education and Training Command, Gen. William R. Looney III, they made sure he would meet someone with a special place in Air Force history. They seated one of their "heritage representatives"—Bill Harris—at the general's table.

Chapter namesake Harris is a World War II ace with 16 aerial victory credits. The retired lieutenant colonel was a P-38 pilot in the Pacific Theater, "recognized as the greatest ace of Thirteen Air Force," as Chapter President Curtis A. Waite put it. Harris celebrates his 90th birthday this month.

Looney was in town for two days in March to visit the 173rd Fighter Wing (ANG) at Kingsley Field, where many of the chapter members are stationed. The wing is an F-15 AETC training unit.

Guests at the dinner for Looney included wing members and local community officials, Waite said. Waite added that in his remarks to the audience, Looney paid tribute to Harris, saying it was an honor to sit with such an American hero.

POW Story

Last November, **Cochise Chapter** member David Sanderson III attended a Veterans Day Chamber of Commerce luncheon in Sierra Vista, Ariz., honoring retired USAF Lt. Col. Barry B. Bridger.

An F-4C pilot during the Vietnam War, Bridger had been a POW in North Vietnam from January 1967 to March 1973, most of the time in the prison nicknamed the Hano Hilton.

Before then, he had been Sanderson's pilot training classmate at Webb AFB, Tex., in 1964. The two got together during the Veterans Day 2005 visit and Sanderson invited Bridger to come back to the city, this time under chapter sponsorship and this time to tell his story of survival, faith, and perseverance to JROTC cadets and other young people.

In February, Bridger returned. His first chapter-coordinated presentation was scheduled for JROTC cadets at Buena High School, but Sanderson, who is in charge of Cochise Chapter's special projects, said the school extended the audience to include the sophomore class and students from nearby private schools and a junior college. Sanderson said that, in the end, more than 1,000 students and their parents turned out to hear Bridger speak about his POW experience.

That evening, Bridger addressed a chapter dinner, an event covered by the local newspaper. Sanderson noted that three World War II POWs from three services were in the audience.

The next morning, Bridger went to Davis-Monthan Air Force Base

ANG photo by SSgt. Megan Hunter

SrA. Thomas Seper II prepares to receive an Airman of the Year award from CMSgt. W. Graham Burnley Jr., leadership development VP for the Spirit of St. Louis Chapter, and Brig. Gen. Michael Brandt, commander of the Missouri Air National Guard. See "AOY in Missouri," below.

for another presentation to a packed house.

Celebrity

The high-profile personality for the **C. Farinha Gold Rush Chapter's** annual Celebrity Speaker Luncheon was US Rep. Dan Lungren (R-Calif.), a six-term Congressman and member of the House Budget, Homeland Security, and Judiciary Committees.

For his presentation to the chapter meeting, held in Sacramento in February, Lungren spoke about developing and maintaining a strong military, and providing resources and funding for the Intelligence Community.

More than 135 Air Force, DOD civilian, and local business leaders attended the meeting, reported Richard C. Taubinger, the chapter's leadership development VP. The guests gathered at the former McClellan Air Force Base—now an office park—in what used to be the Officers Club, now ballrooms at the Lions Gate Hotel and Conference Center.

The Celebrity Speaker Luncheon has been a tremendous success for the chapter for three years, Taubinger said.

AOY in Missouri

Six outstanding airmen were honored in March at the 31st annual Airman of the Year banquet sponsored by the **Spirit of St. Louis Chapter (Mo.).**

The award recipients were: MSgt. Angela L. Varvel from the 131st Fighter Wing, Lambert-St. Louis Arpt., Mo.; MSgt. Craig Ploessl and TSgt. Ronnie Dunker, both from the 345th Recruiting Squadron, based at Scott AFB, Ill.; from Jefferson Barracks ANGS, Mo., SMSgt. Michael D. Baker of the 157th Air Operations Group, and SrA. Thomas J. Seper II, 218th Engineering Installation Squadron; and TSgt. Nathaniel R. Looper, from the 7th Civil Support Team, Ft. Leonard Wood, Mo.

