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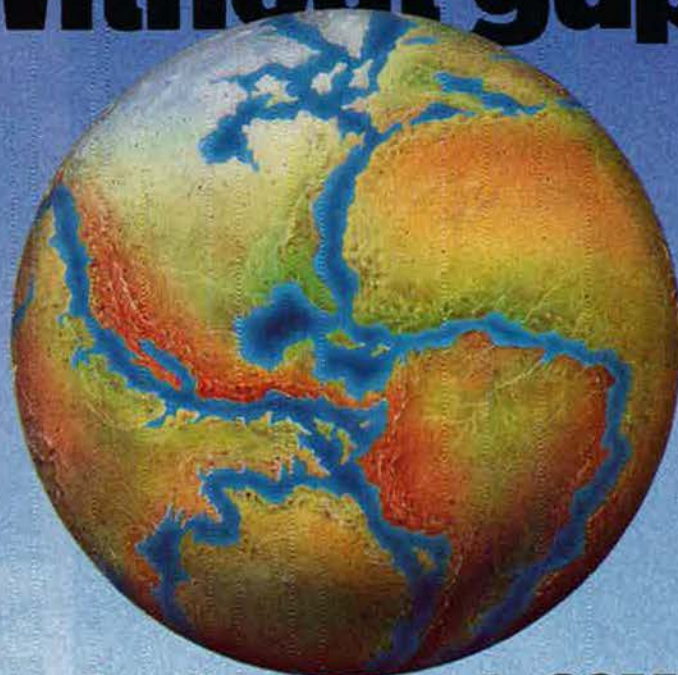
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AIR FORCE MAGAZINE

September 1992, Vol. 75, No. 9

PUBLISHED BY THE AIR FORCE ASSOCIATION

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About the cover: The speed and striking power that made the B-1 pivotal in the SIOF now are being harnessed for conventional missions. With B-52s aging out of the force and the B-2 fleet capped at twenty, the E-1 must shoulder the bulk of the bomber mission. Staff photo by Guy Aceto.

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AIR FORCE Magazine (ISSN 0730-6784) September 1992 (Vol. 75, No. 9) is published monthly by the Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Phone (703) 247-5800. Second-class postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** \$21 per year; \$60 for three-year membership. **Life Membership:** \$400 single payment, \$420 extended payments. **Subscriber Rate:** \$21 per year; \$25 per year additional for postage to foreign addresses (except Canada and Mexico, which are \$8 per year additional). Regular issues \$3 each. Special issues (USAF Almanac issue and Anniversary issue) \$5 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send changes of address to Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air Force Association. Copyright 1992 by Air Force Association. All rights reserved. Pan-American Copyright Convention.

By John T. Correll, Editor in Chief

The Call to Conversion

THE defense business is dropping like a rock. When it finally levels out, according to some estimates, Pentagon procurement may amount to only a third as much as it did in the boom years of the 1980s.

Much of the defense industry would be gone before things sink that far. Prime contractors are already releasing workers by the tens of thousands. Nobody knows for sure how hard the impact has been on small firms in the supplier and subcontractor ranks.

Until recently, the only people worrying about the defense industrial base were those concerned about equipping and sustaining the armed forces. Now, as plants close and jobs disappear, the alarm has spread. The problem has gotten severe enough to cause regional downticks in the economy.

Popular causes need popular titles. The one in fashion for this problem is "conversion." It covers a range of ideas about how the defense industry can convert to civilian production. A host of committees, commissions, and other groups have taken up the banner.

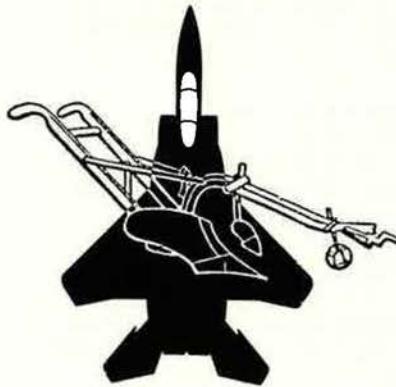
Most of them declare a determination to provide for the industrial needs of defense. Some activists, however, seem more interested in channeling money to a broad "national infrastructure," which can be defined as including almost anything that anybody wants to fund.

There is considerable doubt about the basic concept of conversion. As the committees and commissions have been reminded, there are few examples of industries making the leap successfully from swords to plowshares.

The demobilization that followed World War II has been cited as a model, but as Kenneth L. Adelman and Norman R. Augustine said in *Foreign Affairs* last spring, that was an instance of reconversion. Firms temporarily engaged in defense production went back to their regular prewar product lines.

If the straight swap-out model of conversion is feasible, it might solve some employment and economic prob-

lems, but it does not necessarily cover defense needs. The armed forces are not buying that much at present, but they will have requirements in the future, and they are left in the lurch if the defense industry vanishes.



**It may prove
a bad bargain to trade
all the munitions
plants for dog food
factories.**

The answer to that, supposedly, is generic industries that can swing back and forth between military and civilian output. Like conversion, that is a swell-sounding idea, but we have few examples of such remarkable agility, and the concept is, to put it mildly, unproven.

As new defense systems—when there are any—pass through the development process, steps will be taken to ensure that an industrial base exists to support the acquisition. That

is probably sufficient to provide for planned, peacetime production.

If we accept the peacetime standard, then we must also sign up to the corollary: We can envision no contingency where we cannot prevail on a 100 percent come-as-you-are basis, and, when conflict ends, we can reequip and resupply ourselves back to an adequate defense posture.

Operation Desert Storm lasted forty-two days. Except for minor items and consumables, there was no requirement for industry to expand production. Toward the end, though, thin spots had begun to show.

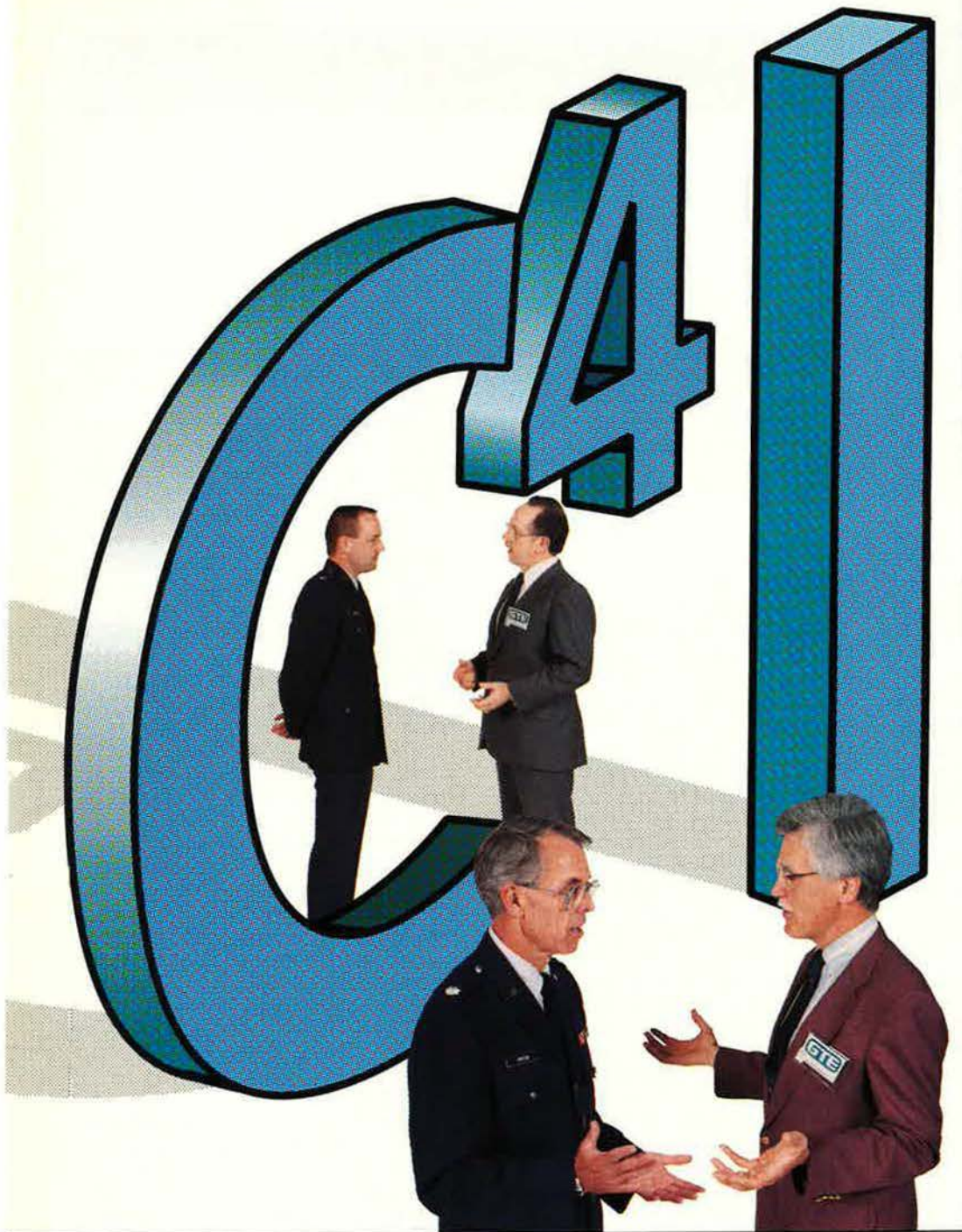
The Gulf War surge was handled magnificently by the depots and materiel commands of the military services. They drew upon strong stock levels built in the 1980s and mounted an incredible effort to keep the airplanes flying and the bombs and bullets coming.

Today, the logistics centers are taking heavy budget cuts. They compete with the manufacturing industrial base for work. Like the defense firms, their capabilities are being converted right out the door.

Some theorists may regard this as good news. The nation is shedding its cold war mindset. The free market, with a little help from its friends, is reallocating resources in a greater economic scheme. The source most frequently mentioned for financing this transformation is—what else?—the already-depleted defense budget.

There are no easy solutions to the defense industrial base problem. As Adelman and Augustine also said, you can't manage a free-fall. It becomes certain that no solution will be found if conversion officials lock their attention on building a "national infrastructure" or a redistribution of federal money.

It is unlikely that the United States has fought its last war or faced its last enemy. When crisis comes again, it may prove a bad bargain to have traded all the munitions plants for dog food factories. Next time, maybe we can drop some of that national infrastructure on the bad guys. ■



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A Disastrous Option

In reference to "The Base Force Meets Option C" [*Washington Watch*, June 1992, p. 15], I have to agree with USAF Chief of Staff Gen. Merrill A. McPeak when he says that Rep. Les Aspin's defense budget numbers "are a recipe for military disaster."

It is all well and good for Mr. Aspin to want a larger peace dividend and to talk about the size of the federal deficit, but one must ask what he would use the so-called "peace dividend" for. Would Mr. Aspin be willing to put any savings in defense spending toward paying the national debt? Or would he insist that these monies be earmarked for the bloated entitlement programs, which Mr. Correll correctly marks as "the main growth factor in federal spending for the past twenty years"?

Mr. Aspin has, I believe, correctly identified the areas in which our military can be expected to play a role in the coming decades: countering regional aggressors, combating the spread of nuclear arms and other weapons of mass terror, fighting terrorism, restricting drug trafficking, keeping the peace, and assisting civilians. But I believe he's misguided if he thinks the very small end strengths he puts forth in Option C will be enough for "one Desert Storm equivalent, a Korea-sized contingency, a Panamaised contingency, humanitarian missions, airlift, sealift, and a base for rotation of forces between the United States and overseas."

With his force structure, we might be able to handle one of these, but not all simultaneously. As General McPeak said, "My guess is that no one responsible for the outcome would ever sign up to those options as meeting the stated goals."

Mr. Aspin's comment that "the Desert Storm Equivalent could do the job" in Iraq today is probably true, given that we've already decimated Saddam Hussein's military. If we had had to face him in January 1991 with Mr. Aspin's "Desert Storm Equivalent," we might still have won, but certainly not in three months, possibly not even in three years.

I would suggest to Mr. Aspin that he leave military planning and force-structure decisions to those who know it best, who do it for a living on a daily basis: the planning staffs in the Pentagon.

MSgt. Colin T. Carlile,
USAF
Kelly AFB, Tex.

Replacing the F-16

"A Replacement for the F-16" [*July 1992, p. 76*] contained an error that should be noted. It stated, "On the assumption that the F-16 has an 8,000-hour service life, Block 50/52 F-16s begin to leave service in 2005." Block 50/52 F-16s are the newest versions and only began operational deliveries earlier this year. If these stay in the active-duty force their entire life, they would not reach 8,000 hours until 2020. Even the oldest F-16s, the Block 01 F-16A/Bs, which began operational service in 1979, will not reach the 8,000-hour mark until 2015.

An 8,000-hour service life equates to twenty-eight to thirty-five years of service, depending on when the aircraft are transferred to the Guard and Reserve. This is well beyond USAF's retirement goal of twenty-two years for fighters. With such durable aircraft, other factors are becoming more prominent than service life in USAF's force-structure planning.

One factor is potential inventory shortage. For the 26.5-wing Base Force and termination of production in Fiscal Year 1993, the attrition reserve for F-16s is projected to be exhausted by 2005. It is also desir-

able to have a pool of contingency reserve aircraft for national emergencies.

Another important factor in retirement planning is obsolescence. Combat aircraft normally undergo a major upgrade every seven to ten years. The F-16A/B fleet received the Operational Capabilities Upgrade modification in the late 1980s. The engines, avionics, and cockpit systems on these aircraft will be getting old and difficult to support by the end of this decade, and the airframes may require some structural upgrades or repairs to achieve an 8,000-hour lifetime, given the aggressive way the F-16 is flown. Therefore, the alternatives are to perform extensive upgrades or to replace the F-16A/Bs with new ones.

Thus, the main consideration behind the Air Force's Force Sustainment initiative is probably not so much aircraft structural service life as it is maintenance of sufficient inventory levels and determination of the most cost-effective solution to modernization and obsolescence needs.

Mike Nipper
Fort Worth, Tex.

Nighttime Confusion

After reading "Upgrading the Fighter Fleet" [*July 1992, p. 42*], I was confused about two statements that, to me, sound contradictory. They concerned the helmet-mounted display system being developed for the CAS/BAI variant of the F-16.

The first reads, "It [the helmet-mounted display] is being developed under the CAS/BAI F-16 upgrade and will not include a night capability." The second statement contends, "The helmet will allow for off-boresight targeting and will control the head-steered infrared systems, which will greatly increase the field of view at night."

How can the helmet-mounted display control head-steered infrared systems that increase the field of view at night without displaying the infrared view on the helmet? Or does this mean that it will not impose HUD symbology at night?

The article also states, "Cockpit

Do you have a comment about a current issue? Write to "Letters," AIR FORCE Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Letters should be concise, timely, and preferably typed. We cannot acknowledge receipt of letters. We reserve the right to condense letters as necessary. Unsigned letters are not acceptable. Photographs cannot be used or returned.—THE EDITORS

upgrades will . . . include installation of a sidestick." All F-16s already possess a sidestick controller for control of aircraft movement.

Robert Rettagliata
Staten Island, N. Y.

■ *The helmet system is being developed primarily for the CAS/BAI F-16 program and will include a new night attack capability. The technology from the CAS/BAI F-16 helmet will also be applied to the midlife update program. However, the midlife update will not include the night capability.*

With regard to the F-16 sidestick, reader Rettagliata is correct. All F-16s have a sidestick.—THE EDITORS

Dated Checklist

If your "Checklist of Major Electronic Systems" [July 1992, p. 33] was intended to be a "snapshot" of program status, you must have used an old black-and-white camera.

You started out on the right foot by noting that "Electronic Systems Division" at Hanscom AFB is now "Electronic Systems Center." You then went downhill by repeatedly using "FSD" [full-scale development] when "EMD" (engineering, manufacturing, and development) is the new buzzword, introduced in February 1991.

I can't speak for the timeliness of all the data in your checklist. I do track the status of programs in what is now the Communications and Airspace Management Systems Office and noted several disconnects.

Along with the name change in January 1992, a number of programs were added to the program office, including Digital European Backbone, Ground Mobile Forces SATCOM Terminals, and TRI-TAC/TRC-170. Management responsibility for Digital Brite was transferred to FAA in January 1992. New Mobile Rapcon died quietly in March 1991 for lack of production funding.

Keeping a finger on the pulse of acquisition programs is like charting borders in eastern Europe. Perhaps your readership would be better served if you had an "as of" date in future editions. . . .

Capt. William A. Malec,
USAF
Hanscom AFB, Mass.

■ *The checklist was compiled with the aid of the Electronic Systems Center, and the bulk of the terminology is the center's.*—THE EDITORS

In the Beginning . . .

"Beginnings" [June 1992, p. 82] recapped many important milestones in the development of air-to-air refuel-



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PUBLISHED BY THE AIR FORCE ASSOCIATION MAGAZINE

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BPA Circulation audited by
Business Publication Audit

Letters

ing. I was disappointed to find that the most significant achievement in this capability was not mentioned.

Starting on June 4, 1935, brothers Al and Fred Key of Meridian, Miss., set the world record for sustained flight using air-to-air refueling. The refueling nozzle attached to the hose of the "tanker" was designed and hand-built by A. D. Hunter, a master machinist from Meridian. Their record of 653 hours, thirty-four minutes, has never been broken. Indeed, it will always remain the world record because the category has been deleted from competition.

The Key brothers' twenty-seven-day flight took them an estimated 52,320 miles, more than twice the distance flown by Capt. James Gallagher's crew fourteen years later, as recorded in Mr. Callander's article. Their Curtiss Robin monoplane, *Ole Miss*, consumed 6,500 gallons of fuel, and it was computed that the propeller of their aircraft made 52,860,000 revolutions. The 113 refueling sorties flown by James Keeton and William Ward resulted in 432 air refueling contacts with *Ole Miss*.

Al and Fred Key went on to distinguished careers in the Army Air Corps. In 1939, they helped form Mississippi's first Air National Guard unit, the 153d Observation Squadron. Following activation for World War II, Fred returned to Meridian as commander of the 153d, while Al remained on active duty, retiring from the Air Force as a colonel. Today, the airport where the Key brothers set the world record is called "Key Field," and the ANG unit at Key Field is now the 186th Air Refueling Group.

Col. Frederick D. Feinstein,
Miss. ANG
Meridian, Miss.

I should like to offer a small quibble with your otherwise estimable magazine. In "Beginnings," the statement was made that, other than P-61 night fighters, Army Air Forces aircraft only flew day bombing missions. To correct this notion, I should like to mention the activities of the 47th Bomb Group in the ETO in World War II.

In August 1944, I was transferred to the 47th Bomb Group, stationed on Corsica. We flew from sundown to sunrise over German-occupied France and northern Italy. Our purpose was to seek out and destroy enemy transportation. This was accomplished in A-20s using a British bombsight, the Mark IX. I was a bombardier who trained with the Norden bombsight but never had the opportunity to put

my training to use. To my knowledge, the 47th Bomb Group (12th Air Force) was the only US bomb group that flew night missions exclusively, and, I might add, very successfully.

Milton Corwin
Beverly Hills, Calif.

A Munitions Workhorse

"The BUFF at War" [June 1992, p. 44] was great for this old fan of the B-52. However, your writer of the picture captions struck a nerve for us aerospace ground equipment troops. The picture of the "jammer" (a wheeled cart) raised howls in our section. The "cart" is the MHU 83 Bomblift truck, capable of lifting 7,000 pounds at a time and positioning them to within fractions of an inch. It has been around for a long time but is still a workhorse for the munitions troops. Because the AGE section is one of those areas that has low visibility, we are always glad to see some of our equipment in AIR FORCE Magazine. Keep up the good work, and remember: "No airpower without groundpower."

SMSgt. Jay Essington,
N. J. ANG
Atlantic City, N. J.

"Tanker Land"

"The Other Industrial Base" [July 1992, p. 50] provided timely information on the many changes occurring at the five Air Force depots. As such, it is an informative article for many of AFMC's customers. Unfortunately, the dedicated engineers, technicians, "loggies," and mechanics who support the thirty-two versions of the C/KC-135 have again been slighted by AIR FORCE Magazine.

Yes, Oklahoma City ALC can rightfully be called "Bomber Country," and yes, we are responsible for America's entire bomber fleet. But the 300-strong bomber fleet is only half as large as the 700 -135 series aircraft fleet. As the B-52 fleet is slowly retired, and with the -135 fleet projected to fly until 2040 or beyond, Oklahoma City ALC's existence depends on providing high-quality, cost-effective system management and maintenance for the nearly forty-year-old C/KC-135 fleet.

We are proud that Oklahoma City ALC supports the entire bomber fleet, the E-3 AWACS fleet, and numerous contract logistics support aircraft (including the KC-10), but, considering the impact the -135 weapon system has, a more appropriate moniker for Tinker AFB is "Tanker Land."

1st Lt. Thomas J. Ramsey,
USAF
Tinker AFB, Okla.



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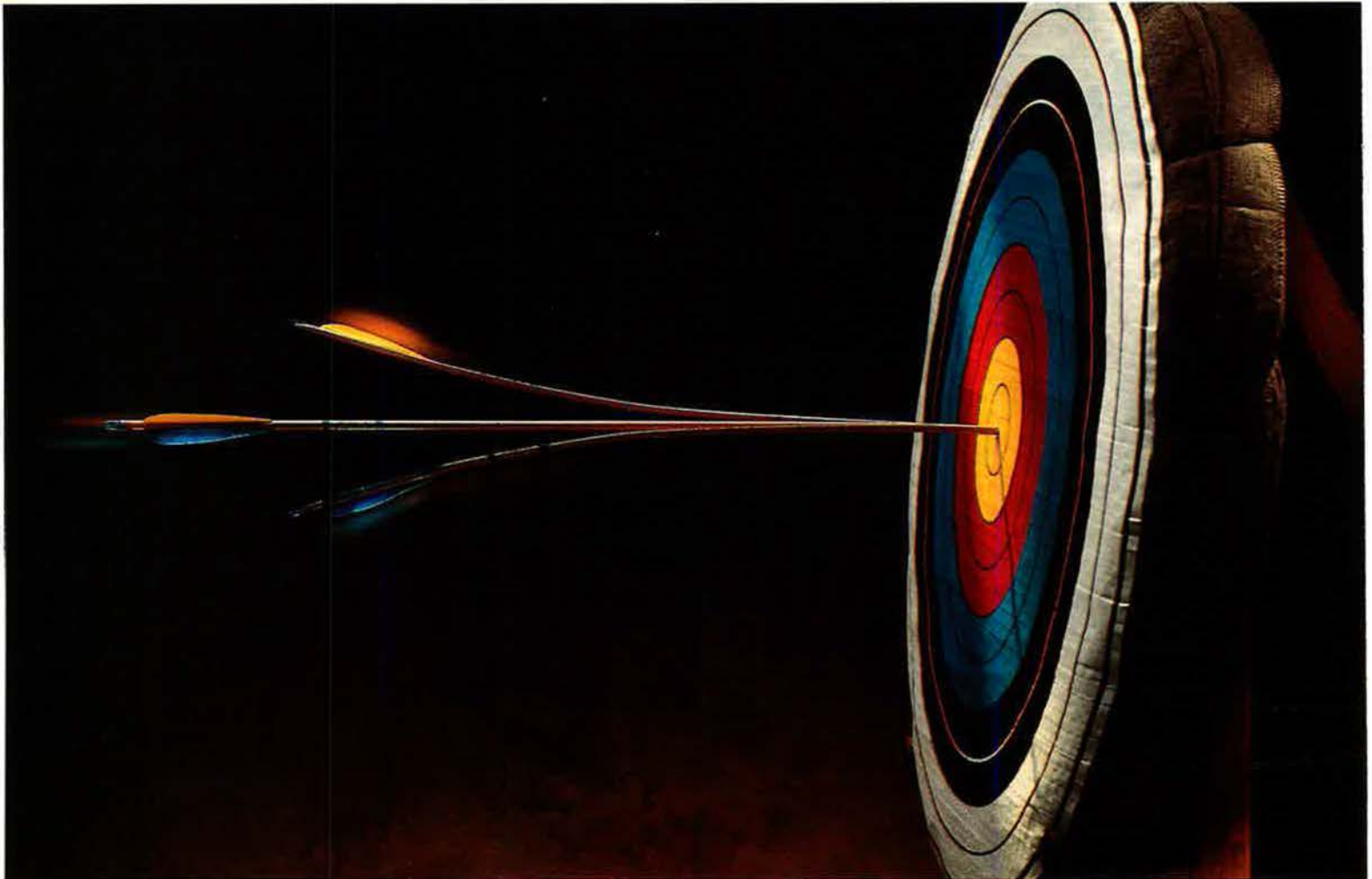
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Remember the Maintainers

I do not want to jump on the why-all-the-changes bandwagon—but I feel compelled to voice my concerns about our current direction [*"The End of the Stovepipe," June 1992, p. 32*].

First, while I have never been a proponent of adopting civilian business practices for military leadership, the total quality management program has made some significant and positive contributions to many unit-level decision-making processes. Individuals, empowered by their leadership, have made changes that boost productivity and increase worker satisfaction—steps in the right direction. But where is the TQM at the Air Staff level?

Issues like reorganization, personnel reductions, two-level maintenance, and even the ever-popular new uniform are clear examples of top-down, damn-what's-best-for-the-troops decision-making. TQM is for all levels of leadership, isn't it?

Second, when I first joined the Air Force in 1970, I knew that as a non-rated officer I would never rise to the position of Chief of Staff or even wing commander, but I also knew that numerous positions were available that demanded dedicated professionals and aggressive warriors to sustain our warfighting capabilities. I became an aircraft maintainer and logistician—a front-line supporter of our fly-and-fight mission.

Now I see an effort to eliminate the influence of professional maintainers from the flight line and reduce their stature concomitantly. Maintenance performance in Operations Desert Shield and Desert Storm was outstanding. Though our weapon systems have become more reliable, the performance levels of these systems have also been raised—demanding intense and dedicated maintenance and logistics support.

Does the Chief of Staff really think that giving the job of managing the maintenance of his assigned aircraft to the ops group commander will improve or even retain prewar levels of aircraft reliability and safety? In budget-conscious environments, doesn't it make sense to streamline but keep the "experts" doing what they do best?

I am saddened by some of the changes that have been made to my old career field, but I hope some future leadership will recognize the mistakes now being made and reverse them before it is too late. . . .

Lt. Col. G. R. N. Blanston,
USAF (Ret.)
Salt Lake City, Utah



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By Brian Green, Congressional Editor

Nunn's Challenge

The Senate Armed Services Committee calls for less duplication and a hard look at roles and missions.