In addition, student Rosa Akers received the chapter's Charles DuBois Scholarship of $600. Akers' mother, chapter member MSgt. Christine M. Akers, is assigned to the 131st FW.

The DuBois Scholarship is named for a current chapter member: retired Maj. Gen. Charles H. Dubois, a St. Louis native, World War II ace, and Korean War veteran.

Brig. Gen. Michael G. Brandt, chief of staff and commander of the Missouri ANG, was guest speaker for the event, held at a conference and banquet center. Among the AFA dignitaries that evening were Patricia J. Snyder, state president, and James Snyder, president of the **Harry S. Truman Chapter (Mo.).** St. Louis Chapter President Gary M. Young served as master of ceremonies.

Warthog Airmanship

"Large chunks of her plane shot away, the hydraulic control system dead, Capt. Kim Campbell pushed and pulled at backup manual controls, struggling to keep the antitank aircraft from crashing as it limped away from an ambush over Baghdad."

With this dramatic description, the **Tennessee Ernie Ford Chapter** in Sunnyvale, Calif., announced that the guest speaker for its March meeting would be Capt. Kim N. Campbell.

As an A-10 pilot in April 2003, Campbell was on a close air support mission along the Tigris River when her Warthog was hit by enemy ground fire. She nevertheless managed to fly the damaged aircraft back to Kuwait.

Campbell's airmanship received extensive media coverage, and this is at least the second AFA chapter that she has addressed. This time, she delivered her presentation at the Biltmore Hotel in Santa Clara.

Campbell grew up in San Jose, Calif., where her father, USAF veteran Chuck Reed, is a city councilman. He introduced her at this chapter meeting.

According to Chapter President John K. Barbour, "Kim is a particularly effective speaker and an excellent example of what young people can accomplish, particularly in the USAF." Campbell is now assigned to the 422nd Test and Evaluation Squadron at Nellis AFB, Nev., and is a member of the **Thunderbird Chapter.**

New Chapter, New Leaders

In March, one of AFA's newest chap-

AFA Conventions

June 3	**Alabama State Convention,** Montgomery, Ala.
June 9-10	**New York State Convention,** Hammondsport, N.Y.
June 16-17	**Oklahoma State Convention,** Oklahoma City
July 14-15	**Florida State Convention,** Fort Walton Beach, Fla.
July 21-23	**Texas State Convention,** Houston
Aug. 5	**Georgia State Convention,** Warner Robins, Ga.
Aug. 9	**Michigan State Convention,** Mt. Pleasant, Mich.
Aug. 11-12	**Colorado State Convention,** Pueblo, Colo.
Aug. 19	**Indiana State Convention,** Indianapolis
Aug. 26	**California State Convention,** Ontario, Calif.
Aug. 26	**Midwest Region Convention,** Galesburg, Ill.
Aug. 26	**North Carolina State Convention,** Raleigh, N.C.
Sept. 22-24	**AFA National Convention,** Washington, D.C.
Sept. 24-27	**Air and Space Conference,** Washington, D.C.

AFA In Action

The Air Force Association works closely with lawmakers on Capitol Hill, bringing to their attention issues of importance to the Air Force and its people.

Hill Staffers Learn About the KC-135

AFA and the Air Force Office of Legislative Liaison recently gave Congressional staffers the chance to visit the 459th Air Refueling Wing at Andrews AFB, Md. The visitors learned about the aerial refueling mission undertaken by the Air Force and met airmen who fly, maintain, and support KC-135 tanker aircraft.

ters held its first elections, where the founding officers made preparations to turn over the reins this fall to new leaders.

Langford Knight was voted president of the **Meridian Chapter (Miss.).** Now the founding treasurer, he will begin serving as president in September, along with Mel Scarborough, VP, Tom Williams, re-elected as secretary, and Bradley Crawford, treasurer.