WITH its rewrite of the President's proposed Fiscal 1993 defense budget, the Senate Armed Services Committee, led by Sen. Sam Nunn (D-Ga.), challenged some of the most entrenched views at the Pentagon and on Capitol Hill. The panel's bill, unveiled in late July, includes several provisions designed to force the four armed services to accept more joint weapon acquisition and to reduce duplication of effort [see "Aerospace World," p. 17]. Regardless of its fate, the bill raises issues that will help shape the defense debate over the next several years.

This legislative initiative stems from Senator Nunn's view that "redundancy and duplication are costing billions of dollars every year" in the Defense Department.

The initiative, however, goes well beyond abstract criticism. The committee's bill, if enacted, would require the Chairman of the Joint Chiefs of Staff (JCS) to submit a no-holds-barred roles and missions report to Congress. To force the issue, the bill would cut or defer spending on a number of high-priority Navy, Air Force, Army, and Marine Corps programs.

For example, Senator Nunn's initiative provides \$2.2 billion—the amount USAF requested—for continued development of the F-22 Advanced Tactical Fighter. However, it stipulates that the Air Force may spend no more than half that amount until sixty days after Congress receives the required JCS study. The same restriction applies to other major new tactical aviation programs.

Other legislative provisions reflect Senator Nunn's oft-stated concerns about developing a proper mix of Navy carriers equipped with stealthy, medium-range A-X bombers and long-range, landbased Air Force bombers. Additional tests of heavy landbased bombers in conventional conflict would be required, but Congress's

commitment of funds for conventional upgrades to the B-1B and B-52 would be postponed. Full funding of a new aircraft carrier would be shifted from Fiscal 1995 to Fiscal 1996. Fiscal 1993's long-lead procurement funding for the new carrier would be reduced, and no money beyond Fiscal 1993 could actually be spent until Congress receives the JCS report, including a detailed review of trade-offs between capabilities of landbased and seabased bomber forces. Funding for the A-X would also be slashed from the \$165 million requested to \$50 million. A-X funding would be used to initiate development of competitive A-X prototypes.

Advocates of naval airpower expressed discomfort over the direction taken in the bill. "I'm very concerned about some kind of competition being set up between bombers and aircraft carriers," warned Sen. John McCain (R-Ariz.), a member of the Armed Services panel. "I think that the premise that we may not need a bomber for an aircraft carrier . . . means that we don't need an aircraft carrier, because the whole reason for an aircraft carrier's being is to project power."

The bill also focuses on the proposed Multirole Fighter (MRF), intended to replace the F-16. Senator Nunn, noting that the Navy's F/A-18 is also a multirole aircraft, argued that the nation cannot afford to develop two such fighters, one for the Navy and one for the Air Force. The Senate Armed Services Committee directs the Air Force to use the Navy's proposed F/A-18E/F strike fighter—an upgrade of the Hornet now deployed on carrier decks—as its next-generation multirole fighter. It would also terminate acquisition of the F-16, a heavily modified version of which could provide the basis for an MRF. "We simply don't need any more," said Senator Nunn, who also opposed continuing production "strictly for industrial base purposes."

Senator Nunn noted other areas that could yield savings through consolidation of roles and missions, including air defense, electronic surveillance, and jamming. He said that the

Air Force was so effective in defeating the Iraqi Air Force during Desert Storm that "the Army didn't shoot a single air defense missile at an enemy aircraft during the war." The defense authorization bill expressed the sense of Congress that the Army should not proceed with any new air defense systems or upgrades until after the roles and missions review.

Senator Nunn's legislation would assign the standoff jamming mission to the Navy and cancel upgrades to the Air Force EF-111 Raven, which handles standoff and escort jamming for US strike packages. A competition between the Navy EP-3 and the Air Force RC-135 tactical intelligence aircraft would be required prior to selection of one of the two for upgrading.

The Senate bill suggested that greater competition in the conduct of depot maintenance might also produce significant cost reductions. The bill would remove legislative restrictions on the Defense Department's ability to allow competition for maintenance work load among DoD depots and between depots and the private sector during Fiscal 1993.

The bill also directs the JCS Chairman to examine integration and cooperation of Marine Corps and Army capabilities in the roles and missions review.

Air Force Chief of Staff Gen. Merrill A. McPeak argued recently that much of the so-called mission overlap "is healthy and ought not to bother us." He contended that "many of the fielded capabilities are—or should be—complementary, and, in the employment phase, each should assist the others with little duplication of effort." He said that Air Force participation in the combined arms team is a "dominant concern."

Secretary of Defense Dick Cheney and Gen. Colin Powell, Chairman of the Joint Chiefs of Staff, disputed the claim that there is unneeded duplication of effort in airpower projection. The General argued that the air combat arms of the Army, Navy, Marines, and Air Force are all "unique" and that Air Force and Navy bombers are complementary in purpose. ■



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Hughes Aircraft Company's AGM-65G Maverick missile can now be used to its full capability, as the U.S. Air Force's F-16 aircraft has undergone software upgrades that expand its tracking mode. With the F-16's improved tracking set in the area track mode, Maverick can pinpoint any recognizable target feature. This increases its effectiveness against objects that lack high-contrast boundaries, including large buildings, fuel dumps, bridges, and aircraft hangers.

U.S. Armed Forces helicopter pilots flying low-level missions in total darkness, smoke and fog are being aided by the combat-proven Hughes Night Vision System, designated the AN/AAQ-16. The system has been installed on U.S. Army Special Operations Aircraft, on U.S. Air Force MH-60G Pavehawks, and on U.S. Navy SH-2F and SH-60B LAMPS helicopters. It has also been selected for the V-22 Osprey tiltrotor aircraft and is being integrated on the U.S. Marine Corps' CH-53E Super Stallion helicopter. The turret-mounted infrared system provides the crew with TV-like imagery on a cockpit panel display.

Emirates, the international airline of the United Arab Emirates, is the first airline in the world to bring in-seat color video entertainment to its passengers in all three classes. These in-flight systems, designed and manufactured by Hughes, are carried on Emirates Airbuses including two new A310-300s to be delivered later this year. They will enable passengers to select a variety of programs and movies, and view them through four-inch or six-inch monitors from their seats. Designing and building these systems — which include individual cable modules, display units and passenger control audio units — was only one aspect of this inaugural effort. Everything, including seats, bulkhead monitors, and the architecture for the cable routing, had to meet rigid government certification.

To reduce air defense weapon reaction time, and better protect troops, tanks, and other frontline units, the U.S. Army is developing the Forward Area Air Defense System. The system's primary sensor will be Hughes' TPQ-36A three-dimensional radar. This radar system automatically detects, tracks, identifies, and reports targets, such as low-flying helicopters and fixed-wing aircraft. And it is fast and accurate. The system uses advanced phased-array antenna and solid-state component technology to minimize its electronic signature while operating in the face of severe electronic countermeasures.

Some 700,000 school children experienced a field trip to the ocean floor off the Galapagos Islands, thanks in part to Hughes' SBS satellite. This high-technology journey was part of an unusual educational program — the JASON Project — which integrated the latest in marine science, videoteleconferencing, and satellite communications. Transmitted by Hughes' SBS satellite, video images of exotic underwater sea life flashed across large display screens, practically enveloping students in classrooms and auditoriums across the United States and Canada. The sharp, projected images were the result of Hughes' liquid crystal light valve technology.

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HUGHES

By Frank Oliveri, Associate Editor

Nunn Scrutinizes Service Missions

Sen. Sam Nunn (D-Ga.), chairman of the Senate Armed Services Committee, has called for a fundamental review of US military roles and missions. The Senator identified projection of airpower as a top priority for the analysis.

In a July speech, Senator Nunn raised questions about US service activities across ten mission areas: airpower projection, expeditionary ground forces, theater air defenses, space operations, helicopter forces, intelligence, functional organizations, logistics and support activities, administrative and management headquarters, and reserve component forces.

In each mission area, activities of two or more services overlap. Said the Senator, "Certainly, there are many potential ways to streamline our operations."

Senator Nunn set no timetable for concluding the review. The Defense Department was in the midst of its own roles and missions study, with results to be unveiled in the fall.

Senator Nunn, though an ardent backer of tactical fighter forces, called for cutting duplication of effort. He pointed with concern to the fact that "we spend tens of billions of dollars every year" operating tactical aircraft for the four services. Moreover, he said, "the services now have over \$350 billion worth of new combat aircraft on the drawing boards, with only limited efforts to achieve commonality."

Senator Nunn's new roles and missions study calls specifically for scrutiny of the proposed A-X attack aircraft—a step seen as an ominous development for the Navy. The Navy is counting on the A-X to replace the A-6 medium bomber and become the backbone of carrier attack aviation.

Pilot Shortage

The Air Force says that pilot retention continues to be a problem (though largely masked by the current force drawdown) and that congressional approval of a pilot reenlistment bonus will be critical to retaining a high-quality pilot force.

The Air Force disclosed that, by



This recently declassified photo shows one of the Northrop-built BQM-74C multirole aerial targets, reconfigured as decoys, that were used by the Air Force during the Persian Gulf War. The Air Force said the decoys significantly reduced the losses of allied air groups in the early hours of the war.

Fiscal 1997, it will face a shortfall of 3,000 pilots. Commercial airlines are a steady attraction, and USAF pilots have lucrative opportunities outside the Air Force. The service says it retains only one of every three pilots in the critical eight-to-twelve-year group.

Ironically, the Air Force is being forced to "bank" (place in nonflying jobs) undergraduate pilot training graduates for up to thirty-four months after graduation. This year 603 pilots were banked. The procedure is expected to continue until the force reduction is nearly complete.

New Airborne Weapons Advance

In late June, the Pentagon's Defense Acquisition Board (DAB) approved Milestone 0 for the Joint Direct Attack Munition (JDAM) and Milestone 2 for engineering and manufacturing development of the Joint Standoff Weapon (JSOW). Both "smart" weapons are deemed critical to the future of the Air Force's bomber fleet.

The Air Force heads the JDAM program, the Navy the JSOW program.

They will share such common components as an inertial navigation system, links to the Global Positioning System, and a terminal seeker.

By combining the INS, GPS, and terminal seeker components, the Pentagon board united Phase 1 and Phase 3 of the JDAM program, which will produce the 2,000-pound, direct attack JDAM I and JDAM III weapons. Phase 2 will produce a 500-pound JDAM II bomb, used principally by Navy aircraft.

The Air Force and Navy may cooperate with France to produce the 500-pound bomb. The DAB ordered the Air Force to ensure that the kits developed in Phase 1 are modular and compatible with the Phase 3 terminal seeker to be developed later.

The DAB ordered both services to begin integrating the Sensor-Fuzed Weapon submunition into JSOW to support a Milestone 2 decision around 1994. Following release of the DAB decision, Texas Instruments won a \$202.7 million contract to begin engineering and manufacturing development.



Air Force Chief of Staff Gen. Merrill A. McPeak presented the Mackay Trophy to this MH-53J Pave Low crew, which rescued a downed Navy pilot during Desert Storm. From left are Lt. Col. Richard L. Comer, TSgt. Gregory M. Vanhyning, TSgt. James A. Peterson, Jr., Capt. Thomas J. Trask, SSgt. Craig Dock, MSgt. Timothy B. Hadrych, Maj. Michael E. Homan, and Sgt. Thomas W. Bedard.

Bomber vs. Carrier Debate

With his call for a new roles and missions study, Senator Nunn has raised anew many politically sensitive questions about the relative merits of projecting military airpower from land bases or from the sea.

In his July speech, the Senator stated the question flatly: "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?"

Senator Nunn said the US should decide on the basis of efficiency. "From my point of view," he observed, "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?"

Senator Nunn noted that the Pentagon's Fiscal 1993 budget contains an \$800 million down payment on a \$4.8 billion *Nimitz*-class aircraft carrier and \$165 million to start development of a \$60 billion to \$80 billion A-X aircraft for the Navy's carrier decks. At the same time, Senator Nunn said, the Air Force is proposing a \$5 billion upgrade of the B-1B bomber.

This, said Senator Nunn, raises big questions. "What is the tradeoff between upgrading the B-1 bomber fleet and operating another aircraft carrier? What can a new A-X bomber from an aircraft carrier do that our existing long-range bombers from land

bases cannot do? Could Navy aircraft carriers utilize shorter-range bombers, like the F/A-18s, and let the Air Force provide the long-range bombing capability? Is A-X so important to the Navy that it will accept fewer aircraft carriers or give up the F-18E/F to get it?"

Flying Hours Endangered

The House has proposed cutting the Pentagon's projected budgets by

\$50 billion over five years. The Air Force says that it will be forced to reduce flying hours by fifteen percent if the full Congress follows through on the House proposal.

The service makes that projection in its latest "Issues Book." Flying time would be slashed by 180,000 hours, taking USAF back to training levels not seen since the late 1970s. The Air Force said that the overall flying hour program is funded at eighty-five percent of total training requirement, "the minimum acceptable level based on our experience." It warns that, if deeper budget cuts materialize, it would have to dedicate a "disproportionate" part of a tight budget to conduct "a constant cycle of requalification and recertification."

The service's conclusion: "This would lead to loss of the multirole capabilities of many weapons systems and significantly increase the time required to prepare for conflict."

TSSAM Succeeds in Test

The Air Force conducted a successful test flight of the Triservice Standoff Attack Missile in early June, taking some pressure off the critical weapon program, which had encountered some technical setbacks.

TSSAM has experienced malfunctions of the pyrotechnic device that separates the missile from the aircraft, extends its missile wings, and blows the cover off the engine inlets. The problem was so troubling that, last fall, Air Force Secretary Donald



The second X-29 Advanced Technology Demonstrator aircraft was modified with a prototype Vortex Flight Control system. During testing at Edwards AFB, Calif., it proved stable at angles of attack up to fifty degrees. The system includes two slotted nozzles, visible within the lighter area on the nose.



In July, Gen. Charles A. Horner assumed duties as commander in chief of United States Space Command, replacing Gen. Donald J. Kutyna, who retired after thirty-five years of service. As commander of 9th Air Force, General Horner orchestrated the Desert Storm air war, relying heavily on US Space Command assets.

B. Rice issued a cure notice to Northrop, TSSAM's developer.

After Northrop took on a subcontractor to deal with the pyrotechnic problem, the newly designed weapons separator system worked flawlessly. Mr. Rice said the missile is meeting low-observable and guidance system requirements. TSSAM will be air-launched by Air Force and Navy aircraft. Army ground-launched versions will be fired from the Multiple Launch Rocket System.

B-1B Engine Failure

The Air Force temporarily ordered a stand-down of all ninety-seven B-1B bombers after one plane from Dyess AFB, Tex., suffered a catastrophic engine failure during a June training mission. By calling for a stand-down rather than a grounding, USAF was signaling that the aircraft would not be used in training but could be used for combat.

Preliminary investigations indicated that a malfunction of a turbine caused the failure of the number two engine, according to DoD spokesman Pete Williams. The engine bays of both the number one and number two engines were damaged.

The malfunction occurred during a climb-out at 9,000 feet. The crew made an emergency return to base. The engine was later removed and taken to Oklahoma City Air Logistics Center at Tinker AFB, Okla.

Gen. John Michael Loh, the commander of Air Combat Command, ordered the stand-down. The Air Force has categorized the occurrence as a

Class A mishap, putting damages at more than \$1 million. The B-1B uses the General Electric F101-GE-102 engine, which is in the 30,000-pound-thrust class.

Pressure Hits USAF Depots

The US commercial manufacturing sector has stepped up its efforts to seize a chunk of the maintenance and repair business now performed by the Air Force's organic depots. So said Gen. Charles C. McDonald, the now-retired commander of Air Force Logistics Command, who noted that private industry is making the move in a bid to survive amid shrinking defense budgets.

General McDonald, in a report issued shortly before the deactivation of AFLC on July 1, cautioned against giving free rein to such tendencies because peacetime industrial practices do not place sufficient emphasis on the readiness and sustainability required to wage war successfully. Thus, he concluded, the Air Force must retain some form of excess capacity to permit surge operations in time of need.

The Air Force's five Air Logistics Centers now come under Air Force Materiel Command.

Today, said the General, "there is increased tendency to consider only peacetime efficiency" in industrial operations. The commercial sector lacks the inherent capability to respond quickly to contingencies, he added, "since it retains little excess capacity."

General McDonald said that, in the

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Persian Gulf War, the commercial sector's surge was limited to consumables and small equipment items. It could only surge what was already in production, and thus it could not mobilize in the true sense of the word. Despite these problems, the extra capacity of AFLC's organic depot system permitted the Air Force to generate the equivalent of 1,000 extra flying days and produce 90,000 repaired or overhauled parts in addition to its normal peacetime production rate of 60,000 parts monthly.

"Green" Prosecutions Up

Federal officials appear to have stepped up prosecutions of Defense Department and armed services employees on charges of violating environmental laws.

The Justice Department reported that, in 1991, the department filed a total of forty-eight environmental criminal cases, some with multiple defendants, and netted eighty-two convictions. Of individuals convicted during 1991, twenty-eight received jail time.

The "green" prosecutions have struck only one Air Force employee thus far. The foreman of a wastewater treatment plant pleaded guilty to falsifying a test record. Prosecutors alleged that the foreman changed sludge test results to show that the plant was operating within the level authorized by a plant discharge permit. He received a \$5,000 fine and an eighteen-month suspended sentence.

The Department of Justice said,



The F-117B Stealth Fighter aircraft took off on July 7, marking the start of functional flight testing in the Pacer Strike upgrade program. Pacer Strike, being carried out by Air Force Materiel Command's Sacramento ALC and Rockwell, should improve reliability and maintainability, navigation, and weapons delivery.

"This . . . sends a clear message to employees of federal facilities and installations who are involved in environmentally sensitive work that their status as federal employees will not shield them from prosecution for criminal acts of pollution committed by them."

446th AW Wins Airlift Rodeo

The 446th Airlift Wing (Reserve) from McChord AFB, Wash., won the

title of best overall wing in Airlift Rodeo '92, the first aerial competition sponsored by newly activated Air Mobility Command (AMC).

The competition, held June 8-12 at Pope AFB, N. C., featured sixty airlifter teams, representing the active-duty US Air Force, Air Force Reserve, Air National Guard, Marine Corps, Army, and ten foreign nations.

Honors for best US crew went to the 463d AW, Dyess AFB, Tex. The best foreign team title went to the Portuguese Air Force's 501st Squadron, based at Montijo, Portugal.

In the tanker portion of the meet, eight of twelve teams ended up with perfect 400 scores in refueling. After two tiebreakers, first place was captured by the 101st Air Refueling Wing, Bangor, Me.

The KC-10 refueling winner was the 452d Air Refueling Wing, March AFB, Calif., with a perfect 400. The winner of the cargo loading competition was the 22d Air Refueling Wing, also from March. The 380th Air Refueling Wing, Plattsburgh AFB, N. Y., won the KC-135 tactical navigation award.

Other winners are as follows: best C-130/C-160 airdrop crew, 374th AW, Yokota AB, Japan; best C-141 airdrop team, 438th AW, McGuire AFB, N. J.; best aerial port joint airdrop inspection, 439th AW, Westover AFB, Mass.; best aerial port combat team endurance course, 437th AW, Charleston AFB, S. C.; best aerial port team, 5th Mobile Aerial Port Squadron, RAF



This compact assembly, part of Hughes Aircraft Co.'s Top Hat infrared technology demonstrator, houses a coated optic lens that focuses an observed image on the focal plane array mounted beneath the lens. The system is used to test seekers in a tactical air-to-air environment.

Mildenhall, England; best C-130/C-160 engine running on/offload (ERO), 5th MAPS, RAF Mildenhall; best C-141 ERO, 514th AW, McGuire AFB; best C-130/C-160 basic postflight operational inspection, the Japan Air Self-Defense Force's 1st Tactical Airlift Group, Komaki, Japan; best C-141 basic postflight operational inspection, 63d AW, Norton AFB, Calif.; best C-130/C-160 short-field landing crew, 302d AW, Peterson AFB, Colo.; best C-141 accuracy landing, 62d AW, McChord; best combat control team, the French Air Force's 64th Military Airlift Wing, Evreux, France; best C-130/C-160 maintenance team, 435th Squadron, Edmonton, Canada; and best C-141 maintenance team, 63d AW.

JPATS Document Issued

The operational requirement document for the Joint Primary Aircraft Training System (JPATS) brought into sharper focus an aircraft that will have much greater capability than existing Air Force and Navy trainers.

Unlike the Air Force T-37 and the Navy T-34, the JPATS aircraft will be required to fly at high altitudes and must be able to climb to 18,000 feet in eight minutes or less. JPATS will also have GPS and all-digital avionics.

The operational requirement document, released in early July, said the JPATS aircraft must be able to enter a traffic pattern at an altitude of from 800 to 7,000 feet at speeds of 170 to 250 knots. The aircraft must be able to take off and land in crosswinds of twenty-five knots and withstand ground gusts of eighty knots. It must have a mission capable rate of ninety-one percent and a mission readiness rate of 98.5 percent.

The Air Force plans to procure one JPATS in Fiscal 1996, four in Fiscal 1997, twenty-two in Fiscal 1998, thirty-three in Fiscal 1999, forty-four in Fiscal 2000, and forty-eight in Fiscal 2001.

Randolph AFB, Tex., will start training instructor pilots in 1998, with Laughlin AFB, Tex., becoming the first base to begin training in June 1999. Reese AFB, Tex., will follow in September 2001, Columbus AFB, Miss., in March 2003, Vance AFB, Okla., in September 2004, and Sheppard AFB, Tex., in April 2006.

C-17 Firsts

The second production C-17 airlifter, "P-2," made its first flight in late June. Shortly before, "T-1" flew with its cargo door and ramp open for the first time, during flights at Edwards AFB, Calif.

P-2, the third model C-17 to fly, will be the main avionics qualification air-

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craft and is likely to accelerate the C-17 test program. P-2 will test inertial navigation and GPS equipment, weather radar, and high-frequency radio.

The first fifty hours of P-2's tests will look at range, payload, and fuel consumption. Operators will also examine lift and drag performance and cruise performance.

T-1 opened its doors at 10,000 feet at a speed of 200 knots. The crew then increased the speed to 225 knots before closing the doors again. This sig-

nificant milestone opens the way for airdrop testing later this year, according to McDonnell Douglas. The door test was completed on the seventy-eighth flight of T-1.

ACM Buy May Be Halved

Air Force Secretary Donald Rice warns that a congressional budget cut could halve the number of AGM-129A advanced cruise missiles (ACMs).

Recent congressional action has left the program with \$344 million less

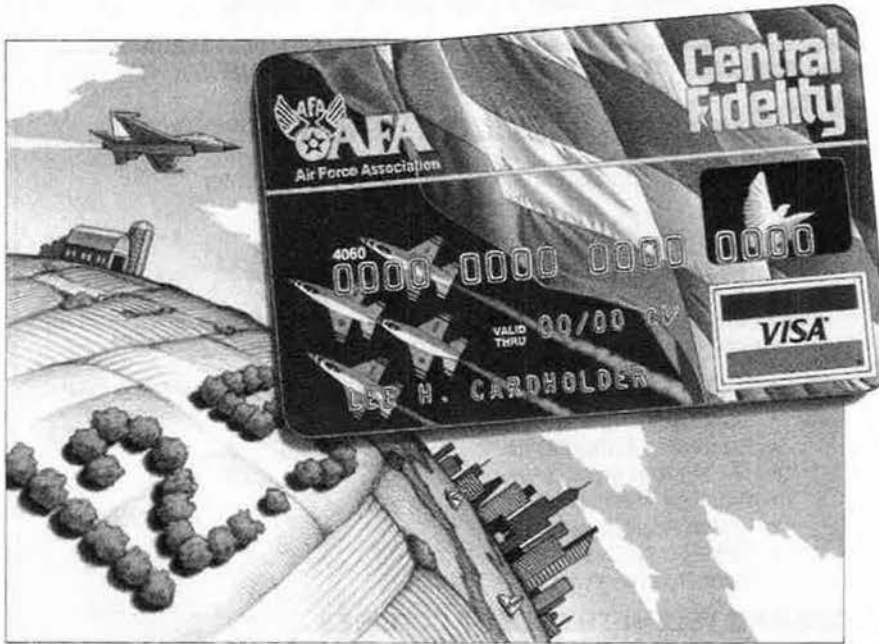
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than expected. Mr. Rice said the Air Force has two options in dealing with the ACM. Under the first, the Air Force would use the program money it has received to date to pay for missile procurement and contract closeout. (There is a large liability for early termination of the program.) The Air Force would then have about 270 of the stealthy, nuclear-tipped missiles.

The second option would require congressional support: The Air Force would buy 400 to 440 missiles with funds set aside in 1992 and in prior years. However, closeout costs would have to come from 1993 appropriations.

USAF Seeks More F-16s . . .

The Air Force will seek further buys of F-16s in its future budgets, according to Secretary Rice.

In July, Mr. Rice said he thought it would be worthwhile to buy more F-16s, adding that the service has many concepts for upgrading the aircraft. Mr. Rice's statement is in step with those issued by Air Force Chief of Staff Gen. Merrill A. McPeak earlier this year. General McPeak suggested that the service was thinking about buying F-16s as force sustainment fighters until a new multirole fighter could be procured.

The F-16 program will provide the only active Air Force fighter production line. By procuring more F-16s, the Air Force also preserves the option to derive a future MRF from the F-16.

. . . But Restricts Others


USAF and foreign F-16s equipped with Pratt & Whitney F100-PW-220 engines with more than 600 hours of flying time went on restricted flight status in late June after P&W found cracks in the No. 4 bearing rear air seal.

Air Force maintainers at Osan AB, Korea, found cracking in the air seal and relayed the information to the San Antonio Air Logistics Center, Kelly AFB, Tex., after which USAF issued a Time Compliance Technical Order (TCTO).

The Air Force reported that there are 3,450 engines in the F100 family worldwide. The TCTO applies only to those aircraft flying the -220 engine. About 1,181 engines were restricted, and two-thirds of those appeared to have no problems.

However, 650 engines are restricted to flying no more than 600 hours. At that point, maintainers will pull the engines and replace the air seals. About 531 engines are restricted to 1,000 flying hours, at which time they

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will also be pulled and the seals replaced.

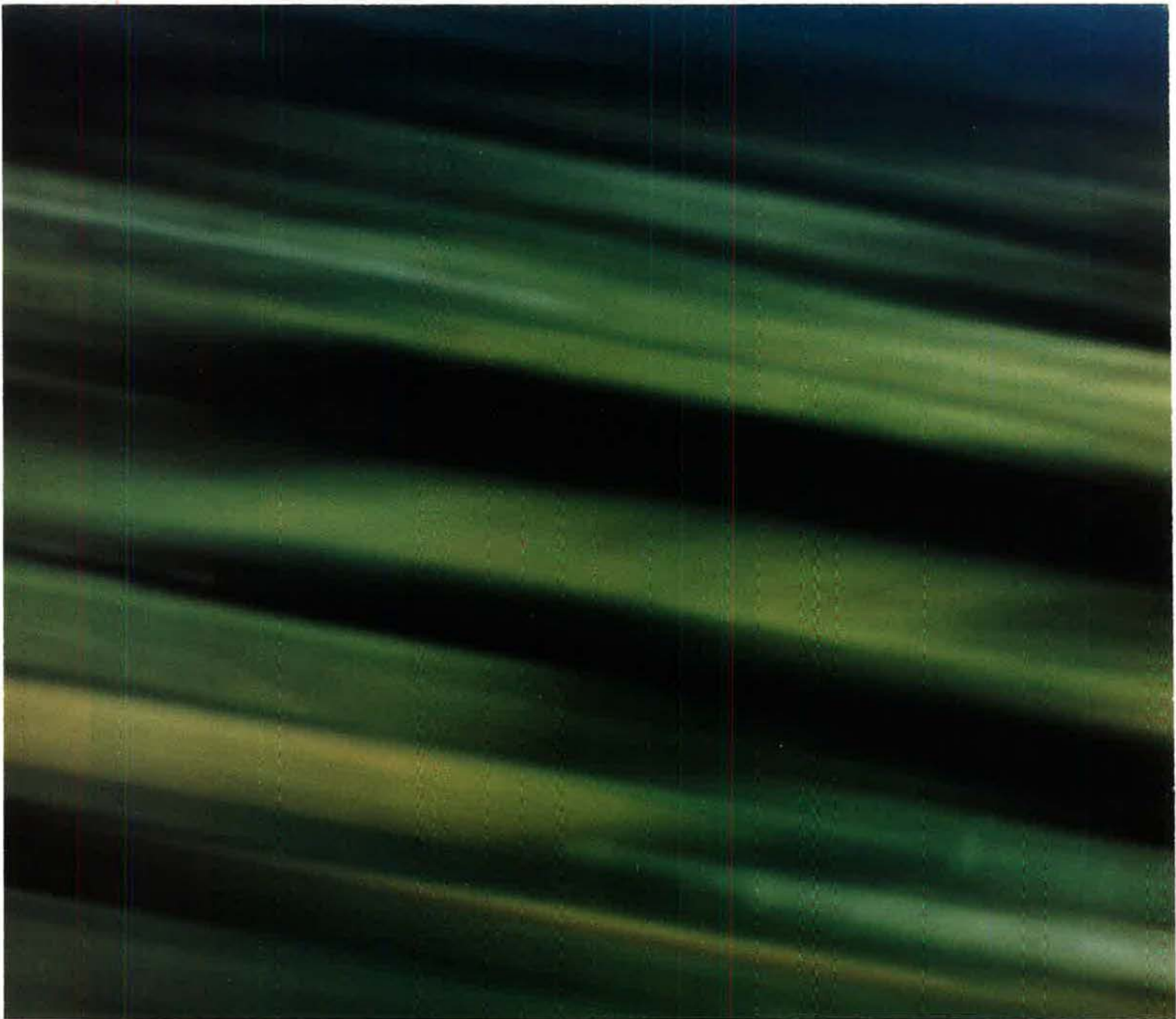
P&W will pay most of the costs associated with replacing the seals. F-15s powered by the -220 engines are not affected.

V-22 Compromise, Crash

A V-22 Osprey tiltrotor aircraft crashed during a July 20 test flight, killing all seven crew members. The crash came just weeks after Defense

Secretary Dick Cheney, facing pressure from Congress, had proposed a compromise that may—in the long run—solve the armed forces' medium-lift problems and that seemed to get the Osprey program back on track.

Anticipating further allocations for the V-22 and the possibility of a congressional lawsuit to force his hand, Secretary Cheney proposed combining \$790 million in V-22 money authorized in Fiscal 1992 with the House-



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Surface-to-air missile threats against tactical aircraft have grown more sophisticated. That means the U.S. Air Force needs improved self-protection capabilities for its aircraft.

The answer: Raytheon's ALQ-184. An update of an existing ECM jamming pod, the new system will enable aircraft to cope with any foreseeable radar-guided threat right through the 1990s.

The key to the ALQ-184 is Raytheon multibeam technology. Through its use, the older pod's single high-power transmitter tube was replaced by a bank of reliable mini-

tubes that feed a high-gain antenna array.

Results: The new system has greater sensitivity, faster response time, and higher effective radiated power. It can detect threat signals and direct high-power jamming signals against multiple hostile radars.

And because the ALQ-184 uses multiple mini-tubes instead of a single big one, even the loss of several tubes will not disable the system.

Fully maintainable by Air Force personnel, the ALQ-184 and its support needs are now in production. It's another example of how Raytheon's



the ALQ-184.

long experience with system fundamentals can improve an older system's capabilities.

For more information, write Raytheon Company, Government Marketing, 141 Spring Street, Lexington, MA 02173.

The ALQ-184 jamming pod is being deployed on U.S. Air Force F-4s, A-10s and F-16s.



Raytheon

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proposed \$750 million in V-22 funds for Fiscal 1993. He would make this available for advanced technology work and operational demonstrations for both the V-22 and a possible new medium-lift helicopter.

Sen. Phil Gramm (R-Tex.) called Secretary Cheney's proposal a clear victory for V-22 proponents.

The proposal is consistent with DoD's new approach to weapons acquisition, said a Pentagon spokesman. The program would be given funds to prove the viability of tiltrotor technology and its military operational usefulness in meeting the medium-lift needs of the armed forces. The funds would be used to solve weight, engine, and flight test shortcomings of the two existing V-22 demonstrator aircraft and to build more V-22 demonstrators.

The remaining funds would be made available for the new medium-lift helicopter demonstration. This would prove the viability of advanced helicopter technology in meeting medium-lift needs.

The Pentagon has not publicly identified the cause of the crash. An investigation is under way.

IG Hits F/A-18E/F

The Navy should have performed a Cost and Operational Effectiveness Analysis (COEA) of the proposed F/A-18E/F fighter before it began engineering and manufacturing development, said Pentagon Deputy Inspector General Derek J. Vander Schaaf.



Photo by Nathan Leong

An Air National Guard F-16A crashed on July 31 in a cornfield near Curran, Ill., killing the pilot, Capt. Donald E. Leckrone (ANG), of Springfield, Ill. The fighter was en route to Denmark as a part of the 183d Tactical Fighter Group for NATO exercises. The crash is being investigated.

Speaking to a House subcommittee, Mr. Vander Schaaf said, "Without a COEA, we concluded that viable alternatives to this development program, including the Navy A-X and existing aircraft, may not be adequately assessed before the F/A-18E/F program is approved and funded."

On March 12, the Pentagon's Office of the Inspector General issued a report highly critical of the Navy's decisions surrounding the E/F pro-

gram. In his testimony, Mr. Vander Schaaf reiterated his contention—disputed by Navy leaders—that the F/A-18E/F is not merely a modification of an existing plane but a different aircraft, with \$5 billion in R&D funds programmed to redesign the fuselage size and structure, wing, and flight control computers.

The aircraft will also sport new engines, derived partly from the F/A-18C/D and the defunct A-12 program.

The Navy requested that the COEA requirement be waived, asserting it was not required for a major modification. It also argued that if a COEA were required, it should be limited to the F/A-18C/D baseline. Mr. Vander Schaaf said that by eliminating alternatives the purpose of a COEA was defeated.

GD Lays Off 450

General Dynamics was forced to lay off 450 workers engaged in the final assembly process of the F-16 because the line was bogged down as a result of quality problems in production, the firm said in June.

GD's Fort Worth, Tex., facility turned out only three F-16s in two months and fell thirty-three aircraft behind schedule. Because production has slowed, droves of workers have been standing around with nothing to do, so GD will lay off some for two to six months, the firm said.

In April the Defense Plant Representative Office directed GD to correct quality problems in the produc-



In June, this Army UH-1H Iroquois recorded its 20,000th flight hour. The thirty-year-old Huey, which flew extensively in combat over Vietnam, was honored in a special ceremony at Fort Rucker, Ala. The Bell-built helicopter is currently used for pilot training at the US Army Aviation Center.



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tion of certain parts. GD submitted an action plan to the office. GD said it will satisfy the quality problems.

A-X Stealth

Rear Adm. Riley Mixson, acting Navy aviation requirements chief, said the Navy seeks to incorporate current-generation stealth technology in the A-X attack aircraft.

In his June statement to the National Aviation Club, Admiral Mixson said the A-X will use "proven" stealth technologies developed in the B-2 bomber, F-22 fighter, and A-12 attack plane programs. He said that using avionics developed under the F-22 program would achieve significant savings.

Contractors provided the Navy a wide range of proposals that included supersonic strike fighters and "trucks," or heavy-lifting fighter-bombers.

Admiral Mixson seemed to dismiss the strike fighter option, saying that the Navy already has the F/A-18. He referred to the A-X, which will have an air-to-air capability, as the Navy's "silver bullet."

In addition, the Admiral assailed

the Pentagon's IG for saying the Navy performed an inadequate COEA on the F/A-18E/F. He stated that the Navy had met all of the Pentagon's study requirements on the F/A-18E/F and that DoD was on board with the program.

News Notes

■ Defense Secretary Cheney appointed Pentagon Comptroller Sean O'Keefe to be acting Navy Secretary following the July resignation of Navy Secretary H. Lawrence Garrett III. The actions were directly related to the "Tailhook incident," the harassment and abuse of dozens of Navy and civilian women at a 1991 convention of Naval aviators. In addition to dealing with the fallout from the Tailhook convention, Mr. O'Keefe is charged with "taking the Navy into the twenty-first century," says the Pentagon.

■ The House recommended that the Air National Guard take on certain command, control, communications, and intelligence (C³I) missions as US forces are restructured. The recommendation came in the House

Appropriations Committee's report on the 1993 defense bill, which was passed in June. The report suggested that Guard and Reserve units may be more capable of assuming greater C³I responsibilities because of "current civilian skills part-time soldiers bring to the job."

■ A bronze statue of General of the Air Force H. H. "Hap" Arnold will be erected at the Air Force Academy in Colorado Springs, Colo. The statue will be dedicated in early November 1993, the Air Force said in June.

■ The LTV-led Panther 800 helicopter program began its flight test program in June. The Panther is being offered to the Army as an off-the-shelf replacement for the UH-1H light utility helicopter.

■ The Titan IV solid rocket motor upgrade booster was successfully test-fired in June at Edwards AFB, Calif. The firing was the first in a series of five scheduled qualification tests. It followed fourteen months after an unsuccessful initial attempt in April 1991. The upgrade will increase the Titan's lift capability by twenty-five percent.

Senior Staff Changes

RETIREMENTS: B/G William J. Ball; B/G Ralph T. Browning; B/G William E. Collins; B/G Roscoe M. Cougill; M/G Richard F. Gillis; L/G Charles McCausland; M/G Kenneth E. Staten.

PROMOTION: To be **ANG Brigadier General:** Douglas M. Padgett.

CHANGES: Col. (B/G selectee) Kurt B. Anderson, from Cmdr., 82d FTW, ATC, Williams AFB, Ariz., to Cmdr., 48th FW, USAF, RAF Lakenheath, UK, replacing Col. William M. Guth . . . M/G Richard E. Carr, from Dep. Dir., Foreign Intel., Defense Intel. Analysis Ctr., DIA, Bolling AFB, D.C., to Dep. Cmdr. and C/S, 4th ATAF, NATO, Heidelberg, Germany, replacing M/G Harald G. Hermes . . . B/G Jeffrey G. Cliver, from Vice Cmdr., 7th AF, PACAF; C/S, ROK/US Air Comp. Cmd., CFC; and Vice Cmdr., US Air Forces Korea, Osan AB, Korea, to Cmdr., 18th Wing, PACAF, and Installation Cmdr., Kadena AB, Japan, replacing B/G Joseph E. Hurd . . . M/G Brett M. Dula, from Vice Cmdr., 8th AF, SAC, Barksdale AFB, La., to Cmdr., 2d AF, ACC, Beale AFB, Calif., replacing B/G Lawrence A. Mitchell . . . B/G Milton L. Haines, from DCS/Comptroller, Hq. AFLC, Wright-Patterson AFB, Ohio, to Dep. for Special Projects, Ass't Sec'y of the Air Force for Financial Management, OSAF, Wright-Patterson AFB, Ohio . . . B/G Thomas C. Hruskocy, from DCS/Log., and Dep. Dir., Log., STRACOS, Hq. SAC, Offutt AFB, Neb., to Exec. Dir., Quality Assurance, DLA, Cameron Station, Va., replacing B/G Rondal H. Smith.

B/G Joseph E. Hurd, from Cmdr., 18th Wing, PACAF, and Installation Cmdr., Kadena AB, Japan, to Ass't Dep. Under Sec'y of the Air Force for Int'l Affairs and Chair, Security Assistance Commission, OSAF, Washington, D. C., replacing M/G Philip W. Nuber . . . B/G (M/G selectee) Nicholas Kehoe III, from Dep. Dir., Reg. P&O, Hq. USAF, Washington, D. C., to ACS, Ops., SHAPE, Mons, Belgium, replacing M/G (L/G selectee) James L. Jamerson . . . M/G John G. Lorber, from DCS/Plans, and Staff Dir., Plans, PACOPS, Hq. PACAF, Hickam AFB, Hawaii, to Ass't to DCS/P&O, Hq. USAF, Washington, D. C. . . . B/G Lawrence A. Mitchell, from Cmdr., 2d AF, ACC, Beale AFB, Calif., to Dep. Dir., Central Imagery Office, OSD, Washington, D. C. . . . M/G Philip W. Nuber, from Ass't Dep. Under Sec'y of the Air Force for Int'l Affairs and Chair, Security Assistance Commission, OSAF, Washington, D. C., to Chief, Jt. US Mil. Mission for

Aid to Turkey, USEUCOM, Ankara, Turkey . . . B/G David Oakes, from Cmdr., 24th Wing, ACC; Cmdr., USSOUTHAF Forward; Dep. Cmdr., Jt. Forces Panama, and Installation Cmdr., Howard AFB, Panama, to Cmdr., 552d ACW, ACC, Tinker AFB, Okla., replacing retired B/G William J. Ball.

M/G Joseph J. Redden, from Commandant of Cadets, USAFA, Colorado Springs, Colo., to DCS/Plans, and Staff Dir., Plans, PACOPS, Hq. PACAF, Hickam AFB, Hawaii, replacing M/G John G. Lorber . . . B/G James M. Richards, from Ass't DCS/P&R, Hq. SAC, Offutt AFB, Neb., to Cmdr., 92d BW, ACC, Fairchild AFB, Wash., replacing Col. Michael G. Ruotsala . . . B/G James S. Savarda, from Cmdr., AC&SC, Hq. AU, Maxwell AFB, Ala., to Cmd. Dir., NORAD Combat Ops. Staff, J-31, Hq. NORAD, Cheyenne Mountain AFB, Colo., replacing retired B/G William E. Collins . . . B/G David A. Sawyer, from Cmdr., 23d Wing, ACC, England AFB, La., to Cmdr., 24th Wing, ACC; Cmdr., USSOUTHAF Forward; Dep. Cmdr., Jt. Forces Panama, and Installation Cmdr., Howard AFB, Panama, replacing B/G David Oakes . . . Col. (B/G selectee) Ervin C. Sharpe, Jr., from Cmdr., CADRE, Hq. AU, Maxwell AFB, Ala., to Vice Cmdr., 7th AF, PACAF; C/S, ROK/US Air Comp. Cmd., CFC; and Vice Cmdr., US Air Forces Korea, Osan AB, Korea, replacing B/G Jeffrey G. Cliver . . . B/G John R. Wormington, from Cmdr., Prgm. Mgmt. Div., DCMC, and Cmdr., DCMC Primary Field Level Activity, DLA, Cameron Station, Va., to Dir., C⁴ Sys., J-6, Hq. USTRANSCOM, Scott AFB, Ill., replacing B/G Jerome A. Landry.

SENIOR EXECUTIVE SERVICE (SES) RETIREMENT: John E. Lang.

SES CHANGES: Roger M. Blanchard, from Dep. Dir., Personnel Mgmt., Hq. USAF, Washington, D. C., to Dep. Dir., Plans & Rqmts., Hq. USAF, Washington, D. C., replacing Earl A. Aler . . . Roy C. Gay, from ACS, Personnel, Hq. AFSC, Andrews AFB, Md., to Dep. Dir., Personnel Mgmt., Hq. USAF, Washington, D. C., replacing Roger M. Blanchard . . . Fredolin W. Kuhn, from Cmdr., Hq. AFLSA, Bolling AFB, D. C., to Ass't General Counsel, Installations and Environmental Law, OSAF, Washington, D. C., replacing retired Grant C. Reynolds . . . Robert D. Stuart, from Dir., Budget Investment, OSAF, Washington, D. C., to Dep. for Budget, Dep. Ass't Sec'y, Budget, OSAF, Washington, D. C., replacing John W. Beach.

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THE C-17. LIFELINE TO THE FRONT LINE.

■ Westinghouse Aerospace and Antisubmarine Warfare Division has integrated an infrared sensor into the AN/APG-68 fire-control radar, giving the F-16 a significant night attack capability. The Air Force will test the Falcon Knight system in the Advanced Fighter Technology Integration F-16 at Edwards AFB.

■ In June, NASA and the Russian Space Agency formally ratified the first contract between NASA and a Russian aerospace firm, NPO-Energia, to study applications of Russian space technology to the Space Station Freedom program. The contract is for one year and \$1 million.

■ Twenty-four F-4E Phantom IIs belonging to the 20th Fighter Squadron and the 1st German Air Force Training Squadron transferred to Holloman AFB, N. M., from George AFB, Calif., in June. The aircraft will be part of the 49th Fighter Wing and will be used to train German pilots.

■ The Joint Service Imagery Processing System, developed by Electronic Systems Center at Hanscom AFB, Mass., won approval from the Secretary of the Air Force to proceed into production. The system records

electronic imagery, sends it by data link to JSIPS shelters on the ground, and then quickly disperses it to commanders. The program is part of the Advanced Tactical Airborne Reconnaissance System, which can be loaded on tactical aircraft.

■ The B-2 bomber made its first night flight in June at Edwards AFB, where the plane's crew evaluated its night flying capabilities and characteristics. The flight lasted four and a half hours.

■ The failure of a Lightweight Exo-atmospheric Projectile in June to hit its target in a test shot at White Sands Missile Range, N. M., was attributed to the number of experiments attempted during the projectile's short flight time, not to problems with the system itself, according to SDIO Director Henry Cooper. Although LEAP did not intercept its target, it acquired and tracked the target successfully.

■ In late June, DoD completed the worldwide withdrawal of the US stockpile of nuclear artillery shells, Lance missile warheads, and Naval nuclear depth bombs to US territory in accordance with the US's September 1991 nuclear initiative.

Purchases

The Air Force awarded McDonnell Douglas an \$85 million face-value increase to a fixed-price incentive firm contract for an extension of Lot IV advanced buy/long lead for four C-17 aircraft. Expected completion: April 1994.

The Air Force awarded McDonnell Douglas a \$390 million face-value increase to a fixed-price incentive contract for Fiscal 1990 and 1991 production for the AGM-129A Advanced Cruise Missile (ACM), consisting of fifty ACMs in 1990 and fifty in 1991. Expected completion: March 1993.

The Air Force awarded General Motors Corp. a \$6.4 million face-value increase to a firm fixed-price contract for eight T56-A-15 engines for use on Air National Guard C-130H aircraft. Expected completion: December 1992.

The Air Force awarded McDonnell Douglas a \$57 million face-value increase to a fixed-price incentive firm contract for the reconfiguration of C-17 aircraft numbers one through four to production configuration after completion of initial program testing and evaluation. Expected completion: May 1995. ■

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With the B-52 aging out and the B-2 fleet capped at twenty, the bulk of the bomber mission falls on the B-1 Lancer.

The Bone

By Frank Oliveri, Associate Editor



THE BIG gray jet screams along a ridge line at 200 feet, doing .95 Mach. Then, within the space of a few seconds, bomb bay doors open, eighty-four 500-pound iron bombs drop, and the doors snap shut again. Almost before the first bomb strikes its target, the jet is gone.

That kind of speed and striking power can be found in only one aircraft in the world: the US Air Force's B-1B. Nobody calls this heavy bomber the Lancer. Everyone just calls it the "Bone."

"When you have [an experienced] crew and you're having a good day, it's a thing of beauty," said Capt. Brian Donahoo, copilot of a B-1 assigned to Air Combat Command's 319th Wing, at Grand Forks AFB, N. D. "It's almost a religious experience."

Until recently, the plane was mostly under wraps. The fleet of B-1Bs was almost fully dedicated to the mission of carrying out the Single Integrated Operational Plan (SIOP) for delivering specific numbers and types of nuclear weapons on specific targets in the Soviet Union.

All that has changed. Though the Bone still has nuclear responsibilities, it has gone conventional.





Capt. Tim Stocking, aircraft commander, 319th Bomb Wing, performs a walk-around inspection of his aircraft before a training mission. B-1B crews typically fly two training missions per week at Grand Forks AFB, N. D.

As a B-1B copilot, Captain Donahoo has the best possible seat for seeing what the bomber can do. "If you're flying," he explained, "you're 100 percent concentrating on not hitting the ground. If you sit back being 'Mr. SA' [situational awareness] . . . it feels good. You're confident in what you're doing, the guys in back are navigating, jamming and jiving, dropping bombs. . . . It's great."

The B-1 aircraft commander, Capt. Dave Kugler, agreed. "It's a very relaxing ride. I have seen 200 feet in hard ride, sleeves rolled up, saying 'Gee, I can eat a sandwich right now,' zipping along the ground at .95 Mach."

Don't misunderstand Captains Donahoo and Kugler. Both know they must maintain extreme vigilance when flying. With the B-1B bomber, there's always a thin line between control and "departing from controlled flight," which could well mean death for the four-man crew.

The Line Blurs

One need only talk with B-1B operators about conventional tactics to notice that a big change has taken place in the bomber's mission. Like fighter jocks, the B-1 pilots begin to talk with their hands. They're talking about Gs, speed—even air-to-air missiles. The once-distinct line between fighters and bombers begins to blur.

The emergence of the B-1 as a conventional force could not have come at a better time. The Air Force appears

resigned to getting no more than twenty stealthy B-2 bombers, rather than the planned seventy-five, and the rest of the bomber fleet—B-1s and B-52s—must take up the slack. With B-52s aging out of the force, USAF will grow more dependent on the B-1 for conventional power.

The B-1 has been overshadowed by the B-2. In the words of one B-1 pilot, "We . . . felt that our aircraft was involved in some kind of political chess game because of the B-2."

The new Air Force plan for the B-1, however, is enough to give its advocates goose bumps. The bulk of the bomber mission will fall on the shoulders of ninety-seven B-1s.

To fulfill these expanded expectations, the B-1 will need more than Mk. 82 500-pound dumb bombs. The bomber is far from full maturity and has yet to receive some existing weapon systems. The Air Force plans to give it many new capabilities. For example, USAF foresees a B-1B weapon complement consisting of such smart weapons as the Joint Direct Attack Munition (JDAM), the Sensor-Fuzed Weapon, and the Triservice Standoff Attack Missile (TSSAM).

Beyond its plan to give the bomber new weapons, the service wants to upgrade other aspects of B-1 performance with highly advanced new systems. The possibilities:

- Equipping the B-1B with terminals that would tie the plane in to the Global Positioning System (GPS) sat-

ellite net, further improving the aircraft's precision targeting.

- Installation of an improved defensive electronic countermeasures (ECM) suite to compensate for weaknesses in the troubled ALQ-161 system and increase capability against a wider variety of electronic threats.

- Completion of a long-deferred logistics program, which would eliminate the need to keep expensive contractor personnel in the bomber's support system and enable uniformed crews to provide all maintenance.

- Use of night vision goggles for low-level night missions. The goggles would complement the bomber's existing terrain-following radar (TFR). A program that would have included installation of equipment resembling Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) was recently terminated.

When asked to provide a list of additional items and capabilities the B-1 would need, system operators say they hope for a new mission-planning system, a jam-resistant Have Quick UHF radio system, improved ability to operate out of a bare base, and a better conventional weapons load facility to improve aircraft turnaround times.

Many crew members also expressed a desire for a self-defense system. One radical possibility would be to equip the bomber with the AGM-120A Advanced Medium-Range Air-to-Air Missile. AMRAAM has heretofore been regarded as a weapon for fighters only.

Funding for B-1 upgrades, as with every other program in the Air Force, will be difficult to find. The service faces hard decisions over the next few years, but senior Air Force officials said the B-1 will be a top-priority item.

Born in Controversy

The B-1 is no stranger to controversy. The bomber program, born in the 1960s, was canceled by Jimmy Carter in 1977 and revived in altered form in 1981 by Ronald Reagan. The Reagan Pentagon put production on a fast track, aiming to field the new bomber in record time. "Well, we achieved that," one pilot said, "which I guess was a good thing, but . . . we've now hung all our dirty laundry out there in the test world as operational failure of the aircraft."

The bomber's pilots and others in-



Captain Stocking goes through preflight checks inside the cockpit. Teamwork is the name of the game as the four-man crew—aircraft commander, copilot, and defensive and offensive systems operators—prepares for a training sortie.

volved in the program say that many of the teething problems that arose early in the program are not unusual for a new system of such complexity and capability. Still, said Brig. Gen. David W. McIlvoy, the 319th Bomb Wing's commander, the bomber's controversial birth has produced "a tendency for the people that don't like it to look to blow those [problems] out of proportion."

As the Air Force has become more familiar with the plane, it has begun to visualize an awesome capability in the B-1B, resulting from its variable-geometry wings, four 30,000-pound-thrust General Electric F101-GE-102 turbofan engines, unrefueled intercontinental range, and 450,000-pound operational weight. The B-1's maximum speed is supersonic and remains near-supersonic even when traveling on the deck. The Air Force has imposed a restriction that limits the plane to no more than three Gs. In its weight class, the bomber holds every record in "time to climb." Pilots swear it flies like a fighter.