Located in central Mississippi, 16 miles from the Alabama border, the Meridian Chapter received its charter in 2005, with Roy P. Gibbens as president and Sam Forbert as VP. The chapter had 55 members. Gibbens had worked for two years in establishing the group. He said he was motivated because the Navy facility in Meridian has strong community support, and he wanted to muster similar backing for the Air National Guard's 186th Air Refueling Wing at Key Field. He explained that the chapter held early elections to broaden participation as quickly as possible.

Among the 73 guests at the March meeting, held at a country club, were Brig. Gen. Erik Hearon, the state's new ANG chief of staff. Also on hand: AFA Mississippi State President Leonard Vernamonti and current and prospective Community Partners.

The audience listened to short briefings about military units in the area. Representatives from these organizations covered the 186th ARW; its support units such as the 238th Air Support Operations Squadron and 248th Air Traffic Control Squadron; three Army National Guard units that had just returned from Iraq; and the Civil Air Patrol.

Welcome the Newcomers

At its March meeting, the **Southern Indiana Chapter** in Bloomington highlighted the area's newest AFJROTC unit, from Owen Valley High School in Spencer, Ind.

Chapter member Dave Allen, a retired lieutenant colonel, is the senior aerospace science instructor at the unit, which was then completing its first year. Seven cadets joined him at the chapter meeting. They were formally introduced to the gathering and conducted a flag folding ceremony that merited a standing ovation, according to Chapter President Marcus R. Oliphant.

The chapter presented $250 to the JROTC unit.

Saluting the ANG

The **Donald W. Steele Sr. Memorial Chapter** held a Salute to the Air National Guard, with Lt. Gen. Daniel James III, ANG director, as guest speaker.

Nearly 200 guests, including Guard personnel and defense industry representatives, gathered at the Officers Club at Ft. Myer, Va., for this fourth ANG recognition banquet and awards ceremony.

After recapping the Guard's recent accomplishments, James joined CMSgt. Richard A. Smith, who is the command chief master sergeant for the bureau, and Chapter President George DeFilippi in presenting awards. Twenty outstanding officer and enlisted airmen were honored as ANG Action Officers of the Year.

Chapter VP Tom Veltri organized this salute, rounding up support from 36 companies as co-sponsors of the event and organizing local Civil Air Patrol cadets to handle registration.

More AFA News

■ The **Carl Vinson Memorial Chapter** donated $1,500 to the Museum of Aviation in Warner Robins, Ga., in March, in support of the museum's Young Astronauts Day. SMSgt. Eric Miller, chapter 2nd VP, joined Maj. Gen. Michael A. Collings, then commander of Warner Robins Air Logistics Center, Ga., in presenting the donation. ■

Reunions

reunions@afa.org

1st Air Commando Assn (WWII), Burma, China, India. Sept. 1-4 at the Grand Hyatt Tampa Bay Hotel in Tampa, FL. **Contact:** Morris Zalmanovich, 26900 Forest Hills St., Leesburg, FL 34748 (352-365-9564).

1st Fighter Assn, including current 1st FW personnel. Sept. 10-14 at the Radisson Hotel in Hampton, VA. **Contact:** Alfred Eberhardt, 615 Willow Valley Lakes Dr., Willow Street, PA 17584 (xp38pilot@yahoo.com).

4th Fighter-Interceptor Wg Assn (Korean War). Oct. 4-7 in San Antonio. **Contact:** John Drucker, PO Box 2281, Red Bank, NJ 07701 (732-933-1030).

8th Air Force Historical Society, Pennsylvania Chapter. June 24-27 at the Days Inn in State College, PA. **Contact:** Fielder Newton, 3301 Shellers Bend #914, State College, PA 16801 (814-235-0889).