The potential of the B-1 went on display not long ago at Nellis AFB, Nev., when several of the sleek new swingwing bombers took part in a Red Flag competition. Evidently, the fighter jocks assumed the bomber would operate at slower speeds than those to which fighters have become accustomed. They quickly learned that their fighters could not maintain some of the low-level speeds that the B-1

finds optimal. Having flown for years alongside the B-52, whose speed the B-1 can double, fighter pilots were surprised.

No Decoy Work

When planning the first few mission packages, the fighter pilots suggested that the Bone should be used as a decoy to allow the fighters to get in and hit the target area. Captain Kugler, who took part in the exercise, had a blunt response: B-1s don't do decoys. In the world of fighter pilots, he added,

"there seems to be a lack of appreciation for the tonnage you are carrying."

Captain Donahoo said, "If the mission is to get bombs on target, you shouldn't be risking the most bombs in the entire strike package as a decoy. Our radar cross section, head-on, is smaller than [that of] an F-16, so we're really not putting up that big a skin paint. The only way we can get people to come after us is to start radiating. That's a bad idea."

At Red Flag, pilots quickly found that certain aircraft worked very well together. For example, said Offensive Systems Operator (OSO) Capt. Shawn Lehnertz, the coordinated work of the B-1 and the F-111 was "outstanding." He said both aircraft have similar airspeeds and missions, while the air-to-air threat of the F-111 forced adversaries to respect their formations.

Captain Kugler said the same was true of the combination of B-1s and F-15E strike fighters. The F-15E can swing to an air-to-air role as an escort for egress. "They could hang with our airspeed because they carry more fuel than an F-16 or [AV-8B] Harrier," he added.

B-1 crews also came away from Red Flag with a healthy respect for the F-4G Wild Weasel, a highly effective system for attacking enemy radars.

However, bomber crews found that they operated best alone, primarily because of the low observability of



Sunrise Surprise drops away from a KC-135 tanker during a training mission. The Bone is difficult to kill when it flies at low level. One crew member who took part in Red Flag said aggressors never succeeded with radar-guided missiles.



A conventional bomb module is loaded into the B-1 in much the way a toilet paper roll goes into a dispenser. The three modules, which discharge up to twenty-eight 500-pound bombs each, can be clip-loaded or loaded while in the bomb bay.

the B-1. Often electronic emissions from F-16s or other fighters would betray the location of the B-1s.

"It turns out in some cases our survivability goes down if the mutual support you have has a negative impact on your best asset," reported defensive systems operator Capt. Daniel Grenier. "What if the fighter escort can't go as fast as us? Now we just sacrificed our best asset. What if these fighters have a larger [radar] cross section than us? That happened. In a combined force, what you'd think would be an obvious solution to your survivability factor turns out not to be."

Captain Kugler said that some of the thinking of the old Strategic Air Command also rubbed off in positive ways. "I think we look at things on a more strategic scale. Okay, here's the threat. Here's what we need to do. Not all of them [fighter pilots], but some of the younger ones, were thinking a lot about how many aerial kills they got. Sorry, that doesn't win the war. We went in there with the idea that we needed to obliterate the enemy, and the fighter guys came away with a pretty healthy respect for that."

Lost in the Clutter

One package favored by B-1B folks was the "Gorilla Package," whereby all assets are concentrated over a small area in a short period of time. "You could have all sixty aircraft at basically the same time at a different penetration line and overwhelm the de-

fenses," Captain Kugler said "We get lost in that clutter."

B-1 crews were pleasantly surprised to find that enemy radars had great difficulty locking on to the bomber. Placing the nose of the aircraft directly toward enemy radars severely degraded their detection capability, while low-level flight also helped to mask the aircraft.

Captain Donahoo said that, at Red Flag, the opposition's simulated attacks with radar-guided missiles never succeeded: "There were only visual

kills." Captain Lehnertz pointed out that Red Flag reaffirmed the axiom, "Speed is life."

"He with the most gas wins," he said. "If you can get up to .9 Mach [on the deck] . . . let's be real; not many guys can hang with that."

Captain Kugler conceded that, compared to the B-1, fighters are far more maneuverable, meaning they could get out of trouble quicker. While fighters can turn on a dime, the Bone requires eighteen miles to make a 180-degree turn. Yet, as bombers go, the B-1 has unprecedented maneuverability. Gone are the days, say crew members, when you could get airborne and leave a coffee cup unattended.

However, B-1 commanders have learned that battles are often won by not maneuvering at all. "If you put yourself in the right position, keep your nose on, keep your radar cross section down, and keep your bank angle down so you can let ECM work, you may not have to maneuver much at all," Captain Kugler said. He added that aggressive maneuvering becomes necessary only when an enemy has actually launched air-to-air missiles.

The B-1's ALQ-161 defensive ECM suite had its share of problems at Red Flag, but not of the type that one might have expected. Usually, complaints about the system center on its inability to counter certain threats. At Red Flag, operators found that the system was jamming too much. Captain Grenier explained the problem



A maintenance crew must go over the B-1B with a fine-tooth comb, knowing that the crew's lives depend on it. Ground crews, through their own initiatives, have increased maintenance efficiency on the Bone.

this way: At Red Flag, the aggressor force operated US systems. There were times when the B-1's ECM system was unable to distinguish blue forces from red forces. It would, therefore, sometimes jam both.

The operators said that problem foreshadows tomorrow's battlefield. "We may face French- or American-made aircraft, but it's hard to sort out good and bad," Captain Grenier said. "The -161 did a good job [identifying] what's out there, but we had trouble telling it what not to jam."

The B-1's Core program aims to improve maintenance of the ALQ-161 system, enabling operators to solve problems more readily. Currently, the suite can counter eleven of fifty possible threats at any given time. Eleven likely threats can be programmed into the system before a mission.

Maj. Bob Ketchener, also a defensive system operator, said the Core improvements will allow maintenance workers to identify problems quickly and thus turn the aircraft rapidly.

"It [the ALQ-161] has quite a bit of capability right now," said General McIlvoy. "In fact, in some of the bandwidths and some of the regimes, it actually has more capability than the B-52."

The ALQ-161's ability to distinguish threats will be improved by modifying it with emitter identification modes. One improvement might be to upgrade identification, friend or foe technologies.

Another might be to install Have Quick radios. The Have Quick is jam-resistant and allows friendly aircraft to communicate clearly. If the -161 were to identify a potential threat, the B-1 crew would only have to call that aircraft to verify if it were friend or foe. Only a friend could respond to the call.

Currently, the B-1B is outfitted with dual ARC-171 UHF radios, which are susceptible to jamming. "It happened to us in Red Flag," said Captain Kugler. "When they decided to jam our frequency, we could no longer hear anybody, and these guys on Have Quick are talking back and forth with no problem at all. If there was a target change, forget it."

The B-1 has the KY-58 secure voice system, but most other US aircraft lack that system, Captain Kugler said.

Another lesson of Red Flag was that jamming is not the only way to counter threats. Crew members said



Staff photo by Guy Aceto

Planning, planning, planning. Aircraft commanders are responsible for the aircraft and its crew, so they go over maintenance records and mission briefs thoroughly. Officers and enlisted personnel work closely together on the flight line.

that the RR-170 chaff and MJU-23B flares worked well.

The Nuclear Mission

For all the new emphasis on conventional operations, the Bone will still carry much of the SIOP's penetrating bomber mission, one for which it has been long criticized.

Operators challenged those who question the bomber's penetration capability. They said that if the B-1 took part in a nuclear conflict between superpowers, the plane would not arrive at its targets until the US had laid down a full missile attack on key enemy installations.

"That takes care of a lot of the threat," Captain Kugler said.

Added Captain Donahoo, "We're not stupid. We're not going to plan some kind of route where we're going to fly over a fighter base and SA-10 missile sites that are in the way."

The B-1's all-weather, low-level, high-speed capability depends heavily on its TFR system, which can fly the aircraft at an altitude of 200 feet. The TFR is a part of the larger APQ-164 pulse-Doppler radar. The APQ-164 handles such functions as ground mapping, automatic instrument landing approach, and terrain following.

If the TFR system is engaged, the pilot flies "hand off stick" but is prepared to override the system should he feel the need to do so. The TFR scans terrain to a distance of 9.5 nautical miles. In the event of failure, the

system generates an automatic 2.4-G flyup to lift the aircraft to safety.

However, because the APQ-164's top priority is terrain following when TFR is engaged, the B-1 OSO must calculate targeting information through offset aiming points. Offset aiming points are located thirty to sixty degrees off the nose. The inertial navigation system (INS) will place the cross hairs where it thinks the offset aimpoint is.

The OSO manually resets the cross hairs on the exact point. Steering information is then transferred to the pilot's command heading marker and autopilot, and the aircraft is steered to the release point.

Offset targeting is not as accurate as direct targeting. However, USAF has begun a program that would provide new avionics software to correct targeting problems. The new software, which Captain Kugler says will soon be implemented, allows better radar time-sharing between the TFR and direct targeting. He acknowledged that the TFR could be jammed, leaving the pilot blind in foul weather or darkness, flying at .95 Mach at low level. Night vision goggles could be crucial to crew survival if the TFR were jammed. While not a LANTIRN system, night vision goggles would at least allow the pilot to fly the aircraft visually.

With a GPS terminal on board to update the INS, targeting would improve further. The Air Force plans to introduce GPS capability late next year.



Once besieged, now the backbone of the bomber fleet, the B-1B is well suited to meet the Air Force's needs, with its low-observable characteristics and greater payload and speed than the venerable B-52.

The GPS will also enhance the aircraft's ability to launch precision guided munitions. Captain Bonavita said the Bone could carry up to twenty-four 2,000-pound PGMs—eight on rotary launchers in each of the B-1's three bomb bays. The impact of such a platform could be devastating. Each F-117, used with shattering effect in Desert Storm, carries only two 2,000-pound laser-guided bombs.

The Air Force plans to integrate into the B-1 the 1760 data bus, originally developed for the SRAM II (short-range attack missile). The data bus will enable the B-1 to deliver smart munitions, according to Captain Bonavita. General McIlvoy said that, in the late 1990s, the B-1 will be able to deliver smart weapons, though the bomber still will have to fly over or near the target area.

Plans call for USAF to give B-1Bs the capability to carry standoff conventional munitions in the late 1990s.

"I'm not talking about conventional cruise missiles, like the kinds the B-52 launched," General McIlvoy said. "I'm talking something that is twenty, thirty, forty miles from the target."

The Bone Meets Popeye

Such weapons would enable the B-1 to stay far outside the range of lethal air defense systems. The General said the Air Force was studying possible use on the B-1 of a derivative of Israel's Popeye conventional munition similar to Have Nap. The missile is too

large for the bomber to carry internally, but it could be carried externally. However, the General said, external carriage would undermine two of the bomber's best features: speed and low observability. The service is developing a variant of Popeye with folding fins, which the B-1B could carry on its internal rotary launcher.

The JDAM, an inertially guided, GPS-assisted munition, will enter procurement in 1994 and be introduced to the B-1B in the late 1990s. The Joint Standoff Weapon (JSOW), an antiarmor munition that could achieve multiple kills, will be introduced in 2002. The TSSAM, an autonomous, precision guided stealthy cruise missile to be used against high-value targets, will be introduced by 2004.

Some B-1 features that were adequate for the SIOP mission are inadequate for the conventional mission. One is the existing mission data preparation system. Captain Grenier said the current system is programmed prior to each mission but is hard to reprogram in flight.

"The thing we really need—and we're a dinosaur compared to other systems out there—is to be able to mission-plan flexibly," he said.

To reprogram in flight, B-1 operators must manually calculate their track on paper with a "whiz wheel," a calculating device used to help in navigation. Those coordinates must be manually punched into the system. An SIOP mission may not require

flexible planning, but a conventional mission—with mobile targets—requires great flexibility. The problem, in the words of Captain Grenier: "If you're six hours in flight and they say, 'Oh, by the way, you're not hitting this target anymore. They moved,' well, your whole route of flight has changed. Now you'd have to hand-load all those points."

The B-1's conventional role also requires a better capability to operate from bare bases. It can use its auxiliary power unit to power up without ground assistance, but it lacks a preload facility for conventional ordnance, Captain Kugler said. "Our turnaround time for producing sorties is significantly degraded" by this deficiency.

Just loading the conventional bomb module can be a major challenge. It requires a 40,000-pound trailer, according to SMSgt. Gary Allen, the wing's weapons manager. Loading a single module while it is in the bomb bay is a major ordeal that requires great precision. "It takes forty minutes for the first bomb [which includes loading the module in the bay] and five minutes for each additional bomb, so you're looking at about three hours for a single bay of twenty-eight bombs," Sergeant Allen said.

Moving the 40,000-pound trailer is not easy. One C-5 airlifter is required for each trailer. Sergeant Allen said that his crews, on their own initiative, devised a method whereby the much smaller MJ-40 bomb loader could be adapted to install the conventional bomb module. The new method is being engineered for possible use.

Maintaining the module is also challenging. The system discharges bombs ballistically. Each bomb is released by the electrically initiated explosion of two impulse cartridges. Once used, the cartridges must be removed and carbon scrubbed from the area. One failure could cause a hung store, meaning that a sequence for dropping bombs is broken, causing the bombs to get hung up inside the module. Sergeant Allen's crew's experience has made such mishaps infrequent.

Crew members fly an average of two training sorties each week and supplement that training with work on the simulator. Two years ago, B-1B crews logged less than a third of their time in conventional training. Now, preparing for that mission consumes more than two-thirds of their training time. ■

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Theater operations are now a core mission, rated equal to nuclear deterrence, for the bomber force.

The Bomber Roadmap

By Robert S. Dudley, Executive Editor

THE Air Force's ambitious new plan to strengthen its bomber fleet foreshadows a major shift in the conduct of US defense.

The service's proposed "US Bomber Roadmap" reports that the force has formally acquired a new core mission: sustained theater air warfare. Bombers long have had a conventional role, but it was deemed to be of secondary priority. Now the theater mission and nuclear deterrence are of equal importance.

The new bomber concept promises to affect American defense planning in two key ways.

First, it portends the emergence of a versatile, 211-bomber force that will permit a theater commander to carry out sustained conventional air attacks against an enemy force without a lengthy buildup of local military assets and even in areas where bases might not be available. Plans call for bombers to be able to conduct not only mass raids but also precision attacks. The principal aim, in the words of the Roadmap, is to inflict "operational paralysis" to "unhinge" enemy defenses.

"The bomber force we are constructing—a combination of mass, reach,

and immediacy with precision strike—will be a weapon of choice for operational commanders," says Donald B. Rice, the Secretary of the Air Force.

Second, defense experts say Washington is likely to view bombers as an increasingly attractive tool for US "show-of-force" operations. In a crisis, the aircraft could be deployed forward to threaten adversaries or reassure allies.

Some things won't change. The Air Force emphasizes that it will continue to meet its bedrock commitment to nuclear deterrence. The fleet will retain a nuclear capability and train for nuclear war.

Much has yet to be revealed about

the Air Force's plan, which describes how bombers will be employed over the next few decades. Essentials were laid out in testimony to Congress and in a white paper that combines conclusions of an Air Combat Command force analysis and Air Force investment priorities.

Turning From the Nuclear Mission

Fueling the plan was the growing perception that the Air Force had to reorient its bomber fleet away from nuclear missions and turn it into a smaller, versatile, more sophisticated force equipped to perform a variety of conventional and nuclear tasks. This belief stems from the withdrawal of US military forces abroad, the shrinking of the defense budget, the unpredictability of the international situation, and the complexity of US global interests.

Essentially, officials explain, the Air Force chose to capitalize on new technology to enhance the bomber's conventional prowess. The results are a new bomber concept of operations, a new force structure, and a new investment plan for the coming decade.

The plans and priorities laid out in the Bomber Roadmap derive from the conviction that the force should be equipped for the most demanding requirement: the need to provide a swift initial response to aggression and sustained firepower for a full-scale theater war. In this context, USAF officers say, the key objective of bomber activities would be to bring on "operational paralysis," or disruption of the enemy's capacity to respond to attack.

The thinking is that the fleet must be able to destroy targets that could cause unacceptable damage to US forces if permitted to survive. Included are facilities for production, support, or use of mass-destruction arms, massed enemy forces, enemy command and control, air defenses, air attack assets, and war industries.

As the Roadmap states, "The art of inflicting operational paralysis depends on hitting a . . . selection of the enemy's most valuable targets in a short span of time."

To quantify future requirements for this type of operation, Roadmap authors used the Persian Gulf War as a benchmark. They identified a list of 238 generic "initial, high-priority tar-



Staff photo by Guy Aceto

The workhorse of the 211-ship bomber fleet will be the B-1B. It is flexible enough to operate as either a penetrator or a standoff platform. It can deliver a telling payload, and its capabilities are still emerging.

gets" that a theater commander would likely wish to destroy early in a war. The list was subdivided into 1,250 smaller target elements—building corners, bridge abutments, and the like—that would have to be hit to ensure destruction of the main target set.

The concept called for shattering these targets in a mere five days to "unhinge an enemy's strategic plan, stall his offensive, and pave the way for [friendly] joint forces arriving in theater."

The Air Force assigned to its B-52 and B-1 bombers a notional 0.4-per-day sortie rate and a seventy-five percent mission capable rate. When the planners conducted an assessment based on these factors, the outcome was disappointing. It showed that the 1992 bomber fleet, armed with existing types of weapons, could destroy no more than 300 of the 1,250 targets—one-quarter of the total—within the allotted five days.

The Roadmap warned, "Without substantial improvements [to the fleet], the theater CINC would not be able to inflict operational paralysis on enemy ground, air attack, or air defense forces—or to even stall operations until weeks or months passed to allow time to bring joint forces into the theater."

Covering All Targets

The Air Force proposes specific steps to remedy bomber weaknesses. It claims that, under the same wartime

sortie and readiness conditions, the enhanced bomber fleet would, by 2001, have the power to destroy all 1,250 individual target elements in the first five days—and at the same time bring new antiarmor capabilities to bear against ground force targets.

"Our analysis shows that . . . we will be able to strike the priority target set under the harshest wartime conditions," said the USAF report.

Those conditions include round-trip missions from the US lasting thirty-five hours, an overall 0.4 sortie rate, and a seventy-five percent mission capable rate.

The Roadmap says that the Air Force will be able to field such a fleet by pursuing a versatile force structure, smart weapons, and smart tactics.

Air Force planners have decided that the optimum force structure is 211 bombers—down from today's fleet of about 300—with the reduction achieved near the turn of the century.

The official total aircraft inventory would comprise some ninety-seven B-1Bs, ninety-five B-52Hs, and twenty stealthy B-2As. The Air Force chose to retire gradually all B-52G conventional bombers and transfer their capabilities to the H models, which are newer, cost less to operate, have a longer range, and can fight better from austere locations. Moreover, their engines are one-third more powerful than those on the G model.

Theater commanders will not have a claim on the entire fleet. When one



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discounts planes used for training, in maintenance, and in testing, the maximum available number will be 176 bombers—eighty B-52Hs, eighty B-1Bs, and sixteen B-2s.

With the force structure destined to shrink, Air Force planners argue that the premium is on effectiveness. They say that the two most effective tools are smart tactics and advanced munitions.

The tactical concept for the B-2 bomber is clear enough. Because it is stealthy, and because it carries precision guided weapons, it is expected to lead the bomber attack on the first nights of a war, striking the most heavily defended targets.

"The B-2 will hit the toughest targets," says Secretary Rice, "penetrating and surviving, . . . neutralizing defenses to allow less stealthy systems to operate."

The Roadmap describes the B-2 as "the pivotal tool" for bringing about the rapid destruction of an enemy. "Reaching from US bases, the B-2 can attack the nerve center of enemy capabilities alone and at will."

Planners say that two eight-bomber squadrons of B-2s (the other four bombers will be in maintenance or training) give a theater commander the power to strike high-priority strategic targets and advancing enemy ground forces early in a war.

Air Combat Command will receive its first operational B-2 bombers at the end of 1993.

The Air Force aims to enhance the ability of B-2 aircrews to get the most out of the aircraft. On tap for 1998 is a new, deployable mission planning system for specialized stealth route planning and advanced weapons targeting. This is a major improvement over the mission planning system originally designed to support predetermined nuclear and conventional missions.

The Backbone Bone

In the new scheme of things, the B-2 may be the "pivotal" bomber, but the B-1B's modern capabilities and sheer numbers make it the "backbone" of the conventional bomber force [see "The Bone," p. 34].

Air Force planners note that the B-1 is flexible enough to operate as a penetrator or standoff bomber. In the latter stages of a conflict, it would provide sustained mass to bombing raids or precision attack in composite strike packages.

Air Force officials say the B-1B, with the greatest speed and heaviest payload of any bomber, will provide "leading-edge performance" well into the next century. They contend that the plane will be able to penetrate all but the highest threat environments. Its primary role will be to take on the bulk of defended, time-critical targets early in a conflict, using direct attack or standoff munitions.

Like the F-111 fighter-bomber, the B-1 will be able to fly in packages

with fighters. Instead of carrying four 2,000-pound weapons, however, as the F-111 does, the B-1 can carry as many as twenty-four.

Over the coming years, the B-1 will receive new systems that will provide enhanced targeting and an ability to "shoot and penetrate" in a variety of scenarios. In the Air Force's view, "these capabilities can work in tandem with the B-2's strong suit in leading an initial response, and will allow the theater commander to plan a broad range of air strike options even in the absence of substantial forces pre-deployed to the theater."

The B-52, despite its age, is cast in a starring role in the new age of the bomber. Planners expect the B-52 to function on some occasions as a stand-off bomber, and the Air Force plans to move quickly to give the venerable BUFF conventional standoff capability. This would enable the plane to hit fixed targets in defended areas at what the Air Force terms "acceptable risk."

The B-52 will always have the capability to provide massive firepower in low-threat areas. Today, it can lift 38,000 pounds of bombs from bases anywhere in the US and carry them halfway around the world. Later in the decade, the airplane will acquire precision, direct-attack weapons. Ongoing upgrades, such as the installation of Global Positioning System receivers for sharper navigation, are enhancing the bomber's capabilities.

Development and deployment of a variety of promising "smart munitions" are equally important to the bomber program.

Which Bomber Goes Where?

The operational concepts rely on employing advanced conventional weapons in ways that emphasize a particular aircraft's strength. B-52s would mount direct attacks at low-threat targets but conduct standoff attacks against medium-threat targets. The B-1 could directly attack low-threat and medium-threat points and lob standoff weapons into high-threat areas. The B-2 could attack any and all targets directly, up to and including those most heavily defended.

One key to the effort is the Joint Direct Attack Munition (JDAM), a 2,000-pound weapon with an inertially guided, GPS-assisted munition. The expectation is that the first ver-



The hairiest missions and most difficult targets will go to the small fleet of B-2 Stealth bombers. The Air Force will have only enough B-2s to equip two squadrons and would rely on them to strike key targets in the early phase of hostilities.

sion, the JDAM I, will be accurate to within forty-five feet of the target. JDAM III, an even more advanced 2,000-pound-class weapon, will add a precision seeker, accurate to within ten feet of the target even at night and in poor weather.

The Joint Standoff Weapon (JSOW) is expected to provide bombers with accurate standoff antiarmor capability, enabling bomber aircraft to launch outside the range of anti-aircraft defenses and achieve multiple kills.

The stealthy AGM-137 Triservice Standoff Attack Missile (TSSAM) is the Air Force's prime conventional weapon, scheduled for installation on all three bombers. The TSSAM will combine stealth, a 100-nautical-mile range, an autonomous precision warhead, and a combined effects submunition. It is considered the ideal weapon for destroying small, critical targets from standoff ranges, but the Air Force still has to work out the bugs. Secretary Rice said that the TSSAM recently had a fully successful test flight that overcame a worrisome weapon separation problem but that the program is not out of the woods by a long shot.

All three bombers will also have air-deliverable mine-laying potential. B-52Hs will have Harpoon antiship missiles.

Generally, the B-2 is first in line for advanced munitions. The bomber will achieve initial operational capability for the TSSAM in 1996, for the JDAM I in 1997, and for the JDAM III in 2001.

The B-1 currently has an unguided conventional bombing capability and some potential to lay sea mines. In the next year, it will acquire the ability to use the advanced Mk. 84 iron bomb, which should improve its conventional lethality.

Certification of the B-1 for additional types of conventional munitions is under way. The program plan calls for the bomber to get the JDAM I in 1999, JSOW in 2002, JDAM III in 2003, and TSSAM in 2004. The weapons will greatly enlarge the number and types of targets that the B-1B can hit. To augment these weapons, the B-1 will be equipped with new high-speed, high-capacity computers and software.

Ten B-52 bombers are to be fitted with Have Nap missiles in 1994. The fleet will receive the TSSAM in 1996 and the JDAM I in 1998. In all, forty-



The B-52 may be around forever. Upgraded and modified many times over the years, it still gets the job done. The B-52's image was boosted by its performance in the Gulf War, and planners have given it a place in the new Bomber Roadmap.

seven B-52s will gain new capabilities for precision standoff attack and direct attack.

The Air Force has developed an investment strategy to pay for these improvements. The majority of Roadmap costs—some \$2.5 billion, about two-thirds, over ten years—are related to the B-1. The Air Force argues that such investment has the highest long-run payoff.

The Air Force will request funds for deferred support equipment to establish in-house capability and free itself from the annual cost of interim contractor support. It plans to continue with development of the B-1's troubled defensive electronic countermeasures suite.

Tough Radar Threats

"In regional conflicts," the Roadmap says, "enemy air defense systems may be less than state-of-the-art, but considerably more varied and unpredictable. Concentrations around valuable targets may be nearly as difficult as some of the postulated routes in the former Soviet Union. Because this diversity increases the number of countermeasures challenges for B-1 crews, implementing effective ECM and other endgame capabilities is actually more crucial for conventional mission profiles."

Apart from this amount, the Air Force will spend more to outfit forty-eight B-1s to deploy overseas on short notice. Spares will keep the B-1s fly-

ing at the heavy utilization rate required for regional wars of the future.

The B-52H investment is termed "minimal," about \$189.2 million, and goes primarily for the installation of GPS receivers and a standoff capability. The B-2 weapons integration and support costs are fully funded and contained in the programmed \$44.4 billion baseline B-2 budget.

The investment strategies have two major categories.

- Conventional enhancements will consume 47.7 percent of the new investment and cover the smart weapons and supplements such as a deployable mission planning system for the B-2 and simple modifications for the B-52H.

- Support costs—spares and war reserves, B-1 deferred logistics, ECM fixes—account for the other 52.3 percent of the new Roadmap investments. Other support programs include changing bomb racks and adding the military standard 1760 interface.

Totally funded, the Roadmap is paced at an average of \$485 million annually (then-year dollars) over the next six years, or eighteen percent of the total annual expenditure on bombers.

The Air Force emphasizes that its ambitious transformation of the bomber force is not a plan for the distant future, but for the here and now. Two years ago, B-1 crew members logged less than a third of their time training for conventional missions. This year, they will spend two-thirds. ■

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The Air Force's new recipe for readiness includes reducing administrative overhead and putting the troops back where the airplanes are.

Stripes on the Line

By Peter Grier

THREE years ago, changing a light bulb on the C-5 Galaxies of the 436th Airlift Wing was not necessarily a quick and easy operation.

The giant C-5's 1,100 bench stock items—lights, seals, screws, and other small parts—were kept at a central storage area back from the flight line at Dover AFB, Del. Special expediter trucks took bench stock orders and shuttled back with the parts, but the process could still cause delays of an hour or more.

That has changed. The microcomputers of the 436th Logistics Group crunched months' worth of demand figures and identified the 400 bench stock items that C-5 maintenance workers use the most. The group's four expediter trucks now carry all those parts all the time. These mobile bench stock depots now often deliver requested parts within eight minutes.

"They weigh a lot," says the 436th Logistics Group's deputy commander, Lt. Col. James H. Russell, slapping the side of a lunch-wagon-sized expediter vehicle. "We've had to put really heavy shocks on them."

This move is just one step in Dover AFB's effort to keep C-5 readiness up while budgets continue to tighten. A



Photos by Paul Kennedy

The new emphasis on leaner readiness has put many, formerly desk-bound senior sergeants back on the flight line, such as crew chief MSgt. Rollan Adams (above). The change benefits everyone, including the aircraft. At right, SSgt. Roger Deguzman crawls inside a C-5 engine to check for cracks in the fan blades.





The 436th Logistics Group installed heavy-duty shocks on its expediter trucks. Now they carry the 400 most-requested bench stock items at all times, slashing the average parts-delivery time by more than eighty percent.

similar challenge faces hundreds of other US Air Force installations, big and small, all over the world.

At Dover, organizational fat has been stripped away, layers of management eliminated, maintenance training expanded—all so as many repair workers as possible will be turning wrenches as often as they can.

The rule of thumb at the 436th Logistics Group is that workers should have tools in hand seventy-five percent of the time, with only twenty-five percent of the work day spent on such things as roll call or waiting for parts. Seniority no longer means a desk job, either. Many senior sergeants who used to spend their days on paperwork are now back working on planes.

"More of the available resources are focused on the job. Our total number of people may be diminished, but more people are on the line," says Lt. Col. William E. Martin, Logistics Group commander of the 512th Airlift Wing, Delaware ANG.

A Critical Link

Consider the case of the 436th's propulsion shop—a critical link in the readiness chain.

The Dover engine shop is an intermediate maintenance location, capable of stripping a faulty TF39 turbofan engine down to its smallest part and then building the whole thing back up again. With twelve bays laid out on a single axis, the facility looks like a particularly clean auto repair shop.

The shop used to be manned in two shifts of six teams each. At the change of each shift, teams would be assigned an engine to work on at random. It was the way things had always been done. Now twelve teams work one shift, eliminating the second layer of management oversight a split shift required. Each team "owns" its engines, working on them from start to finish to build accountability and pride of work. Two flight chiefs split management of the six-person teams.

"The reason we have six people to a team is that's the efficient way of repairing engines," says Col. Anthony F. Deascenti, 436th Logistics Group commander. "Only six guys can get around the dock where the engine is hanging. Each team has a leader to make sure those guys are working, but he spends ninety-nine percent of his time working too."

The teams see the same sorts of problems over and over. At any given time, there are probably four or five engines on the flight line running hot, for example.

The raw output of the engine shop is about what it was under the old management style—ten to twelve engines fixed per month—but that number is being reached with only seventy-two people, as opposed to 120 two years ago. The quality of work is higher. Over the last three months, only one engine has failed its test cell run due to the same problem for which it came in.

"Before that, it was two to three failures a month," says SMSgt. William A. Sessoms, propulsion branch superintendent. "It's ownership that makes the difference."

The planes that the engine shop helps keep in the air may not be glamorous, but they are among the most important military assets of the United States. No other airlifter in the West can load main battle tanks and fly around the world on a few hours' notice. Dover AFB has a lot of them. The thirty-eight C-5As and Bs of the 436th Airlift Wing represent fully one-quarter of the Pentagon's strategic airlift capability.

Dover's C-5s were flown hard during Operations Desert Shield and Storm. Some preventive maintenance was put off for the duration. Since April 1991, every one has been put through an "isochronal," an inspection that 436th officials liken to a 15,000-mile checkup on a car.

In the isochronal routine, conducted every 300 days, a C-5 is rolled in on Sunday night and rolled back out, ready to go, on Thursday. In between, the crews perform many tasks, including depaneling eighty percent of the aircraft to inspect its structure. Crew members look for small patches of corrosion or cracks that need attention before they become major problems.

Healthy Again

"Basically, we've just gotten the fleet back up to true health since the war," says Colonel Russell.

The 436th Logistics Group includes approximately 2,600 people out of Dover AFB's total population of around 6,000. Of those, 314 are civilian workers and 215 are Air Reserve technicians (ARTs), full-time reservists of the 512th Airlift Wing, an Air Force Reserve associate of the 436th. The ARTs work right alongside their active-duty counterparts.

"At any given time, we also have fifty to seventy-five weekend-type reserves here on their annual tour scattered among the various shops," says Colonel Martin of the 512th.

Like just about every organization in the military, the 436th Logistics Group has been taking some personnel cuts. It lost 140 authorized personnel slots in a recent five-month period, and more losses are to come.

Strictly speaking, the logistics group has existed only since last December, when the 436th Airlift Wing was re-

organized into an "objective wing" built around groups commanded by colonels. Group chief Colonel Deascenti says he likes the clean new chain of command, flowing from the wing commander, to him, to the commanders of his seven different squadrons, to the troops.

With the objective wing, "we've eliminated seams between organizations," says Colonel Deascenti. "What we've now done within the group is work towards flowing out that structure, getting rid of the intermediate layers of management."

Four of the logistics group squadrons focus on maintenance tasks. The logistics support squadron manages resources; the component repair squadron runs the engine shop, avionics shop, and other part-fixing facilities; and the equipment maintenance squadron focuses on the various inspections and refurbishments needed to sustain the long-haul C-5s. The largest maintenance unit is the new aircraft generation squadron (AGS), which accounts for roughly 1,100 of the 436th Logistic Group's 2,100 people.

The 436th began phasing in the AGS eighteen months ago, under an initiative called "Production Team Maintenance," now in progress throughout AMC. The point of the effort, says Colonel Deascenti, is to get his people to emphasize their bottom-line, most important task: turning their own thirty-eight C-5s and keeping them ready for the air.

The AGS infrastructure mirrors the newly simplified objective wing chain of command. The squadron is broken into two aircraft maintenance units (AMUs), dubbed "Wizards" and "Dragons" by their members. Friendly rivalry between the AMUs is encouraged by cultivating group identity. Many of the trucks rolling up and down the flight line sport wizard or dragon logos.

Signed Work

An AMU, in turn, is broken up into nineteen teams of twenty to twenty-five maintainers, each headed by an aircraft crew chief. Every team is responsible for one of the 436th's C-5s, with the crew chief's name written in white paint across the bottom of the aircraft's nose.

The teams are made up of people with widely varying skills, many of them specialists who used to truck back and forth from central shops to the flight line whenever needed. A typical team might have four engine workers, a couple of electronics workers, and three or four generalists. Many crew chiefs are senior NCOs who used to work in layers of management that have been eliminated.

"We've really pushed a lot of stripes out to the flight line," says Colonel Russell. "Our average crew chief went from being a staff sergeant to being a master sergeant."

Among the layers this structure has eliminated, says Colonel Russell, is

the job control agency, which used to coordinate the complicated routing of various specialists from central shops out to six aircraft or so a day. Now the crew chiefs are supervised by a much smaller staff that works out of brand-new buildings erected inside an old C-124 hangar on the flight line.

Another function that has been eliminated is the old twenty-five-person quality analysis group. These inspectors used to perform task evaluations and inspections of work in progress to make sure things were being done well and safely. Now the job of checking up on quality has been handed back to the chain of command, with crew chiefs responsible for the work of those under them.

"A lot of this stuff we had accumulated over the years because it made the managers and higher-ups more comfortable," says Colonel Russell. He says that many of the people whose administrative jobs have been eliminated were "'house mice.' ... Like mice, they just scurried around the house and didn't get much done as far as generating the aircraft," he says.

The Wizards and Dragons are responsible for aircraft generation twenty-four hours a day, but all twenty-five people on a crew chief's team can't work all the time. Thus, for efficiency's sake, it becomes important that maintainers on a team can do more than one task.

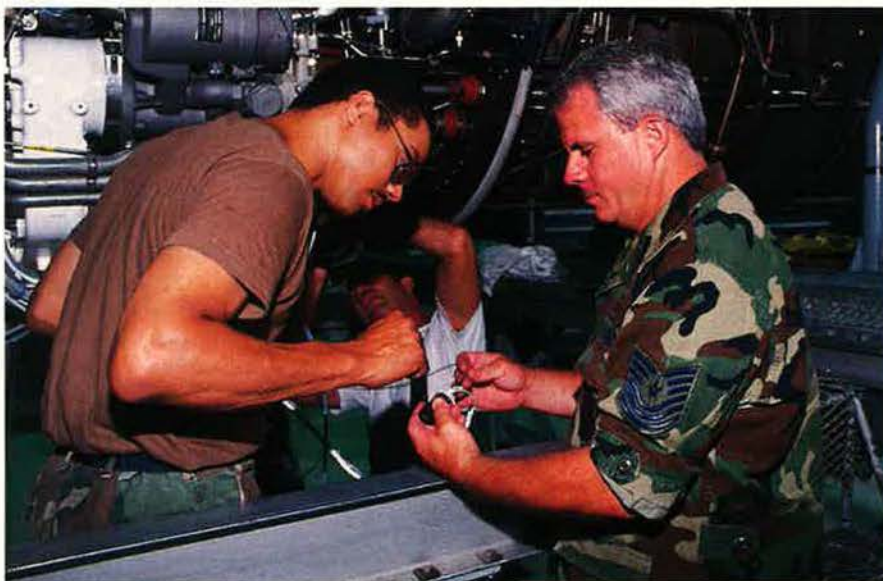
Starting last October, the 436th Logistics Group began phasing in cross-utilization training. Under CUT, aircraft generalists go through pared-down courses in various specialties so that they can take a crack at an avionics problem, say, or a hydraulic leak, if one arises. Officials of the 436th say it's a big change from the old days when you couldn't change a light bulb on an airplane if you weren't an electrician.

CUT courses vary from sixteen to 122 hours. The goal is to give a worker the ability to do seventy-five percent of a specialty's tasks.

Expanded Skills

Through CUT and "the use of on-board test equipment and higher reliability of systems, we're spreading out his capability to do the job," says Colonel Deascenti. "The key to sustaining the Air Force is that people need to be able to expand their skills. We're doing that. The entire Air Force is doing that."

Photo by Paul Kennedy



Object lessons are the order of the day. Older maintainers pass on expertise to new troops, as MSgt. Thomas Patton demonstrates to SSgt. Robert Covington. The goal is to keep maintainers bending metal seventy-five percent of the time.

To this point, all these changes have kept readiness up at the 436th despite the defense drawdown. Officials here say their current \$38 million budget is enough to do what they have to do, and no maintenance is being deferred.

Their goal, set by Air Mobility Command, is a seventy-six percent readiness rate. For January through March 1992, the 436th was slightly under this mark, at 75.5 percent. Things improved in late spring, and for April through June the rate neared eighty percent.

Spares bins are full. So far, the group has enough of the reparable items the C-5 is tough on, such as main landing gear wheels. Need for particular parts often runs in cycles, say officers of the 436th: During the Gulf War they used up many motors for pitch-roll servos, which tended to wear out on the long flights to the Middle East.

Spares are bought with past years' budgets, and Colonel Deascenti is closely watching the budget wars and is concerned about Air Force Materiel Command's ability to sustain parts flow. "If you have to start deferring maintenance because you don't have the parts for replacement, then sooner or later you start building this bow wave of requirements," he says.

If parts supplies drop, cannibalization rates will also rise. That would mean more work for crew chiefs and their teams. Instead of just getting a part and installing it on an aircraft, maintainers would have to remove it from a parked bird. Add the extra oversight necessary to juggle the whole process, and a simple two-man-hour job can escalate to a hundred man-hours.

"Can Birds"

That doesn't mean wing maintainers don't cannibalize planes as a matter of course—they do. They just want to keep it under control. The goal is two "can birds" at a time, one a C-5A, one a B. Typically, they're rotated in thirty-day cycles. An airplane can't be kept on the ground too long before problems begin to develop from its lack of exercise.

Back in the mid-1970s, most C-5 wings would average four or five can birds on the ground. Small spares budgets were only one of the reasons. When the C-5A first came out, many of its original systems were unreliable, says Colonel Russell. Its navi-



Photo by Paul Kennedy

"Do more with less" is not an impossible-to-attain admonition for the men and women of the engine shops. They already match the output produced under the old system, with one-third fewer people and with better reliability.

gational unit, for instance, was extremely complex and was finally replaced in the late 1970s with a simpler system like those on airliners.

Such updates have made the venerable C-5 much more reliable over the years, but the plane's sheer size ensures that it takes many man-hours to maintain it. "You've got over an acre of panels out there," points out Colonel Russell.

The panels are a big headache at times. Each is a thin sheet of metal applied over fragile honeycomb—1960s-vintage technology. A rock stuck in the sole of a shoe can punch a pinhole through a panel sheet, letting in moisture, which can flash into steam in flight and blow off a chunk of skin. Composites would be a big improvement.

Inspections run by the equipment maintenance squadron are oriented toward catching such flaws before they cause damage. The planes are given quick checks every seventy-five days, with the isochronal following at 300. Every six years, the C-5s go through full-scale refurbishment, a six-week procedure that centers on repair, repainting, and reupholstering of interiors battered by every sort of US military heavy equipment.

When the C-5s roll back on to the

flight line after refurbishment, they gleam inside like new cars. Their long, gray ramps are unmarred, all the loading lights work, and the upstairs troop compartment even looks comfortable.

Dover's refurbishments contain some extra touches above and beyond Mobility Command's work standards. Cargo compartment wall panels, for instance, are no longer just patched. They're also covered with diamond-stitched insulation blankets. "We buy this stuff in big rolls. Our shops cut it," says Colonel Russell, proudly thumping the thick material.

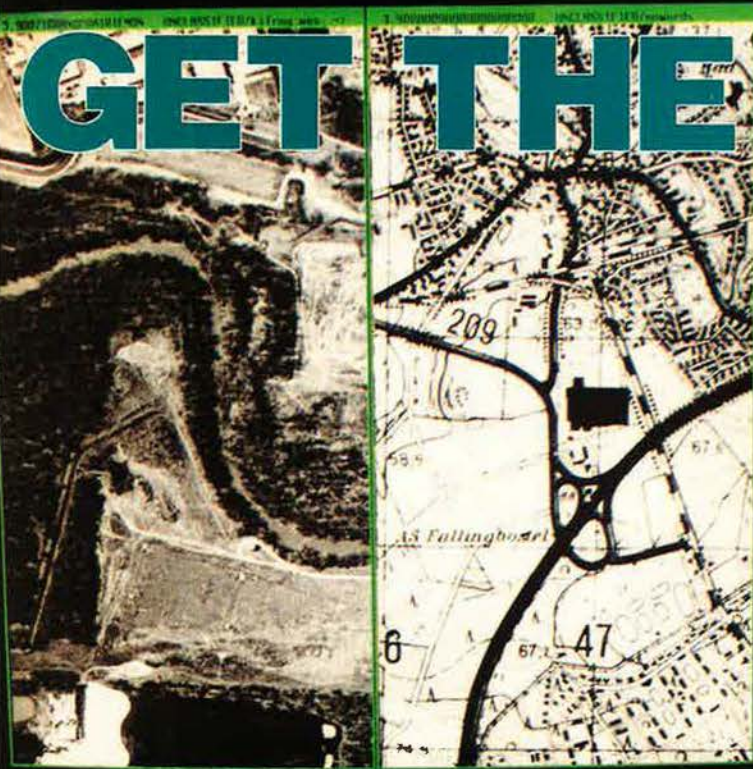
Back in his office, Colonel Deascenti says that everything doesn't always run as smoothly as he'd like. Unexpected fuel line maintenance has bedeviled him lately, for instance. Some months he seems to end up with more than two can birds. Other times a particular tool can be late coming from a depot, backing up needed repairs.

He says that he tries to make sure his 2,600 people believe that, if they do their job right, the readiness numbers that the 436th needs will happen.

"All I can say is, 'Keep that spares money coming,'" remarks Colonel Deascenti. "I was in the service in the 1970s when we dried up the funds, and it got to be no fun." ■

Peter Grier is the Washington defense correspondent for the Christian Science Monitor and a regular contributor to AIR FORCE Magazine. His most recent article, "The Airman's Advocate," appeared in the August 1992 issue.

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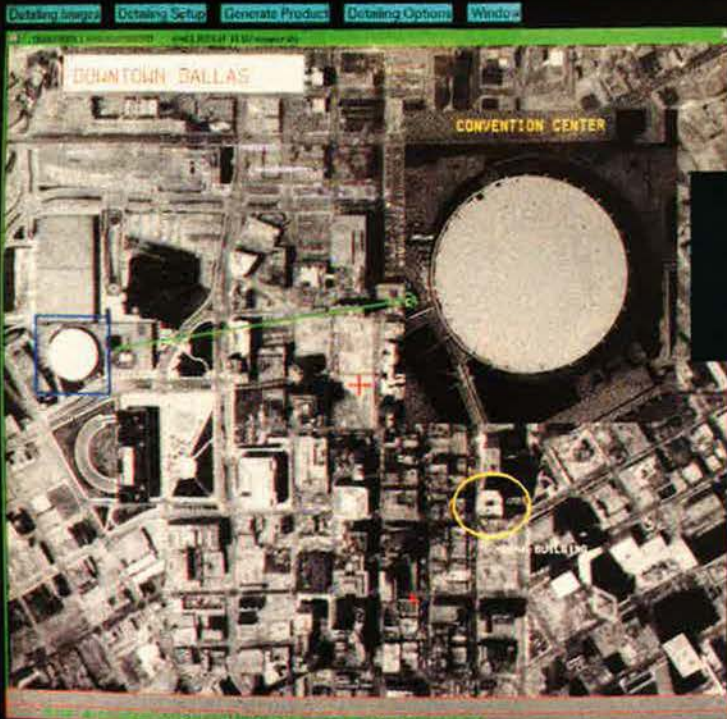
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The wing is the building block of the US Air Force and the focal point of restructuring.

A Directory of Wing Commanders

(As of August 1, 1992)

By Amy D. Marchand, Editorial Associate

THE WING has always been the building block of the US Air Force. It is also the focal point for the restructuring of the force, currently in progress. In recognition of this special importance, AIR FORCE Magazine, with the assistance of the Pentagon and various commands in the field, compiled this directory.

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Tinker AFB, Okla.

1st Air Force

325th Fighter Wing
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Tyndall AFB, Fla.

2d Air Force

9th Wing
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Beale AFB, Calif.

55th Wing
Col. William G. Manire
Offutt AFB, Neb.

8th Air Force

2d Wing
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Barksdale AFB, La.

5th Bomb Wing
Col. William R. Hodges
Minot AFB, N. D.

7th Bomb Wing
Col. Richard Szafranski
Carswell AFB, Tex.

27th Fighter Wing
Brig. Gen. Richard N. Goddard
Cannon AFB, N. M.

28th Bomb Wing
Brig. Gen. Joseph C. Wilson, Jr.
Ellsworth AFB, S. D.

96th Bomb Wing
Brig. Gen. Jerrold P. Allen
Dyess AFB, Tex.

319th Bomb Wing
Brig. Gen. David W. McIlvoy
Grand Forks AFB, N. D.

384th Bomb Wing
Col. Edgar A. Ott
McConnell AFB, Kan.

410th Bomb Wing
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K. I. Sawyer AFB, Mich.

9th Air Force

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Langley AFB, Va.

4th Wing
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Seymour Johnson AFB, N. C.

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Pope AFB, N. C.

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Homestead AFB, Fla.

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Myrtle Beach AFB, S. C.

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Shaw AFB, S. C.

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416th Bomb Wing
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Griffiss AFB, N. Y.

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12th Air Force

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Howard AFB, Panama

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George AFB, Calif.

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Holloman AFB, N. M.

58th Fighter Wing
Brig. Gen. Ralph T. Browning
Luke AFB, Ariz.

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Bergstrom AFB, Tex.

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Fairchild AFB, Wash.

93d Bomb Wing
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Davis-Monthan AFB, Ariz.

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Mountain Home AFB, Idaho

388th Fighter Wing
Col. James E. Sandstrom
Hill AFB, Utah

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Ellsworth AFB, S. D.

90th Missile Wing
Brig. Gen. Lance W. Lord
F. E. Warren AFB, Wyo.

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542d Crew Training Wing
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Columbus AFB, Miss.

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11th Air Force

3d Wing
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11th Air Control Wing
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Eielson AFB, Alaska

13th Air Force

633d Air Base Wing
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Andersen AFB, Guam

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Rhein-Main AB, Germany

3d Air Force

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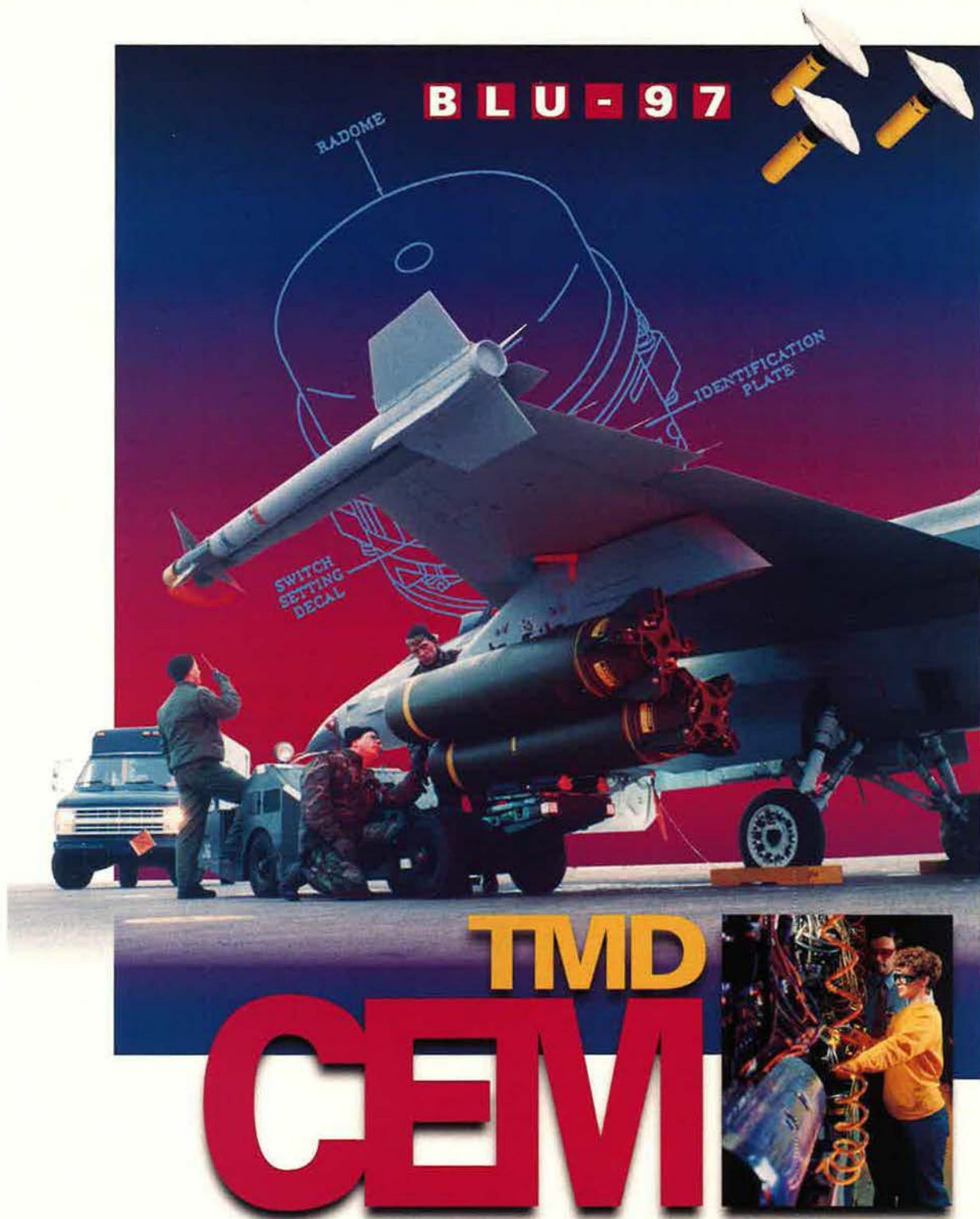
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The Pentagon is concentrating on seven areas of technology, five of which are critical to the US Air Force.

Technology on Five Fronts

By Brian Green, Congressional Editor

THE F-16 pilot, flying in support of US ground forces, looked on impassively as enemy tanks exploded from the impact of antiarmor munitions fired from an Apache attack helicopter hovering nearby, but he was in a battle like no other.

The pilot of the Apache was “flying” in a simulator at Fort Rucker, Ala. The doomed tanks were being maneuvered by officers in simulators at Fort Knox, Ky. The F-16 pilot was sitting in a “cockpit” a few feet from a group of US senators. The battle existed only on a big viewing screen at the Senate Armed Services Committee, which had been wired to receive electronic impulses from the mock fighter, helicopter, and tanks.

This is what technologists call a “synthetic environment,” and it is one of the most promising training advances to emerge in years. It is just one of the technologies that Pentagon executives have identified as key to holding the military edge that US forces currently enjoy.