10th Security Police Sq. Aug. 25-27 in Branson, MO. **Contact:** Wayne Guidry (www.10thsecuritypoliceassoc.com).

12th BG, 12th TFW, 12th FTW. Sept. 14-18 at the Fairview Marriott in Falls Church, VA. **Contacts:** For 12th BG, Mary Bushnell, 1000 Ferndale St. S., Maplewood, MN 55119 (651-739-0051) (mhbushnell@aol.com) or for 12th TFW/FTW, Wilbur Anderson, 270 Airport Rd., Pikeville, NC 27863 (919-736-3711) (wanderson6@nc.rr.com).

27th Air Transport Gp, including 310th, 311th, 312th, and 325th Ferrying Sqs; 86th, 87th, 320th, and 321st Transport Sqs; and 519th and 520th Service Sqs. Sept. 25-28 in Las Vegas. **Contact:** Fred Garcia, 6533 W. Altadena Ave., Glendale, AZ (623-878-7007).

28th MAS/LSS, Hill AFB, UT. Sept. 1-3 at Aerospace Museum/Marriott Hotel. **Contact:** Jim Thurell, 5460 S. 150 E., Ogden, UT 84405 (801-475-9690).

36th TFW and 525th TFS, Bitburg, Germany (1961-72). Sept. 22-26 at the Marriott Evergreen Resort in Atlanta. **Contact:** Gene Maddox (404-406-2768) (twomadkats@aol.com).

39th Troop Carrier Assn, all TCS, TAS, and AS members from WWII to present. Sept. 7-10 at the Crowne Plaza Hotel in Herndon, VA. **Contacts:** Harry Biser (910-764-3437) (bwbiser@aol.com) or Thomas Sparr (636-441-3283) (tsparr@mail.win.org).

43rd BG. Aug. 23-28 in Branson, MO. **Contact:** Victoria Anderson, Branson Hospitality, Inc., PO Box 1167, Branson, MO 65615 (800-877-8687, Ext. 102).

44th SMW/44th MIMS Sq, Ellsworth AFB, SD (1962-70), including all Minuteman I and Titan I personnel. Sept. 12-16 in Rapid City, SD. **Contact:** Roy Gordon, 1442 E. Vogel Ave., Phoenix, AZ 85020 (phone: 602-944-7826 or fax: 602-944-8082) (smithleeroy@yahoo.com).

48th FS, FIS, and FTS. Sept. 20-24 in Dayton, OH. **Contact:** Joe Onesty, 455 Galleon Way, Seal Beach, CA 90740-5937 (562-431-2901) (jonesty2@adelphia.net).

50th FBW, Clovis-Hahn-Toul. Sept. 28-Oct. 1 in Hampton, VA. **Contact:** Fred Crow, PO Box 5403, Williamsburg, VA 23188 (757-345-0922) (fredcrow@cox.net).

55th Strategic Reconnaissance Wg Assn. Sept. 20-24 at the Embassy Suites, Downtown/Old Market in Omaha, NE. **Contact:** Jim Thomas, 4418 Anchor Mill Rd., Bellevue, NE 68123 (jthomas927@aol.com).

57th BW Assn of WWII, including all B-25 units in the Mediterranean Theater. Oct. 12-16 at the Crowne Plaza & Conference Center in Herndon, VA. **Contact:** Bob Evans, 1950 Cunningham Rd., Indianapolis, IN 46223-5341 (317-247-7507).

58th FG (WWII) including 69th, 310th, and 311th Sqs; **58th Fighter-Bomber Wg/Gp** (Korea); **474th Fighter-Bomber Gp** (Korea), including 428th, 429th, and 430th Sqs; and **210th Mexican FS** (WWII). June 6-11 at the Holiday Inn Central Convention Center in Omaha, NE. **Contact:** Jean Kupferer, 2025 Bono Rd., New Albany, IN 47150 (812-945-7649) (jkupferer@insightbb.com).

61st FIS, Newfoundland (1950s). Sept. 7-9 in Branson, MO. **Contact:** Charles Christianson, PO Box 326, Monticello, MN 55362 (phone/fax: 763-295-2861) (cncask4it@tds.net).

64th TCG. Sept. 27-30 in Ogden, UT. **Contact:** Kay Stowell, 2622 N. 1125 E., Ogden, UT 84414 (801-782-2008).

75th Air Depot Wg, Korea (1952-55). Sept. 7-10 in Springfield, IL. **Contact:** Walker Walko, 13616 Paradise Villas Grove, Colorado Springs, CO 80921 (719-488-1106) (wawlaw2@juno.com).

99th BG (WWII). Sept. 24-28 in Las Vegas. **Contact:** Henry Fouts, 777 Tiffany Bend St., Las Vegas, NV 89123-0629 (702-320-9784) (hsfouts@cox.net).

306th BW, McCoy AFB, FL. Sept. 11-17 in Savannah, GA. **Contact:** Joe Demes, 1585 Mercury St., Merritt Island, FL 32953 (321-452-4417) (http://306thbw.org).

309th Sq (WWII). Sept. 7-10 in St. Louis. **Contact:** Dalton Smith (201-385-4950).

322nd FIS, Kingsley Field, OR. Sept. 29-Oct. 1 in Klamath Falls, OR. **Contact:** Dick Carter, PO Box 292, Pacific City, OR 97135 (503-965-6694) (spad2@oregoncoast.com).

329th FIS. Oct. 24-26 at the El Dorado Hotel in Reno, NV. **Contacts:** Jim Geddes (808-742-6908) (geddesj001@hawaii.rr.com) or Joe Hitch (910-346-9661) (joe.hitch@sbcglobal.net).

361st FG Assn (WWII), Belgium, England, France. Sept. 12-14 at the Marriott Riverfront Hotel in Savannah, GA. **Contacts:** Dave Landin, 8419 Michael Rd., Richmond, VA 23229 (804-288-5889) (david.c.landin@verizon.net) or William Sreet Jr., 1103 Henry Dr., Alabaster, AL 35007 (205-663-0326) (wildbillstreet@bellsouth.net).

366th Fighter Assn. Sept. 7-10 in Philadelphia. **Contact:** John France, 2301 St. Claire Dr., Arlington, TX 76012 (817-860-2780) (luv_2_fly@sbcglobal.net).

376th BG (WWII), N. Africa, Italy. Sept. 5-10 at the Wichita Marriott Hotel in Wichita, KS. **Contact:** Charles Andrews, 500 Maona Ave., Fond du Lac, WI 54935 (920-921-0696) (candrews@milwpc.com).

388th FBW, Clovis, NM, and Etain, France. Oct. 5-8 in Kansas City, MO. **Contact:** J. Blumer, 4813 Jarboe St., Kansas City, MO 64112 (816-531-4050).

390th BG Veterans Assn (WWII), Eighth AF, Station 153, Framlingham, England. Sept. 26-30 in Louisville, KY. **Contact:** Ken Rowland, PO Box 28363, Spokane, WA 99228-8363 (phone: 509-467-2565 or fax: 509-467-4707) (rkenrow@msn.com).

435th TCG, including Hq and 75th, 76th, 77th, and 78th TCSs (WWII). Sept. 27-30 at the Hilton Airport Hotel in San Antonio. **Contact:** Al Forbes, 1614-B Berwick Ct., Palm Harbor, FL 34684 (727-785-6075) (for76tcs@aol.com).

454th BS, 323rd BG. Oct. 2-5 in Las Vegas. **Contact:** Frank Johnson (630-355-5273) (fjoh910@aol.com).

610th, 618th, and 850th AC&W Sqs, 527th AC&W Gp, and 43rd Air Div, Itazuke AB, Japan. Sept. 25-28 in Pigeon Forge, TN. **Contact:** John Rosso (661-832-6036) (godfather1501@hotmail.com).