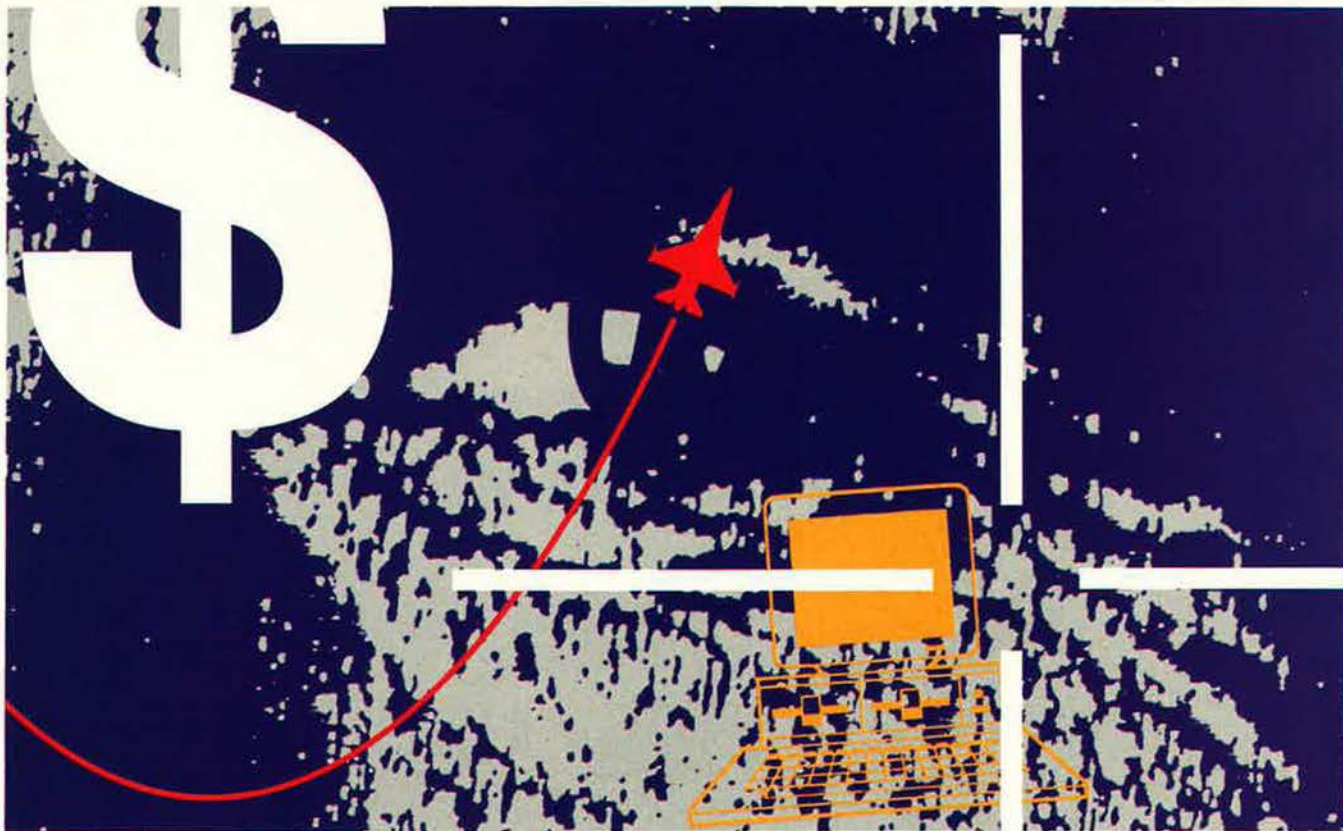
Victor Reis, DoD’s director of Defense Research and Engineering, maintains that the technologies, properly developed and applied, will help ensure US military dominance on the

battlefields of the future, and at a reasonable cost. The demands of fighting on those battlefields, he makes clear, will be radically different from today’s.

The Defense Department’s science and technology experts have begun to gear up to meet these challenges. Mr. Reis envisions a future in which the United States provides its fighting men and women with vastly superior training, domination of enemy airspace, single-shot ground-attack accuracy in

The Pentagon’s Seven Main Technology Thrusts

- Precision strike
- Global surveillance and communications
- Air superiority and defense
- Sea control and undersea superiority
- Advanced land combat
- Synthetic environments
- Technologies of affordability



any weather condition, and near-real-time mission planning, targeting, and attack assessment.

In addition, the Pentagon is heavily emphasizing developing the technologies that will help make all the advances affordable. Without success in this area, say officials, the advances cannot be pursued at all.

To sharpen the focus of the Pentagon's critical science and technology effort, Mr. Reis has identified seven major technology "thrusters." Of these, five are critical to the future of the Air Force: precision strike, global surveillance and communications, air superiority and defense, synthetic environments, and technologies of affordability. (The other two are advanced land combat and sea control.)

Precision Strike

In Operation Desert Storm, US strike aircraft frequently encountered poor weather and returned to base with their bombs undropped. The uneven results of the "Great Scud Hunt" also pointed up the difficulties in finding mobile or hidden targets. Mission planning was a long and cumbersome process. Bomb-damage assessment was a constant problem.

Pentagon planners are focusing hard on precision strike and global surveillance and communications in order to overcome these deficiencies. They aim to provide US forces with systems that have a high probability of a single-shot kill, in any weather, at any time of day or night, against virtually any target, and in near real time.

If these efforts are successful, Air Force attackers will be able to find the target in a blizzard, plan a detailed attack, strike targets—bang, bang, bang—and do it routinely.

It's a tall order. Making possible what once seemed nothing but blue-sky dreaming is the emergence of enhanced command, control, and communications (C³) with all-weather, precision guided munitions (PGMs). Success depends on creating a seamless connection between the Air Force systems that generate target data and the attack aircraft with their precision munitions.

One key program is Artemis, a joint, USAF-led effort to demonstrate the ability to field a low-cost, adverse-weather PGM that can attack and destroy time-critical mobile and fixed targets—along with a mission planning system to support it. The Joint

Direct Attack Munition program is the centerpiece of Artemis. Mr. Reis said that the whole point of the JDAM program is to provide an answer to the question, "How do I take a dumb bomb and make it into a precision guided munition, and then how do I make that into a . . . super-precision guided munition?"

The JDAM will take a standard unguided bomb and make it smart. It will be given fins to guide the system inertially and will have a link to the Global Positioning System (GPS) satellite net, which will provide the positioning data needed for high accuracy. The creation of super-precision—the aspect of the program still in the technology phase—will be based on an advanced seeker capable of finding and recognizing a target and delivering a targeting accuracy of about ten feet.

The technological challenge centers on making the seeker affordable. The cost problem is eased somewhat by an approach that uses both the GPS and a more precise terminal seeker. The Air Force is considering use of a synthetic aperture radar (SAR) for the precision seeker in the JDAM; it would have the ability to "look" through clouds and soupy weather. The muni-

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tion would receive targeting data and an SAR image from its platform or another surveillance source, such as the E-8 Joint STARS aircraft. The GPS would provide a significant degree of accuracy, perhaps down to 150 feet. The munition's SAR would scan the relatively small area in which it expects to find the target. After finding the target, it would correlate the acquired image with the stored image it had received earlier.

In the effort to produce new precision strike systems, the Air Force is not alone. The Navy-led Joint Stand-off Weapon is another such system. The Army is pursuing its ATACMS (Army's Tactical Missile System) and helicopter-borne precision weapons in the context of the Joint Air-Land-Sea Precision Strike (Joint ALS) demonstration project. The Thirsty Saber program is a classified effort to develop "quasi-autonomous surveillance and targeting" capability as part of Warbreaker, a program of the Defense Advanced Research Projects Agency (DARPA).

Warbreaker focuses more extensively on integrating surveillance, intelligence, planning, and targeting. It encompasses the ability to assess enemy forces, where they might hide or move, and what their decoys look like, resulting in the ability to find "deep-hide" targets.

"In this whole area, there is an underlying technology of automatic target recognition that is very key," says Mr. Reis. It also involves assessing enemy intentions as a military situation evolves, as well as the rapid planning of offensive actions and the development of accurate targeting information.

The technology challenges are multifaceted. The intelligence aspect, for example, includes a need for auto-mapping to provide US forces with timely, accurate maps of conflict areas vital to precision strike and mission planning. It will also require a dynamic database that allows a smooth flow of information between surveillance assets and warfighters. Another critical item is the correlation function, needed to provide near-real-time prediction of target locations and attack assessment.

Warbreaker seeks to dramatically improve target detection, the swiftness of mission planning and preparation, and the precision of target location.

Specifically, Warbreaker aims to foster systems that will enable US forces to find targets as small as one square meter in an area of 10,000 square kilometers, to plan an attack mission within ten minutes, and to maintain broad situational awareness over an area of one million square kilometers.

Global Surveillance and Communications

The Pentagon plans to coordinate Artemis, Joint ALS, and Warbreaker later this decade with programs that fall under the global surveillance and communications thrust. The point will be to give a broad demonstration of connectivity and precision to hit time-critical targets.

To meet the demands of combat, surveillance systems will have to pass target data directly to mission planners, who in turn must be able to send that information directly to the appropriate weapon delivery systems and munitions. Some of those surveillance systems will be part of a global "system of systems" designed to assure the shooters access to all the data they need, when they need it.

Operation Desert Storm lifted the curtain on this type of technology. Patriot batteries, for example, received Scud launch warnings and predicted impact areas from Air Force Space Command in Colorado, which had received the data from US early warning satellites.

The goal is to create a greatly expanded and more responsive system of hardware and software linking commanders and their local and worldwide surveillance assets, reference data (such as maps), and other support functions.

These systems, say Pentagon officials, would allow commanders to simulate various options and plan the missions and the "shooters" to practice attacks on their targets. Information and sensor systems will link theater-level commanders to national intelligence sources and provide rapid command and control.

Mr. Reis believes that one important challenge will be to take full advantage of "commercial technology that is moving very much in the same direction" in global communication while still meeting unique military needs, such as communication security. One key is to use international commercial telecommunications standards in the military communications network.

Another technology challenge will be to provide sensors capable of scanning wide areas and detecting and recognizing targets in complex environments and in any weather. Geographical accuracies will be improved by using GPS coordinates. A wider range of phenomena will be measured to improve the ability to identify and describe hidden targets. High-speed, low-power sensors will also be needed.

One technology that may be prominent, says Mr. Reis, is high-temperature superconductivity. "You're always concerned about reducing power or volume in spacecraft or high-altitude platforms that do surveillance," he says. That, in turn, generates new opportunities for reduced requirements—for example, less lift for launching surveillance satellites.

Air Superiority and Defense

Mr. Reis says that, in air superiority and defense, the Pentagon aims to meet "a pretty sophisticated" threat. "There are a lot of people with cruise missiles," he says. "There are a lot of fairly advanced airplanes out there, [and] ballistic missiles are proliferating."

Other potential threats include high-and-fast-flying tactical air-to-surface missiles, new jammers, stealth measures and countermeasures, and terrain-masked helicopters. In the future, says Mr. Reis, the basic requirement for air superiority and defense forces will be to take the fight deep into enemy airspace, win the air battle, and survive, and to destroy or disable an enemy's ballistic missile and cruise missile systems.

In the future, weapon systems and platforms might not look very different from those already on the ramp or in the works. In many areas, the goal will be not to develop new weapons to defeat threats that are growing rapidly in magnitude or technical sophistication but to develop systems that can complement current weapons. The key question, says Mr. Reis, is, "How can I get at that threat with less . . . without leaping ahead to something beyond the F-22 [Advanced Tactical Fighter]?" The F-22 is the next-generation air-superiority aircraft.

The basic programs for the future antitactical ballistic missile mission are already well known. They are the upgraded Patriot PAC-3 system and the Theater High-Altitude Area Defense (THAAD) system, along with

ground-based radar (GBR). The science and technology strategy is to build on that foundation by adding a naval capability based on the Airborne Early Warning/Ground Integration Segment (AEGIS) system, improving the cuing capabilities of THAAD/GBR systems, and enhancing the lethality of interception warheads. Patriot PAC-3 and THAAD/GBR are expected to provide effective point and area defenses against tactical missiles.

Air-superiority forces will benefit from incremental technological improvements over a broad range. Such improvements include new sensors (such as infrared search and track) and electronics to provide better situational awareness, human-system interfaces that allow the pilot to focus on the most urgent and critical tasks, programmable ordnance, and new materials and propulsion to boost aircraft performance.

One major Pentagon initiative calls for creating the technologies for a network of systems to be used when cooperative attacks against a target or a set of targets will be more effective than attacks by individual systems. This effort will attempt to link the Navy's AEGIS system, the Army's Patriot, and the Air Force's E-3 Airborne Warning and Control System (AWACS) aircraft, and—eventually—the GBR, in order to optimize cooperation of friendly forces and employ these forces as effectively as possible.

Synthetic Environments

Mr. Reis is enthusiastic about the revolutionary potential of the underlying technologies that will facilitate the advances in air superiority, precision munitions, and global surveillance and communications.

Synthetic environments, he says, represent "a technology to let us learn how to use technology better. It's that feedback loop that does it." He recently testified that "network simulation is a technology that elevates and strengthens the collective problem-solving abilities of . . . design teams, manufacturing teams, education teams, training teams, acquisition teams, or warfighting teams." These technologies lie "at the very heart of the department's technology strategy" and are expected to "revolutionize our entire acquisition process."

The most visible application of dis-

tributed interactive simulation has been in training, along the lines of the "battle" in the Senate hearing room. Such simulations offer multiple benefits. They can be "replayed" to try to correct mistakes. They allow warfighters to exercise against thinking opponents. Integration can extend from the individual sailor, soldier, and airman up to large unit level.

Furthermore, synthetic battlefields allow military units to conduct large joint exercises with less expense and risk, while providing the opportunity to master joint doctrine.

Mr. Reis points out that operations at Nellis AFB, Nev., where the Air Force conducts much of its advanced training, could be linked to the National Training Center at Fort Irwin, Calif., where the Army conducts much of its most advanced force-on-force training.

Distributed interactive simulations have already linked old and new equipment—both simulators and real platforms—across the services and across the country. Synthetic environments will be able to link an almost unlimited combination of forces. Such training will not replace flying hours but will serve as a valuable adjunct—more so if reduced Pentagon budgets cause a reduction in flying hours.

The heavy involvement of warfighters in these simulations raises the prospect that the simulations can be used to hone requirements. This too has already begun. One example is the design of the F-22 cockpit. The Air Force and contractor team, Mr. Reis says, "actually went through the equivalent of a cockpit arrangement and how it was going to be used, . . . tried that in an actual battle, and found that a lot of things that were in there weren't needed, [were] never used in a combat environment, and that some of the things were in the wrong places." The result: major cockpit changes.

Affordability Technologies

The ability to refine requirements points to yet another benefit of synthetic environments: cost reduction. By adding or deleting capabilities from a proposed system during simulation, weapon designers can find out which capabilities really make a difference in combat and therefore should be kept, and which ones do not and are therefore expendable.

The relevance of synthetic environments to "technology for afford-

ability" goes much further, however. For example, manufacturers make extensive use of computer-aided design/computer-aided manufacture (CAD/CAM) in producing systems. Technologists are pressing to devise means that would allow the builder to use the CAD/CAM database to simulate the weapon system's performance in a synthetic battlefield. Early feedback from warfighters using that simulation will help in evaluating a weapon's design and validating its performance against the contractors' performance baseline.

"The potential cost savings . . . of being able to take the detailed design and evaluate system and subsystem performance before any metal is bent is enormous," Mr. Reis testified recently. He said that the contractor could avoid construction of costly and time-consuming prototypes and eliminate expensive midproduction design changes.

Manufacturers might be able to simulate the entire manufacturing process. "The question is," said Mr. Reis, "How far back in the system can I . . . actually simulate the process?" He noted that DARPA is working with Stanford University to develop a "virtual" factory.

In the long term, Mr. Reis said, "I'd like to be able to have the processes in place so that I don't have to use the same old factories to build the new systems. . . . I want to build an entirely different kind of factory."

That effort focuses on concurrent engineering, flexible manufacturing, and software development, as well as specific processes.

Mr. Reis has specific affordability goals. He wants a thirty percent reduction in system development time and a rapid, trouble-free transition to production; factory floor processes that will make cost independent of volume; a doubling of productivity in high-precision processes; and a halving of overhead expenses.

The stakes are high. In the JDAM program, for example, the goal is to cut the price of the radar seeker by sixty to eighty percent. Showing that such a process exists will be critical in convincing DoD and Congress to move into production, according to Mr. Reis. Other key efforts include the rapid design and manufacture of custom-designed signal processors and the flexible manufacture of infrared focal plane arrays and sensor packages. ■

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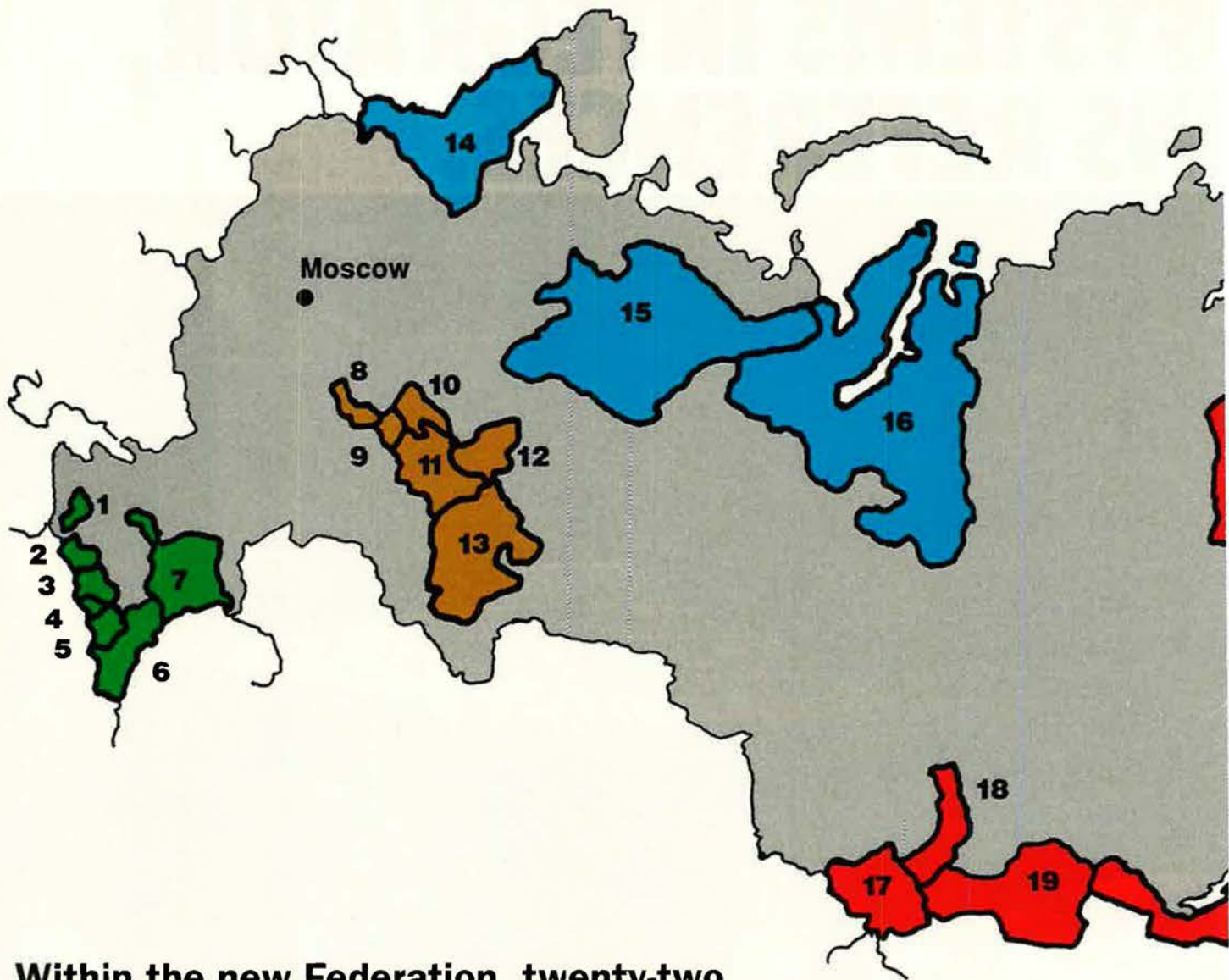
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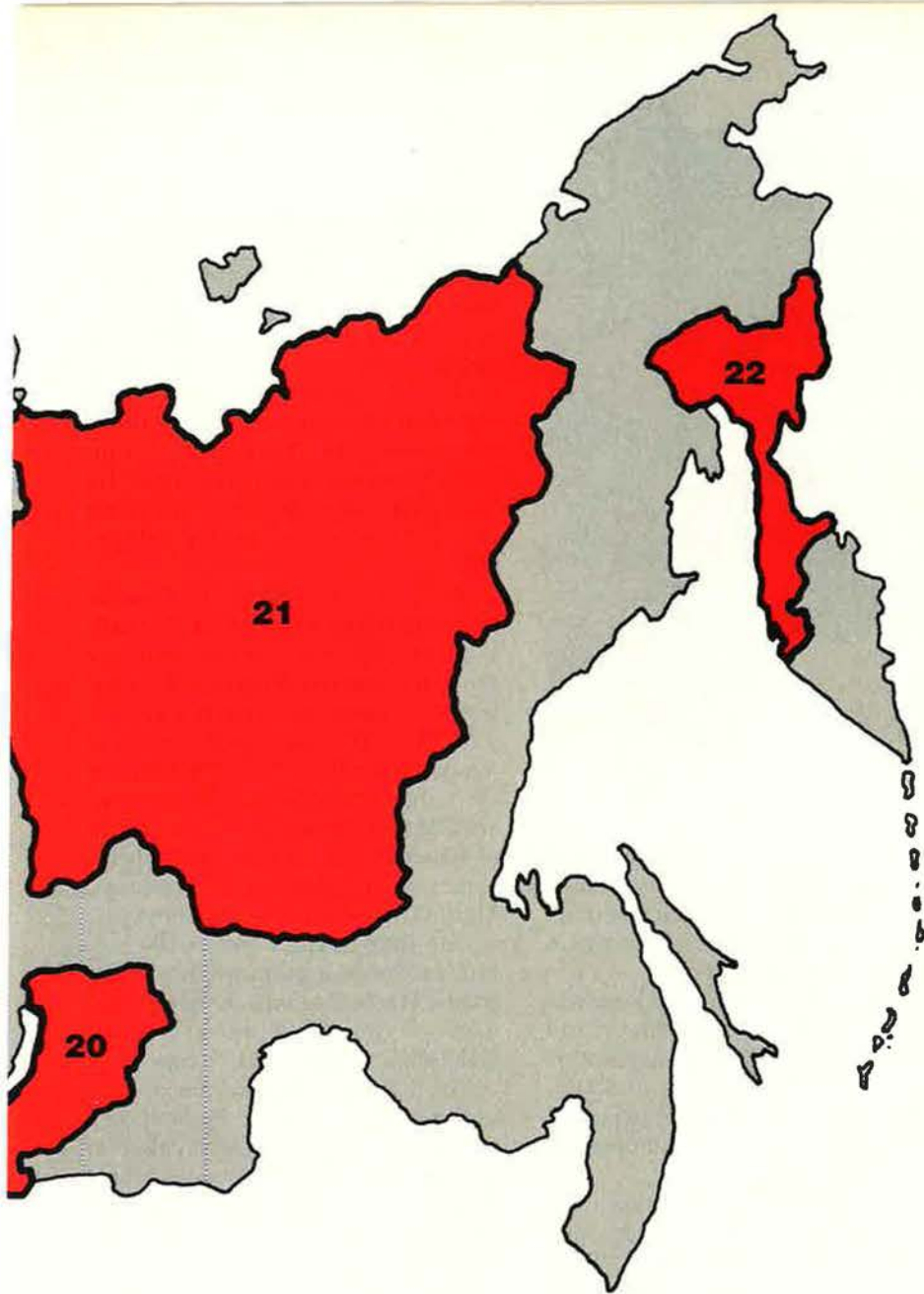
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Within the new Federation, twenty-two “republics” have proclaimed themselves sovereign.

The Semi-States of Mother Russia



By Harriet Fast Scott

Troubles Within

Southern Republics

Caucasus Mountain area; predominantly Muslim

1. Republic of Adygeya
2. Republic of Karachayev-Cherkessia
3. Republic of Kabardino-Balkaria
4. North Ossetian Republic
5. Chechen-Ingush Republic
6. Republic of Dagestan
7. Kalmyk Republic

Central Republics

Concentrations of industry; retain some Communist political structure

8. Republic of Mordova
9. Republic of Chuvash
10. Mary El Republic
11. Republic of Tatarstan
12. Republic of Udmurtia
13. Republic of Bashkorostan

Northern Republics

Predominantly speakers of Finno-Ugric languages; oil and gas deposits

14. Republic of Karelia
15. Republic of Komi
16. Republic of Yamalo-Nenets

Eastern Republics

Deposits of gold and diamonds; might unite to restore the 1920-22 "Far Eastern Republic"

17. Republic of Altay
18. Republic of Khakassiya
19. Republic of Tuva
20. Republic of Buryatia
21. Republic of Yakutia-Sakha
22. Koryakski Republic

ON NEW YEAR'S Eve, just after the USSR broke into twelve pieces, Anatoly Antonov, director of the Moscow Center for Socio-Strategic Research, appeared on Moscow television. He offered a startling prediction.

The breakup of the Soviet empire was not over, Dr. Antonov warned. The Russian Federation—the biggest and strongest of the twelve new republics, armed with thousands of nuclear weapons—would disintegrate into at least a dozen semi-states. "If the process is impeded," he added, "there will be bloodshed."

Events have not fully vindicated Dr. Antonov—yet. But he definitely was on to something. In the Russian heartland no less than on the rim of the old Soviet empire, evidence is mounting that a kind of creeping civil war is taking place.

Virulent ethnic and religious quarrels, commonplace on Russia's pe-

riphery, have now flared within Russia itself. The Russian Federation, with 150 million people, contains 100 nationalities, many of which now clamor for greater political and economic power—even independence. At times, the ethnic feuds have spilled across national borders. In newly independent Moldova, Russia's 14th Army gave armed support to ethnic Russians seeking autonomy.

Russia feels the stress of regional disputes over control of its natural and financial resources. For example, the oil-rich area of Tyumen has faced off against the Russian government, which stands accused of stealing Tyumen's petroleum and sending brutal internal police detachments to stamp out unrest.

At least twenty-two political jurisdictions within Russia's borders have declared themselves sovereign republics.

Finally, the disorders of modern Russia are aggravated and complicated by a new, potentially disruptive force: the supernationalist Cossacks.

For Russia-watchers, the question of the hour is whether these contending factions and regions will try to settle their many disputes peacefully. If they do not, the result could be a replay of Yugoslavian-style strife, only on a superpower scale.

Stalin Lights the Fuse

The groundwork for today's explosive ethnic and national situation was laid by none other than Joseph Stalin, whom Vladimir Ilyich Lenin entrusted with nationalities policy after the 1917 Bolshevik Revolution.

From the beginning, Stalin's policy was to divide and conquer. For four years, he promoted the creation of a series of 'autonomous' regions in Soviet Russia. He established artificial borders for the express purpose of fomenting frictions within and between ethnic areas. South Ossetia, for example, was assigned to Georgia, while the rest of the land of the Ossetians went to Russia.

After Lenin's death in 1924, Stalin tightened up. He permitted minorities to keep little more than their language and native art. Then he robbed them of their languages by forcing on them the Cyrillic alphabet.

In the 1930s, the dictator carried out the equivalent of genocide with forced collectivization of agriculture and numerous bloody purges through-



out the countryside. To prevent large groups from joining in solidarity movements, Stalin created artificial ethnic republics. Nationalism was born where it had never before existed.

Stalin's ethnic engineering continued in the 1940s and throughout World War II. Nikita S. Khrushchev, in his famous 1956 denunciation of Stalin, disclosed mass deportations of people from the Caucasus for "collaboration with the Germans."

In October 1943, the Karachai were deported from their lands. Then came the total native depopulation of the Kalmyk Autonomous Republic. In March 1944, the Chechen and Ingush peoples were uprooted, and the Chechen-Ingush Autonomous Republic ceased to exist. In April 1944, all Balkars were deported from the Kabardino-Balkar Autonomous Republic and it was renamed the Kabardin Autonomous Republic. Khrushchev claimed that Ukrainians would have met the same fate had they not been too numerous to deport or eradicate.

Following the war, Stalin continued his brutal repression, but the situation had begun to change. Nationalities now were hopelessly mixed together in various questionable political arrangements. Formal education to bolster the Soviet economy produced a minority intelligentsia, who identified with minority concerns.

The danger of Stalin's legacy is

nowhere more evident than in today's actual and potential conflicts of religious and ethnic groups mixed together throughout Russia.

"Delayed-Action Mines"

"This year," said one official from a newly sovereign area of the Federation, "we saw the explosion of delayed-action mines, which were laid decades ago by Stalin's repressive antinational policy." R. Abdulatipov, chairman of a government-sponsored nationalities group, warns there has been "an alarming explosion of national egoism." He adds that "all that energy is being directed toward destructive infighting."

Within the borders of the Russian Federation, there are about 120 million ethnic Russians and approximately thirty million non-Russians. Minorities thus constitute roughly twenty percent of the total population. Most numerous are the 5.7 million Tatars in the Volga region. Next come Ukrainians, 4.5 million strong. Ethnic groups of between one and two million include Chuvash, Bashkir, Belarussians, Mordovans, Germans, and Chechens.

One finds smaller but locally significant concentrations of Jews, Udmurts, Maris, Kazakhs, Komi, Armenians, Ossetians, Buryats, Yakuts, Kabardins, Ingush, and Tuvans.

The presence of minorities in a sea of Russians is not the Federation's only ethnic problem. The breakup of the Soviet Union has left many ethnic Russians stranded *outside* the Russian Federation—in effect, minorities in foreign lands.

Tens of thousands of refugees have poured out of South Ossetia, now in independent Georgia, after heavy fighting. North Ossetia blockaded a supply route, cutting off a pipeline to Georgia. South Ossetia wants to join North Ossetia and become part of Russia.

The problem is especially acute for Russians in predominantly Muslim nations. Any violent action against minority Russians in these lands may provoke attacks on the large numbers of Muslims now residing in Russia.

The simmering ethnic problem is compounded by religious differences. With the collapse of atheistic communism, Russia has seen a flourishing of religion of all kinds. Christianity is thriving in Orthodox, Roman Catholic, and Protestant churches. Increased Jewish emigration to Israel has awak-

ened an awareness in Jews in all areas of the former Soviet Union. Even those not planning to emigrate have expressed interest in reviving Jewish culture.

Virtually all Muslims inside Russia are Sunnis of Turkic extraction, though a smattering of Shiites is present. Some worry that Islamic extremism in Iran and other nations to the south could spill over into Russia's Muslim centers and lead to greater unrest, more economic chaos, declining living standards, and, as a result, the assumption of power by authoritarian regimes.

In light of Russia's long and bloody history of social intolerance, and because all of these ethnic and religious groups are intermingled, odds are high that trouble will erupt. Experts believe the conflicts will grow especially acute as shortages of basic material goods worsen.

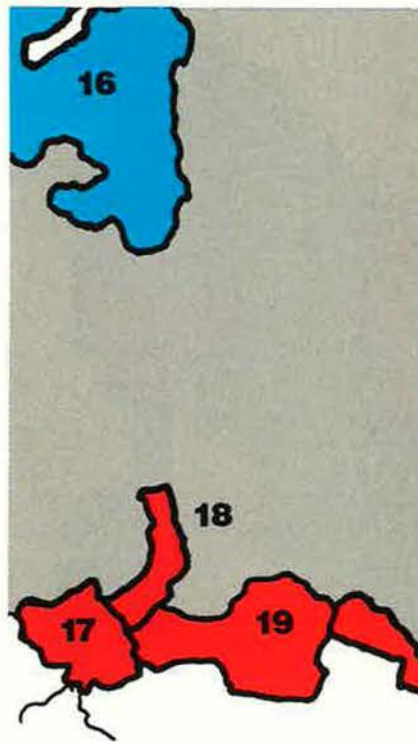
Economic privation and inequalities already have heightened the sense of grievance between regions of the Federation.

In Siberia, rich in natural wealth, the living standard is almost fifty percent lower than in European Russia to the west of the Ural Mountains. The gap is growing, rather than narrowing, engendering "east-west" conflict within Russia. The Siberians tend to see the situation as the result of self-interested decisions by western Russian policymakers in Moscow.

Grievances also focus on perceived inequalities in national finance. For example, officials in Krasnoyarsk Krai in Siberia collected nine billion rubles in taxes during the first three months of 1992, yet the krai received only two billion rubles in government services. Local authorities complain bitterly that they have little say in the formulation of reform policies.

The crux of the problem is the desire of the new republics to control their own resources and to gain from their development and sale. Areas of the new republics are rich in oil, diamonds, gold, and other natural resources.

Today's Russian Federation contains all the lands of the Soviet Union's old Russian Soviet Federated Socialist Republic. The now-extinct RSFSR comprised eighty-six jurisdictions of several different types. These included sixteen autonomous republics, five autonomous oblasts, forty-nine oblasts, six krais, and ten autonomous nationality okrugs. Generally speaking, re-



publics were ethnic enclaves and oblasts were dominated by majority Russians.

All sixteen of the autonomous republics have now become sovereign republics of the Russian Federation. They have been joined by a few former autonomous oblasts that have declared themselves republics. Several republics that encompassed two or more ethnic groups have subdivided along ethnic lines.

As a result, the Russian Federation now contains at least twenty-two "republics" whose peoples maintain that their nations are sovereign [see map].

Four Groups of Republics

The republics are concentrated in four areas: the heart of Russia at the confluence of the Volga and Kama Rivers, the northern slopes of the Caucasus Mountains in southern Russia, the northwest area from the Russo-Finnish border to Siberia, and a wide swath of Siberia from Kazakhstan along the Mongolian border to the Arctic and Pacific.

Perhaps the most important is the central Volga area, in Russia's heartland. The Volga flows eastward, passes north of Moscow, joins the Oka River at Nizhney Novgorod (formerly Gorki), and passes between the Mary El Republic and the Chuvash Republic and through the Republic of Tatarstan. It then turns abruptly south to join the

Kama. In many areas, the old Communist Party power structure remains in place, slowing the pace of reform. Its leaders want to preserve their privileged positions. But these republics are economic powerhouses, rich in oil and industry. New leaders are anxious to have the republics make their own arrangements with foreign companies to speed economic development.

The Republic of Tatarstan, with seventy nationalities and a population of 3.5 million, is the jewel in the crown. Tatar politicians, claiming that their lands were never legitimately part of Russia, want to create an Islamic state. Of similar political and economic importance is Bashkortostan, with 3.8 million citizens.

Caucasus Strung like pearls across the northern slopes of the Caucasus Mountains are seven small, predominantly Muslim, states that have declared themselves republics. In an attempt at solidarity, leaders of the seven have talked of forming a Confederation of Caucasus Mountain People and have drafted a constitution. They have agreed to form "Green Helmet" peacekeeping armed forces. Chechen President Dudayev envisages a single "Union of Caucasus States" stretching from the Black Sea to the Caspian.

In northwestern Russia, the newly sovereign areas contain large numbers of speakers of Finno-Ugric languages. Three republics—Komi, Karelia, and Yamalo-Nenets—have declared sovereignty. This area contains a powerful oil and gas industry. In the Republic of Komi, Vorkuta miners and oil workers have repeatedly struck for higher wages. They would like to secede from the Komi Republic altogether. Khanti-Mansysk autonomous oblast may follow its northern neighbor, Yamalo-Nenets, and form a republic.

Finally, in the east, some have urged a revival of the defunct Far Eastern Republic, which in 1920–22 served as a buffer between Russia and Japan. Six republics have already emerged. Four hug the border with Outer Mongolia from Kazakhstan to east of Lake Baikal. The other two are the Republic of Yakutia-Sakha, rich in gold and diamonds, and the Koryakski Republic, which includes part of the remote Kamchatka Peninsula.

The Cossacks Return

To this stew of ethnic, religious, and territorial factors must be added

one more important element: the recent reawakening of the Cossack culture.

In today's Russia, there are about five million Cossacks, descendants of Russian and Ukrainian serfs who fled servitude in the sixteenth and seventeenth centuries. They settled on the empty steppes, defending the wild border lands of the Tsar's empire against bandits and foreign invaders. Once the Cossacks had settled and pacified an area, Russian colonizers backed by military forces would move in, pushing the Cossacks outward to new frontiers.

Before the Bolshevik Revolution, Cossacks had organized into eleven communities, located along major waterways from which they took their names: Don, Kuban, Terek, Astrakhan, Ural, Orenburg, Siberia, Semirychensk, Transbaikalia, Amur, and Ussuri. The Don and Kuban Cossacks were the most numerous and important.

Cossack villages enjoyed a large measure of self-government until 1918, when the Bolshevik terror began. "They experienced horrible genocide after the revolution, and survived by sheer miracle," the *Moscow News* reported in a recent commentary.

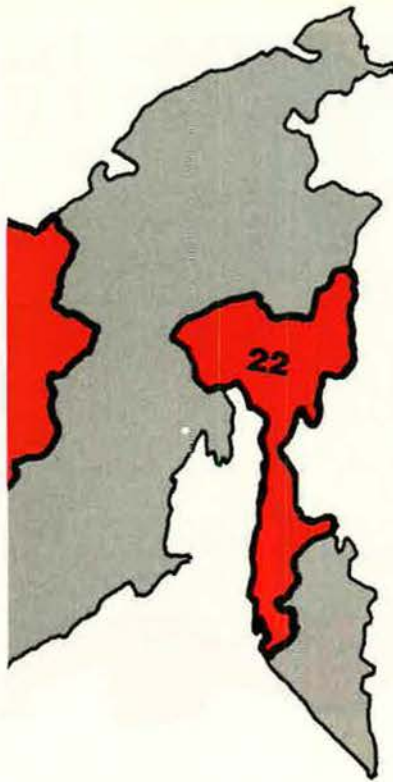
For example, Stalin put the lands of the Ural Cossacks into Kazakhstan when he formed that republic in 1920. In 1936, when the Cossacks petitioned Moscow to make the lands part of Russia, the dictator ordered mass arrests and imprisonments.

Now, after decades of repression, Cossack assemblies are springing to life across Russia.

The first Association of Cossacks was created in Moscow in early 1990 to embrace all of the traditional Cossack troops that ever existed in Russia. Later that year, at the first Grand Assembly of the Union of Cossacks, the Cossacks elected Alexander Martynov to be their ataman, or top leader.

Cossacks living along the Terek River between the Caucasus and the Caspian Sea grew uneasy when one area after another became a sovereign republic. They began pondering the possibility of forming their own nation. The thinking spread to other concentrations of Cossacks.

In November 1991, at the second Grand Assembly, the Don Cossacks announced a decision to create the Don Cossack Republic—a move that



raised the explosive demand that now-independent Ukraine relinquish control of ancestral Cossack lands within Ukrainian borders. Ukrainian Cossack leaders later confirmed that the Krasnodon Cossacks within Ukraine have sworn allegiance to the Don Cossacks in the Russian Federation. Vyacheslav Chornovil, hetman of the Ukrainian Cossacks, said the Krasnodon Cossacks were Russian Cossacks, not Ukrainian, raising deep questions of citizenship and loyalty.

Similarly, the Ural Cossacks want all of the Ural River returned to their territory. They once protected the Ural River, the spawning place for sturgeon. Most of the river is in Russia, but its last leg flows through Kazakhstan, now an independent republic. The Cossacks want Kazakhstan to relinquish control.

As 1992 began, the Cossacks of East Siberia and the Far East decided to form a single union. Representatives of the various Cossack groups signed the agreement and elected their ataman. Col. Alexander Zakharov, ataman of the Novosibirsk Cossacks,

has said that Siberian Cossacks may go on to create a full republic in Siberia. He claimed that the total number of Cossacks and descendants in Siberia may be as high as 400,000.

Meanwhile, Cossack families living in Kazan, the capital of the predominantly Muslim Republic of Tatarstan, decided to create a Cossack community and forces to defend the interests of the Russian-speaking population. That Cossack community, say some of its leaders, aims to establish defensive ties with other Cossack communities nearby.

The Cossacks have become embroiled in the issue of how to defend ethnic Russians living outside the Russian Federation—in particular, those in Moldova, where fighting along the Dniester River has been going on for three years. Reports reached Moscow that hundreds of volunteers from the Don and Volga Cossacks were in the Dniester area of Moldova protecting Russians there. Black Sea Cossacks decided to put vital installations in the Dniester area under guard.

In the Far East, Ussuri Cossack volunteers, who carry and at times have used long whips, have begun patrolling part of the Russia-China border and dampening the enthusiasm of local smugglers and traders. The area is said to be much quieter now.

Without doubt, the Cossacks have become a force to reckon with. *Izvestia* reported in May that the new Russian Army will form several regiments of Cossacks. Yeltsin has named Sergei Shakhrai, a state advisor on legal policy, to chair a commission to prepare a draft law on rehabilitation of the Cossacks. Shakhrai, a Cossack, said that the most pressing issue will be to reach agreements with Ukraine and Kazakhstan on cross-border issues.

Unrest in almost one-fifth of the world's land area poses a danger to the entire international community. When that area also contains thousands of nuclear warheads, the situation is particularly disturbing. ■

Harriet Fast Scott, a Washington, D. C., consultant on military affairs of Russia and other former republics of the USSR, is a member of the General Advisory Committee on Arms Control and Disarmament. Her translation and analysis of the third edition of Marshal V. D. Sokolovski's Soviet Military Strategy is a standard reference work, as are her four other books on Soviet military matters, written with her husband, Dr. William F. Scott. Her most recent article for AIR FORCE Magazine, "The Sixteenth Republic," appeared in the February 1992 issue.



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Military thinking is more dynamic, and the professionals have reasserted their dominance over civilian leaders.

Russia's New Military Doctrine

By Mary C. FitzGerald

RUSSIAN military leaders are currently focusing not only on creating the Russian armed forces but also on developing a new military doctrine for the 1990s and beyond. A draft of a new Russian doctrine was published recently in *Military Thought*, the main theoretical journal of Russia's armed forces.

This doctrine, the journal reported, is based on "defense documents adopted by the Russian president and Supreme Soviet, as well as by the . . . Council of Heads of State" of the Commonwealth of Independent States (CIS).

This new doctrine identifies two direct military threats to Russia: the introduction of foreign troops in adjacent states and the buildup of air, naval, or ground forces near Russian borders. In addition, a violation of the rights of Russian citizens and of persons "ethnically and culturally" identified with Russia in republics of the former Soviet Union is viewed as "a serious source of conflicts."

Finally, Russia now views conventional strikes on its nuclear and other "dangerous" targets as an escalation to weapons of mass destruction—which implies that such strikes will elicit a nuclear response.

Pilots prepare for an Su-27 "Flanker" training flight at Akhtubinsk AB, Russia. The transition from Soviet to Russian military doctrine, with revisions inspired by world events from the collapse of the Soviet Union to the Persian Gulf War, will affect not only members of the Russian military but the rest of the world as well. Among the changes: Conventional strikes against Russian targets may elicit a nuclear response.



Photo by Sergei Skrynnikov / AviaData / Arms Communications

According to Russian doctrine, local wars are becoming the most probable type of warfare. It adds, however, that large-scale conventional wars may develop should local conflicts aimed at Russia or the CIS escalate or should there be a “prolonged threat period” involving a general mobilization. The doctrine assigns priority to wars fought with existing and emerging conventional weapons.

The new doctrine describes three distinct components of the Russian armed forces:

- A limited number of forces in permanent readiness in the theaters to repel local aggression.
- Mobile reserves or rapid-response forces capable of quickly maneuvering (deploying) to any region to repel midlevel aggression together with the permanent readiness forces.
- Strategic reserves formed during the threat period and during war to conduct large-scale combat actions.

The new doctrine also describes two priorities of Russian military-technical policy. The first is “emerging high-precision, mobile, highly survivable, long-range, standoff weapons.” The second is development of arms, equipment, and command, con-

trol, communications, and intelligence (C³I) systems whose quality will permit a reduced quantity of weapons.

The doctrine emphasizes Russia’s requirement for weapon programs and a military-technical policy on a par with world standards. The doctrine calls for reduced procurement of arms and equipment in serial production and maintaining research and development (R&D) and production capacities to ensure the development and rapid surge production of emerging combat technologies.

Five Key Changes

A comparison of Russia’s new doctrine with the 1990 Soviet military doctrine reveals at least five key changes.

First, in 1990 the main “wartime objective” was to “repel aggression.” In 1992 the main wartime objective is to “repel aggression and defeat the opponent.”

Second, in 1990 the main “development goal” was to structure forces to repel aggression. In 1992 the main development goal is to optimize the armed forces for all possible wars and combat missions.

Third, the 1990 doctrine held that

nuclear war “will” be catastrophic for all mankind, while the 1992 doctrine holds that it “might” be catastrophic for all mankind. The 1990 doctrine stated that nuclear war “will assume a global character” and that calculations limiting it to a single region were untenable. In 1992, however, both these provisions have been deleted, implying that Russia now views limited nuclear warfighting as a possibility. These changes may stem from the growing proliferation of nuclear weapons on Russian borders, which increases the possibility of a limited nuclear conflict.

Fourth, the 1990 doctrine held that conventional “sufficiency” meant that no large-scale offensive operations could be conducted. In 1992, conventional sufficiency means that no large-scale offensive operations can be conducted “without additional deployments.” Soviet President Mikhail S. Gorbachev’s 1987 prohibition against developing large-scale offensive capabilities has clearly been rejected.

Finally, the 1990 doctrine emphasized that Soviet military art was based on a defensive strategy and that the USSR excluded the option of delivering a preemptive strike. Defense was

said to be the main type of military action at the outset of war. In 1992, however, these provisions are deleted. Instead, the Russian armed forces will conduct "all forms of military action," will conduct defense and offense equally, and will seize the strategic initiative to destroy the opponent.

One explanation for these striking divergences from 1990 Soviet doctrine lies in the dramatic changes that have swept the USSR since then. Nevertheless, the new doctrine clearly rejects the long-standing civilian call for forces structured solely to conduct defensive operations.

The Russian military's reasserted influence is discernible in two broader aspects of the new doctrine. First, while Gorbachev's concept of "reasonable sufficiency" guided Soviet force development in 1990, the military's concept of "defense sufficiency" guides Russian force development in 1992. Second, Russia's 1992 doctrine defines "military-strategic parity" as approximate quantitative equality in all types of weapons—a rejection of the civilian call for a qualitative assessment of parity.

Desert Storm's Effect

The new doctrine also reflects the pervasive impact of Operation Desert Storm on Russian military thought. Since the early 1980s, such prominent military thinkers as Marshal Nikolai V. Ogarkov have argued that emerging defense technologies are generating a revolution in military affairs. Russian military scientists now argue that Desert Storm confirmed these predictions and serves as the paradigm of future war in strategy, operational art, and tactics.

Russia's emerging doctrine assigns priority to the new systems employed during Desert Storm: Advanced Conventional Munitions (ACMs), electronic warfare (EW) devices, and C³I systems.

Russian military scientists have argued, for example, that ACMs accomplished the equivalent of nuclear missions during the war. The application of advanced EW is said to be a weapon equal to "fire strikes" in its combat effectiveness. Advanced C³I systems are said to be just as important as the entire "correlation of forces and means." In fact, they assert, superiority in EW and C³I can ensure victory in future war.

The doctrine identifies for the Rus-

sian armed forces a new strategic mission—to repel a surprise "aviation-missile attack." Military scientists now argue that the Persian Gulf War generated a new type of combat action—the "electronic-fire operation"—consisting of surprise, prolonged, and massive missile, aerospace, electronic, and naval strikes conducted for days or weeks. The objectives of the new operation will be achieved without seizure and occupation of enemy territory. Instead, the new objectives are "suppressing the opponent's political or military-economic potential" and "ensuring the victor's supremacy in political or economic arenas."

The new doctrine emphasizes the decisiveness of the war's initial period, which is said to consist of air and naval strikes aimed at disrupting strategic deployments, disorganizing civilian and military C², and removing CIS states from the war. The destruction of economic and military targets by ACMs will be accompanied by simultaneous or preemptive EW. Subsequently, the opponent may deploy ground troops under strong air cover.

As a result, Russian experts argue that the Gulf War is the prototype of the new "technological war," wherein the surprise use of new systems will be decisive and the initial period is essentially the only period in warfare. The new systems have also generated a shift from positional to maneuver actions; a shift from unidimensional to multidimensional warfare; and the demise of linear actions, close-in combat, and stable fronts. The lines between strategy, operational art, and tactics are disappearing because strategic objectives can be achieved with a first deep strike.

What can one conclude about the military-technical aspects of Russia's new doctrine?

Back to the Offensive

First, the doctrine assigns priority to wars fought with existing and emerging conventional weapons. Second, it views the Persian Gulf War as the paradigm of future conventional wars. Third, it calls for the maintenance of R&D at the expense of procurement as the defense budget declines. These budgetary allocations reflect a dramatic shift from the era of quantitative supe-

riority in manpower and armor and toward the era of qualitative, technological indices of combat potential.

Fourth, it reflects changing views on nuclear war, implying that a limited nuclear scenario is possible and that conventional strikes on Russia's nuclear and other dangerous targets will elicit a nuclear response. Finally, it reflects the demise of Gorbachev's "defensive doctrine" and a shift to the acceptance of all forms of military action, including "large-scale offensive operations."

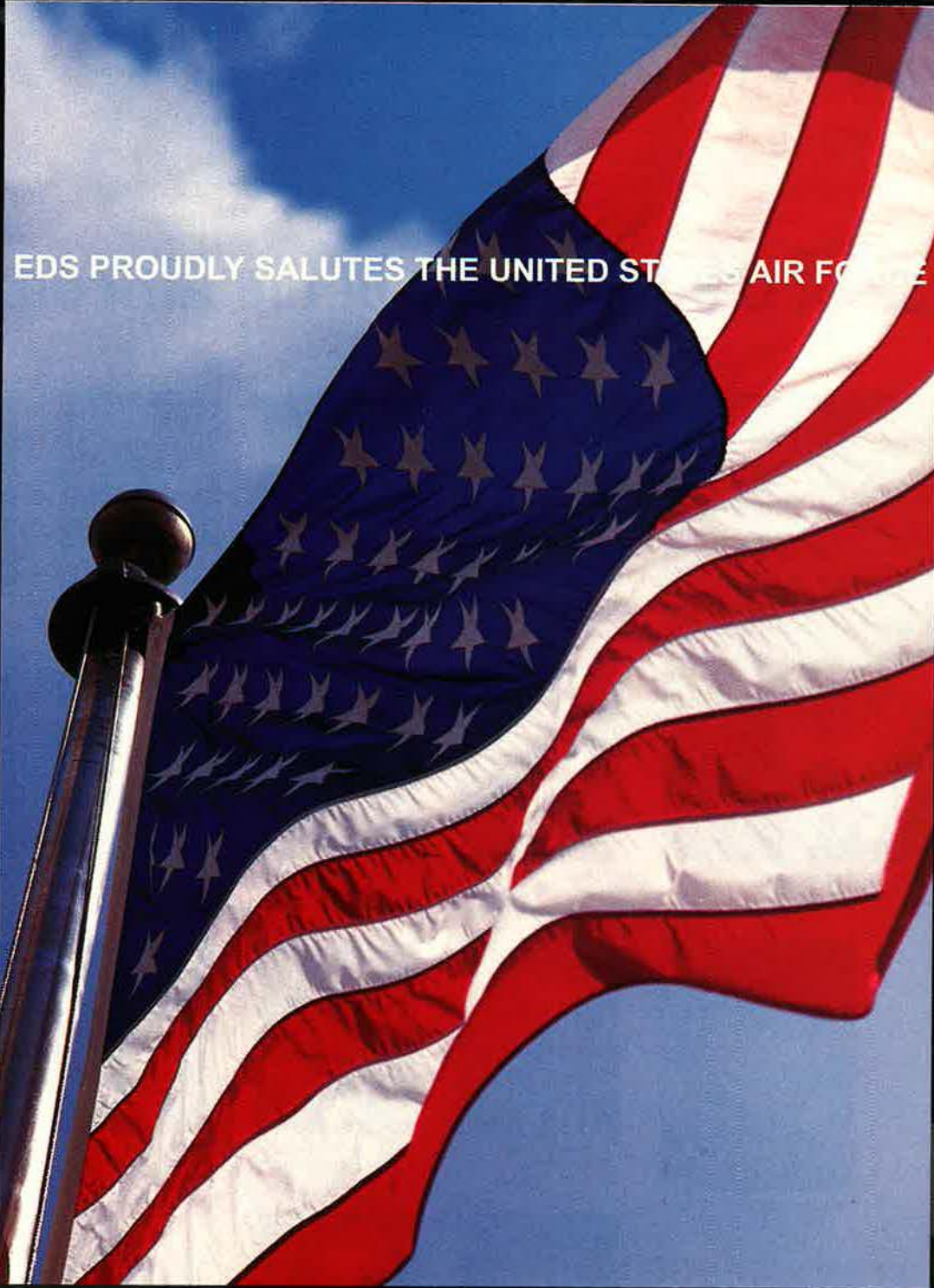
A strong civilian-military consensus exists regarding several key aspects of the new Russian armed forces. Both sides agree that these forces must be smaller, more professional, more mobile, and equipped with emerging technologies. They also agree that large armored forces are "dinosaurs" in modern warfare. No one sees an alternative to the development of ACMs—viewed as the basic deterrent of future war and cheaper than nuclear weapons and large armored forces. Moreover, civilian and military experts agree that R&D must be maintained at the expense of procurement as defense budgets decline.