7330th FTW (MAP), Furstenfeldbruck, Kaufburen, and Landsberg ABs, Germany (1953-60). Oct. 4-8 in Hot Springs, AR. **Contact:** Tom Hotman, 56 Saldana Way, Hot Springs Village, AR 71909 (501-915-8365) (tghotman@hsnp.com).

AC-119 Gunship Assn. Sept. 29-Oct. 1 at the Elegante Hotel & Convention Center, Albuquerque, N.M. **Contact:** Steve MacIsaac (colmacmac@mac.com).

B-26 Marauder Historical Society (WWII), all B-26 Martin Marauder members and units. Aug. 23-26 in Dayton, OH. **Contact:** MHS Headquarters (520-322-6226) (admin@b-26.org).

Berlin Airlift Veterans Assn (1948-49). Oct. 2-5 in Albuquerque, NM. **Contact:** J.W. Studak, 3204 Benbrook Dr., Austin, TX 78757 (512-452-0903).

Colorado ANG Reunion. Aug. 4-5 at Buckley AFB, Colo. **Contact:** 140 WG/CCS, 140 South Aspen St., Stop 37, Buckley AFB, CO 80011 (720-847-9842 or DSN 847-9842) (reunion@cobuck.ang.af.mil).

Malden AFB, Mo., including civilians. Sept. 14-16. **Contact:** R. Thorpe (608-676-4925).

Pilot Class 49-B. Oct. 28-30 in Phoenix. **Contacts:** Jack Stolly (972-681-8290) (flyingjack@juno.com) or John Miller (cmdor@earthlink.net).

Pilot Class 54-K. Sept. 11-14 in Branson, MO. **Contact:** R. Thorpe, 6616 E. Buss Rd., Clinton, WI 53525 (608-676-4925).

Pilot Class 54-M. Aug. 23-27 in Tacoma, WA. **Contact:** Jim Bradley, 22104 177 St. E., Orting, WA 98360 (360-893-6399) (jammar@comcast.net).

Pilot Classes of 1944. Oct. 3-8 in Salt Lake City. **Contact:** Stan Yost, 13671 Ovenbird Dr., Fort Myers, FL 33908 (239-466-1473).

Pilot Training Class 52-F. Sept. 12-14 in Dayton, OH. **Contact:** J.C. Buehrig, 8105 Knottingham Dr., Woodway, TX 76712 (254-399-8308) (jjbuehrig@grandecom.net).

Pilot Training Class 55-A, Marana and Williams AFBs, AZ. September at the Williams Gateway Arpt., AZ. **Contact:** Bob Ginn (520-885-1900) (tbirdip@aol.com).

Pilot Training Class 55-K. Sept. 1-3 at the Gaylord Opryland Hotel in Nashville, TN. **Contact:** Tom Roe (321-777-0219) (rtr2169@aol.com).

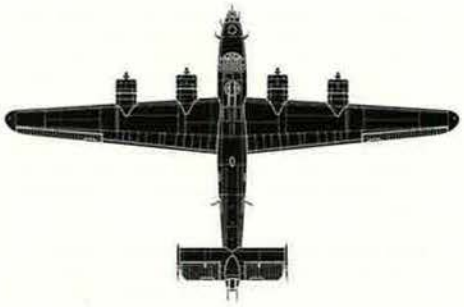
USAF Helicopter Pilot Assn. Sept. 19-22 at the Shades of Green Armed Forces Recreation Center, Walt Disney World Resort, FL. **Contact:** Bob Strout, PO Box 968, Medical Lake, WA 99022 (www.usafhpa.org).

Vietnam Security Police Assn, those who served in Vietnam and Thailand during the Vietnam War, including augmentees. Oct. 4-8 in Las Vegas. **Contact:** Don Graham, 2911 Westminster Rd., Bethlehem, PA 18017 (610-691-6960) (tuyhoa68@att.net) (www.vspa.com). ■

Airpower Classics

Artwork by Zaur Eylanbekov

B-24 Liberator



Before and during World War II, the US built some 18,000 B-24 Liberators—more than any American warplane in history. It was effective as well as numerous. The B-24 served with distinction in every theater of the war, operating not only as a bomber but also as a reconnaissance aircraft (the F-7), transport (the C-87), antisubmarine patrol airplane (the Navy PB4Y), and aerial tanker (the C-109). The Liberator was used by virtually all Allied air services.

The US Army wanted Consolidated to build Boeing B-17s under license, but company president Reuben Fleet declined. He offered a more modern bomber, and he moved fast. Design began in January 1939, a contract was signed March 30, and the XB-24 made its first flight on Dec. 29, 1939. Designer Isaac M. Laddon adopted the new high-lift, low-drag Davis wing, a tricycle landing gear, and a twin-tail layout. In time, Consolidated had two production lines, and Ford, Douglas, and North American had one each. Ford, at peak production, turned out a B-24 every 63 minutes.

US B-24s entered combat in June 1942 when 13 of them raided Romania's Ploesti oil fields. On Aug. 1, 1943, 177 B-24s once more attacked the heavily defended Ploesti fields—an action for which five airmen received Medals of Honor. This operation was the Army Air Forces' first large-scale, low-altitude bomber raid on a stongly defended target.

While effective in Europe (especially over the North Atlantic, where it helped silence the U-boat menace), the B-24 made its mark in the Pacific. Liberators first saw action Nov. 16, 1943 at Bougainville and played a major role thereafter. In the Pacific, the B-24's range and bomb-carrying capacity made it the preferred bomber until the arrival of the B-29. By then, the Liberator had helped push Japan close to defeat.

—Walter J. Boyne

This aircraft: B-24D Liberator #41-24226—*Joisey Bounce* (formerly, *Utah Man*)—as it looked in fall 1943. It flew in the Aug. 1, 1943 raid on the oil installations of Ploesti, Romania, and was lost in November 1943 action over Bremen, Germany.

In Brief

Consolidated design ★ built by Consolidated, Douglas, Ford, North American ★ first flight 1939 ★ crew 8 to 10 ★ four radial engines ★ number built 18,482 ★ **Specific to B-24H/J:** max speed 290 mph ★ cruise speed 215 mph ★ max range 2,100 miles (loaded) ★ armament 10 .50-cal machine guns ★ bomb load 8,800 lb ★ weight (normal loaded) 65,000 lb ★ span 110 ft ★ length 67 ft 2 in ★ height 18 ft.

Famous Fliers

Eight Medal of Honor recipients: Lt. Col. Addison Baker, Maj. Horace Carswell Jr., 2nd Lt. Lloyd Hughes, Maj. John Jerstad, Col. Leon Johnson, Col. John Kane, Lt. Col. Leon Vance Jr., and Navy Lt. Cmdr. Bruce Van Voorhis ★ Actors James Stewart and Tyrone Power ★ Col. Harry Halverson, leader of first US air attack on Nazi forces in Europe ★ Sen. George McGovern and Sen. (later, Treasury Secretary) Lloyd Bentsen ★ USAF Gen. George Brown, JCS Chairman.

Interesting Facts

Went from contract award to first flight in 9 months ★ 55 variants ★ 1,713 lost in training ★ B-24 *Lady Be Good* missing for 16 years, until wreckage found in Sahara ★ refueled B-17 in tests ★ five Medals of Honor to B-24 airmen in Ploesti raid, most of any USAAF action ★ C-87 variant was to be first Presidential aircraft, but it was never used ★ credited with 72 U-boat kills.

Eighth Air Force B-24s release bombs during a World War II raid in the vicinity of Tours, France.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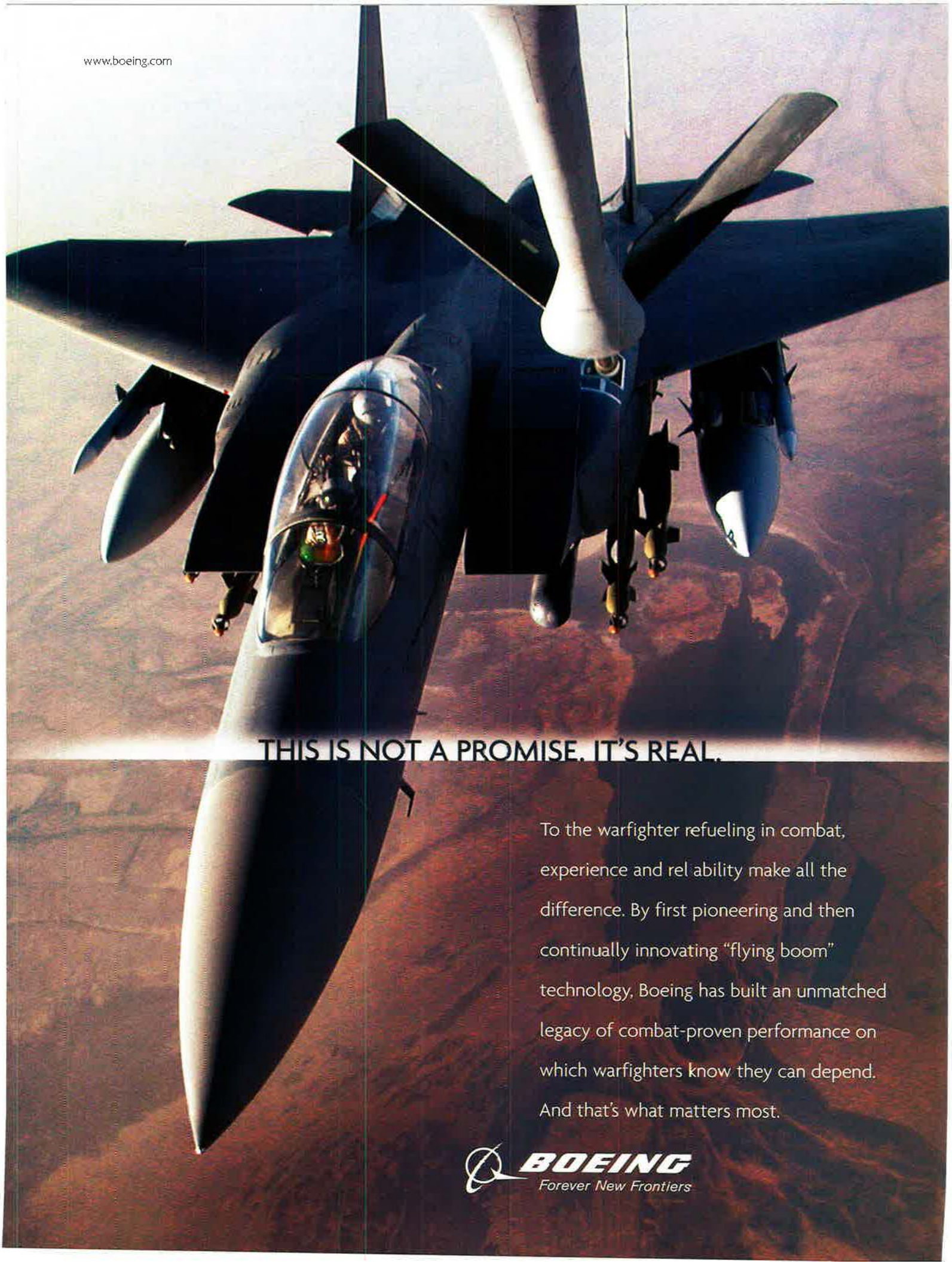
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