This consensus is reflected in the new list of seven priorities for the Russian armed forces recently announced by both Vice President Alexander Rutskoy and Defense Minister Pavel Grachev. The seven priority items are highly mobile troops, army aviation, long-range ACMs, C³I systems, military space systems, air defense systems, and strategic arms.

Russian military doctrine thus remains highly dynamic and visionary. Despite much discussion about the ascendancy of civilians, the military has reasserted its dominance over the development of this doctrine.

For the near term, the new doctrine calls for rapid-response forces in order to prepare for local conflicts. For the long term, it calls for the development of emerging combat technologies in order to prepare for the "technological war." But the future of Russia's economy and defense industries, as well as the nature of its political leadership, will determine whether and when Russia will implement the future-oriented aspects of its new military doctrine. ■

Mary C. FitzGerald is a research fellow at the Hudson Institute in Washington, D. C. This is her first article for AIR FORCE Magazine.



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Tinker AFB, Okla.

Sacramento Air Logistics Center
Maj. Gen. Michael D. Pavich
McClellan AFB, Calif.

45th Space Wing
Brig. Gen. Jimmy R. Morrell
Patrick AFB, Fla.

50th Space Wing
Brig. Gen. Roger G. DeKok
Falcon AFB, Colo.

USAF Special Operations School
Col. Michael M. Flynt
Hurlburt Field, Fla.

Special Missions Operational Test and Evaluation Ctr.
Col. Marvin Schott
Hurlburt Field, Fla.

12th Air Force
Lt. Gen. Thomas A. Baker
Bergstrom AFB, Tex.

20th Air Force
Lt. Gen. Arlen D. Jameson
Vandenberg AFB, Calif.

692d Intelligence Wing
Col. Michael S. Cassidy
Hickam AFB, Hawaii

693d Intelligence Wing
Col. Pat O. Clifton
Kelly AFB, Tex.

694th Intelligence Wing
Col. Jon M. Swanson
Fort Meade, Md.

San Antonio Air Logistics Center
Maj. Gen. Lewis E. Curtis III
Kelly AFB, Tex.

Warner Robins Air Logistics Center
Maj. Gen. William P. Hallin
Robins AFB, Ga.

Aerospace Maintenance and Regeneration Center
Col. Bruce E. Rianza
Davis-Monthan AFB, Ariz.

Aerospace Guidance and Metrology Center
Col. Joseph M. Renaud
Newark AFB, Ohio

Air Force Logistics Management Center
Col. Russell G. Stafford
Maxwell AFB, Ala.

Ballistic Missile Organization
Col. Ralph W. Holm
Norton AFB, Calif.

552d Air Control Wing
Brig. Gen. David Oakes
Tinker AFB, Okla.

696th Intelligence Group
Col. Clarence L. Fairbrother
Fort Belvoir, Va.

Contracting and Standardization Center
Col. Phillip L. Harris
Battle Creek, Mich.

Armstrong Laboratory
Dr. Billy E. Welch
Brooks AFB, Tex.

Phillips Laboratory
Col. Peter J. Marchiando
Kirtland AFB, N. M.

Rome Laboratory
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Wright Laboratory
Col. David A. Herrisko
Wright-Patterson AFB, Ohio

Air Force Office of Scientific Research
Dr. Helmut Hellwig
Washington, D. C.

Major Commands (continued)

Air Mobility Command

Hq. Scott AFB, Ill.



Commander
Gen. H. T. Johnson

15th Air Force

Lt. Gen. John E. Jackson, Jr.
March AFB, Calif.

21st Air Force

Lt. Gen. Malcolm B. Armstrong
McGuire AFB, N. J.

22d Air Force

Lt. Gen. Richard J. Trzaskoma
Travis AFB, Calif.

Air Rescue Service

Col. John D. Woodruff
McClellan AFB, Calif.

Air Combat Camera Service

Col. Thomas E. Diamond
Norton AFB, Calif.

Defense Courier Service

Col. Chris L. Jefferies
Fort Meade, Md.

Air Training Command

Hq. Randolph AFB, Tex.



Commander
Lt. Gen. Joseph W. Ashy

Lackland Training Center

Maj. Gen. Billy G. McCoy
Lackland AFB, Tex.

Chanute Technical Training Center

Brig. Gen. F. Keith Tedrow
Chanute AFB, Ill.

Keesler Training Center

Maj. Gen. John C. Griffith
Keesler AFB, Miss.

Goodfellow Training Center

Col. Joseph H. Wehrle, Jr.
Goodfellow AFB, Tex.

Lowry Training Center

Maj. Gen. Jay D. Blume, Jr.
Lowry AFB, Colo.

Sheppard Training Center

Maj. Gen. Dale C. Tabor
Sheppard AFB, Tex.

USAF Recruiting Service

Brig. Gen. Michael G. Vergamini
Randolph AFB, Tex.

Air Force Reserve Officer Training Corps

Brig. Gen. Robin G. Tornow
Maxwell AFB, Ala.

3636th Combat Crew Training Wing

Col. John C. Chapman, Jr.
Fairchild AFB, Wash.

Willford Hall USAF Medical Center

Maj. Gen. Edgar R. Anderson, Jr.
Lackland AFB, Tex.

Air University

Hq. Maxwell AFB, Ala.



Commander
Lt. Gen. Charles G. Boyd

Air War College

Maj. Gen. Peter D. Robinson
Maxwell AFB, Ala.

Air Command and Staff College

Col. John A. Warden III
Maxwell AFB, Ala.

Squadron Officer School

Col. (Brig. Gen. selectee)
Lance W. Lord
Maxwell AFB, Ala.

Center for Aerospace Doctrine, Research, and Education

Col. (Brig. Gen. selectee)
Ervin C. Sharpe, Jr.
Maxwell AFB, Ala.

Air Force Institute of Technology

Col. David C. Whitlock
Wright-Patterson AFB, Ohio

Air University Regional Hospital

Col. Robert T. Jones
Maxwell AFB, Ala.

Hq. Civil Air Patrol—USAF

Col. Joseph M. Nall
Maxwell AFB, Ala.

Air University Library

Robert B. Lane
Maxwell AFB, Ala.

Air Force Quality Center

Col. William A. Fortner
Maxwell AFB, Ala.

Ira C. Eaker Center for Professional Development

Col. Randal E. Wooten
Maxwell AFB, Ala.

Extension Course Institute

Col. Jerry Sailors
Maxwell AFB,
Gunter Annex, Ala.

USAF Senior NCO Academy

CM Sgt. Glenn R. White
Maxwell AFB,
Gunter Annex, Ala.

3800th Air Base Wing

Col. Gerald R. Adams
Maxwell AFB, Ala.

Pacific Air Forces

Hq. Hickam AFB, Hawaii



Commander in Chief
Gen. Jimmie V. Adams

5th Air Force

Lt. Gen. Richard E. Hawley
Yokota AB, Japan

7th Air Force

Lt. Gen. Ronald R. Fogleman
Osan AB, South Korea

11th Air Force

Lt. Gen. Joseph W. Ralston
Elmendorf AFB, Alaska

13th Air Force

Maj. Gen. H. Hale Burr, Jr.
Andersen AFB, Guam

15th Air Base Wing

Col. William C. Van Meter
Hickam AFB, Hawaii

United States Air Forces in Europe

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Gen. Robert C. Oaks

3d Air Force

Maj. Gen. Charles D. Link
RAF Mildenhall, England

16th Air Force

Maj. Gen. Gerald A. Daniel
Aviano AB, Italy

17th Air Force

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435th Airlift Wing

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**Air Force
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Agency**
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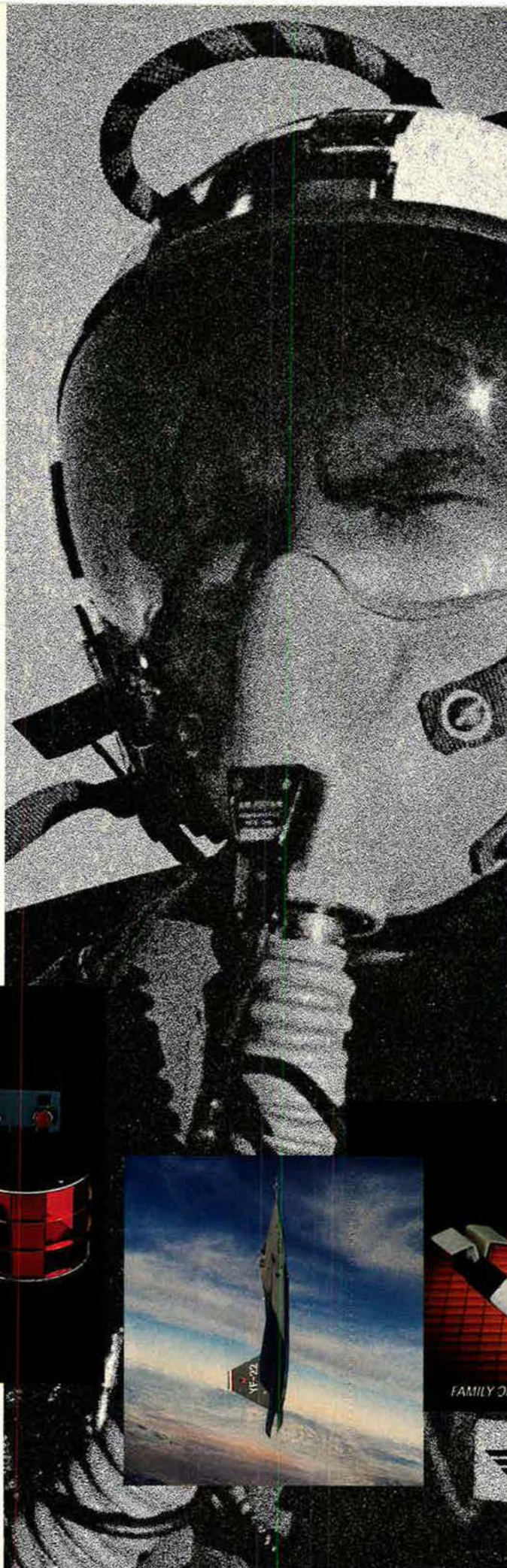
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Hq. Patrick AFB, Fla.



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Commander
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Air Reserve Personnel Center

Hq. Denver, Colo.



Commander
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Hq. Scott AFB, Ill.



Commander
Col. George L. Frederick, Jr.

Center for Air Force History

Hq. Washington, D. C.



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Joint Services Survival, Evasion, Resistance, and Escape Agency

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(effective August 7)

7th Communications Group

Washington, D. C.



Commander
Col. Stephen E. Anno

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**Air Force
District of
Washington**
Bolling AFB, D. C.



Commander
Brig. Gen. James L. Vick

**Air Force
Operational
Test and
Evaluation
Center**
Kirtland AFB, N. M.



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**United States
Air Force
Academy**
Colorado Springs, Colo.



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Lt. Gen. Bradley C. Hosmer

Senior Enlisted Advisors



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Air Combat Command
Langley AFB, Va.



CMSgt. Robert L. Munns
Air Force Intelligence Command
Kelly AFB, Tex.



CMSgt. Michael Di Gregorio
Air Force Materiel Command
Wright-Patterson AFB, Ohio



CMSgt. Delamar T. Jones
Air Force Space Command
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CMSgt. James R. Robertson
Air Force Special Operations
Command
Hurlburt Field, Fla.



CMSgt. David J. Campanale
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CMSgt. George T. Moriarty
Air Training Command
Randolph AFB, Tex.



CMSgt. James B. Livesay
Pacific Air Forces
Hickam AFB, Hawaii



CMSgt. Robert W. Bailey
United States Air Forces in Europe
Ramstein AB, Germany



CMSgt. Rebecca A. Brunotte
Air Force Civil Engineering
Support Agency
Tyndall AFB, Fla.



CMSgt. Ronald D. Allison
Air Force Communications
Command
Scott AFB, Ill.



CMSgt. Eugene A. Allen
Air Force Intelligence
Support Agency
Washington, D. C.



CMSgt. Thomas H. Sanford
Air Force District of
Washington
Bolling AFB, D. C.



CMSgt. Michael J. Bivens
Air Force Office of Special
Investigations
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CMSgt. James A. Rossi
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Robins AFB, Ga.



CMSgt. Richard A. Moon
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Military Manpower and Personnel Policy
Ass't Secretary of Defense
Force Management and Personnel
Washington, D. C.

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Senior Military Ass't to Secretary of Defense
Washington, D. C.

Brig. Gen. George A. Gray III
Senior Military Ass't
Ass't Secretary of Defense
Special Operations and Low Intensity Conflict
Washington, D. C.

Brig. Gen. James W. McIntyre
Staff Director, Seventh Quadrennial Review of Military Compensation
Ass't Secretary of Defense
Force Management and Personnel
Arlington, Va.

Department of Defense Agencies

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Washington, D. C.

Maj. Gen. Richard E. Carr
Deputy Director for Foreign Intelligence
Defense Intelligence Analysis Center
Defense Intelligence Agency
Bolling AFB, D. C.

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Deputy Director, Defense Logistics Agency
Cameron Station, Va.

Maj. Gen. Kenneth L. Hagemann, Sr.
Director, Defense Nuclear Agency
Alexandria, Va.

Maj. Gen. William K. James
Director, Defense Mapping Agency
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Maj. Gen. Robert W. Parker
Director, US Government On-Site Inspection Agency
Washington Dulles IAP, Va.

Maj. Gen. Thad A. Wolfe
Ass't Deputy Director for Operations
National Security Agency
Fort Meade, Md.

Brig. Gen. Richard A. Browning
Commander, Defense Construction Supply Center
Defense Logistics Agency
Columbus, Ohio

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US Defense and Air Attaché, China
Defense Intelligence Agency
Beijing, China

Brig. Gen. Gerald E. Hahn
Deputy for Policy and Network Management, Denver Center
Defense Finance and Accounting Service
Lowry AFB, Colo.

Brig. Gen. Jean E. Klick
Commander, Defense Contract Management Command, Western District
Defense Logistics Agency
El Segundo, Calif.

Joint Chiefs of Staff

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Jt. Requirements Oversight Council
Washington, D. C.

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Director, Logistics, J-4
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Washington, D. C.

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Washington, D. C.

Maj. Gen. Albert J. Edmonds
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Washington, D. C.

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Washington, D. C.

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Director, Operational Plans and Interoperability, J-7
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Military Staff Committee of the United Nations
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Washington, D. C.

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Washington, D. C.

Joint Service Schools

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National Defense University
Fort McNair, D. C.

Brig. Gen. Monroe S. Sams, Jr.
Commandant, Armed Forces Staff College
National Defense University
Norfolk, Va.

US Atlantic Command

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US Air Forces Atlantic
Langley AFB, Va.

Maj. Gen. Raymond E. O'Mara
Deputy Commander in Chief and Chief of Staff
Naval Base Norfolk, Va.

Brig. Gen. Thomas D. Pilsch
Commander, US Forces Azores
Lajes Field, Azores

US Central Command

Lt. Gen. Michael A. Nelson
Commander, US Central Command Air Forces
Shaw AFB, S. C.

Maj. Gen. William A. Studer
Director, Operations, J-3
MacDill AFB, Fla.

Brig. Gen. Roscoe M. Coughlin
Director, C² Systems, J-6
MacDill AFB, Fla.

US European Command

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Stuttgart-Vaihingen, Germany

Maj. Gen. Vernon Chong
Command Surgeon
Stuttgart-Vaihingen, Germany

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Director, Plans and Policy, J-5
Stuttgart-Vaihingen, Germany

Maj. Gen. Bruce J. Lutzbre
Chief, Office of Defense Cooperation, Greece
Athens, Greece

Maj. Gen. Ervin J. Rokke
Director, Intelligence, J-2
Stuttgart-Vaihingen, Germany

Brig. Gen. Jerome A. Landry
Director, C² Systems, J-6
Stuttgart-Vaihingen, Germany

Col. (Brig. Gen. selectee) Thomas J. Lennon
Executive Officer to Deputy Commander in Chief
Stuttgart-Vaihingen, Germany

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Actual flight test photo AGM-130, Eglin AFB, Fla.



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Commander, US Forces Japan
Commander, US Air Forces Japan
Yokota AB, Japan

Lt. Gen. Joseph W. Raiston
Commander, Alaskan Command
Commander, Alaskan NORAD Region, NORAD
Eielson AFB, Alaska

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Commander, Contingency Joint Task Force
Andersen AFB, Guam

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Camp H. M. Smith, Hawaii

Brig. Gen. W. Thomas West
Deputy Director, Operations, J-3
Camp H. M. Smith, Hawaii

US Southern Command

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Commander, US Air Forces Southern Command
Bergstrom AFB, Tex.

Maj. Gen. Walter T. Worthington
Deputy Commander in Chief
US Southern Command
Quarry Heights, Panama

Brig. Gen. David Oakes
Commander, US Air Forces Forward
Deputy Commander, Joint Task Force—Panama
Howard AFB, Panama

US Space Command

Maj. Gen. Phillip E. Bracher
Director, Command Control Systems and Logistics, J-4/J-6
Peterson AFB, Colo.

Brig. Gen. Owen W. Lentz
Director, Intelligence, J-2
Peterson AFB, Colo.

US Special Operations Command

Maj. Gen. Thomas E. Eggers
Deputy Commander in Chief
MacDill AFB, Fla.

Maj. Gen. Bruce L. Fister
Commander, Air Force Component Command
Hurlburt Field, Fla.

Maj. Gen. James C. McCombs
Director, Plans, Policy, and Doctrine, J-5
MacDill AFB, Fla.

Brig. Gen. Dale E. Stovall
Deputy Commanding General, Joint Special Operations Command
Fort Bragg, N. C.

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Gen. George L. Butler
Commander in Chief
Offutt AFB, Neb.

Lt. Gen. Martin J. Ryan, Jr.
Commander, Task Force—Bomber
Barksdale AFB, La.

Maj. Gen. Frank B. Horton III
Director, Intelligence, J-2
Offutt AFB, Neb.

Maj. Gen. Robert E. Linhard
Director, Plans and Policy, J-5
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Brig. Gen. Orin L. Godsey
Deputy Director, Command and Control, J-3/J-4
Offutt AFB, Neb.

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Gen. H. T. Johnson
Commander in Chief
US Transportation Command
Commander, Air Force Component Command
Scott AFB, Ill.

Maj. Gen. Edwin E. Tenoso
Director, Operations and Logistics, J-3/J-4
Scott AFB, Ill.

Col. (Brig. Gen. selectee) William A. Begert
Chief of Staff
Scott AFB, Ill.

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Scott AFB, Ill.

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Air Force Component Commander, LS European Command
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Allied Forces Southern Europe
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Brig. Gen. Lee A. Downer
Deputy Chief of Staff, Operations, 2d Allied Tactical Air Force
Allied Air Forces Central Europe
Rheindahlen, Germany

Brig. Gen. Jeffrey T. Ellis
Deputy Commander, 5th Allied Tactical Air Force
Allied Air Forces Southern Europe
Vicenza, Italy

Brig. Gen. Travis E. Harrell
Ass't Chief of Staff, Plans and Policy
UK Air Forces
RAF High Wycombe, UK

Brig. Gen. Richard T. Swape
Ass't Chief of Staff, Operations
Allied Forces Central Europe
Brunssum, the Netherlands

North American Aerospace Defense Command

Gen. Charles A. Horner
Commander in Chief, NORAD
Commander in Chief, USSPACECOM
Commander, Air Force Component Command, USSPACECOM
DoD Manager for Space Transportation System Contingency
Support Operations
Peterson AFB, Colo.

Maj. Gen. Lester P. Brown, Jr.
Commander, Continental US NORAD Region
Tyndall AFB, Fla.

Brig. Gen. William E. Collins
Command Director, NORAD Combat Operations Staff
Peterson AFB, Colo.

Brig. Gen. Benard W. Gann
Deputy Commander, Canadian NORAD Region
CFB North Bay, Ontario, Canada

Brig. Gen. Timothy D. Gill
Director, NORAD Planning Staff
Peterson AFB, Colo.

Brig. Gen. Hallie E. Robertson
Command Director, NORAD Combat Operations Staff
Peterson AFB, Colo.

Brig. Gen. Arnold R. Thomas, Jr.
Vice Director, NORAD Combat Operations Staff, J-3V
Peterson AFB, Colo.

United Nations Command Korea

Lt. Gen. Ronald R. Fogleman
Deputy Commander in Chief, United Nations Command, Korea
Deputy Commander, US Forces Korea
Commander, ROK/US Air Component Command
Combined Forces Command
Osan AB, South Korea

Maj. Gen. Ronald N. Running
Chief of Staff, United Nations Command, Korea
Chief of Staff, ROK/US Combined Forces Command
Chief of Staff, Ground Component Command
Seoul, South Korea

Departments of the Army and the Air Force

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Chief, National Guard Bureau
Washington, D. C.

Brig. Gen. John L. Finan
Vice Commander, Army and Air Force Exchange Service
Dallas, Tex.

Executive Office of the President

Maj. Gen. Robert M. Marquette, Jr.
Director, Emergency Operations
White House Military Office
Washington, D. C.

Brig. Gen. John A. Gordon
Director, Defense Policy and Arms Control
National Security Council
Washington, D. C.

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How plane geometry figures into America's economy.

It's not a question of just winning another space race with countries who are working on programs similar to the X-30.

And it's not just about adding hypersonics to the list of America's accomplishments.

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The X-30 program is supported by scientists, engineers, government and industry in 44 states.



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AFA and the Air Force salute the best crews of the year in six mission areas.

Top Crews

Chennault Award

Best Aerial Warfare Tactician

Deployed to Saudi Arabia for Operations Desert Shield and Desert Storm as an A-10 WSO and instructor pilot, Capt. Arden B. Dahl of the 23d Fighter Wing (now 23d Wing, Pope AFB, N. C.) developed an innovative night combat training program. A-10 training had emphasized day employment. To prepare his provisional wing for night combat using existing equipment under unfamiliar conditions, Captain Dahl developed unusual tactics. He used Maverick missiles for standoff target location and identification and developed lights-out deconfliction techniques. One A-10 squadron he trained flew more than 1,000 night combat missions, another more than 1,400. Both destroyed enemy targets and received no battle damage. Captain Dahl's tactics are now a permanent part of A-10 training.



Power Award

Best Strategic Missile Combat Crew

Capt. Ferdinand B. Stoss (standing) and 1st Lt. Adrian L. Hovious, Crew S-208 of the 44th Operations Group, 44th Missile Wing, Ellsworth AFB, S. D., individually and as a team won numerous awards and scored high in tests, inspections, and competitions in 1991 (they earned the highest score among twenty-four missile operations crews at SAC's last Olympic Arena). Both were crucial participants in Minuteman II deactivation at the 44th Missile Wing. Captain Stoss improved missile evaluator training procedures, thereby reducing evaluation errors by ninety percent over three months. Lieutenant Hovious is now a missile combat crew commander evaluator.





Space Operations Award

Best Unit in Air Force Space Command

Bravo Crew of the 2d Space Operations Squadron, 50th Space Wing, Peterson AFB, Colo., held a 98.4 percent mission effectiveness rate throughout the Persian Gulf conflict, the US's first "space war." Members of Bravo Crew spotted a GPS satellite design flaw that would have jeopardized Desert Storm operations and overcame it by devising manual operation of solar panels designed to be automatic; spin-stabilized a satellite whose attitude control system failed, thus salvaging valuable navigation coverage for US and coalition forces; and scheduled signal downtime to optimize coverage when an older satellite's power subsystem could not power its payload during a solar eclipse. Bravo Crew also solved satellite problems related to relief efforts, rocket launches, and space shuttle operations.

O'Malley Award

Best Reconnaissance Crew

After leading the longest RF-4C deployment ever, from Bergstrom AFB, Tex., to Shaik Isa AB, Saudi Arabia, pilot Maj. Mark Hefferly (right) and WSO Capt.

Steve Willis (below) distinguished themselves in Desert Storm photo-reconnaissance missions. Major Hefferly led twenty-eight combat missions, including high-risk flights to locate and photograph active surface-to-air missile sites in Kuwait. Despite SAM defenses, Major Hefferly obtained photographs that enabled coalition forces to identify and destroy operational enemy missiles at six installations. Captain Willis photographed more than 300 Priority One targets in thirty-nine combat missions. During one such mission, after battling AAA and SAM fire with on-board countermeasures, Captain Willis precisely



photographed a rocket fuel production complex, communication center, and chemical/biological weapon production facility near Baghdad. Within hours, coalition forces eliminated these facilities. After the war, Major Hefferly advised four ANG units; Captain Willis worked on a reconnaissance program for the Joint Chiefs of Staff and was a project officer for the composite force exercise Pecos Thunder.



LeMay Award

Best Strategic Aircrew

Crews S-05 and E-44 of the 55th Wing, Offutt AFB, Neb., flew the last RC-135 intelligence mission of Desert Shield, just before the start of the Persian Gulf War. They flew numerous wartime Rivet Joint missions, several lasting longer than fourteen hours. During preparations for one mission, their base in Saudi Arabia came under Scud missile attack. Donning chemical-protective equipment, the crews took off despite the closure of the air base. The two aircraft that had been parked near them were damaged. Later in that mission, the crews aided in rescuing a downed naval aviator deep in hostile territory and warned rescue forces of an enemy radar installation in the area. Another mission continued despite an engine fire and an approaching sandstorm. These crews also supported United

Nations inspections of Iraqi facilities after the war. Crew S-05 (above) consists of Capt. David F. Ellis, evaluator/instructor aircraft commander; Capt. Stephen L. Barrett, evaluator/instructor navigator; Capt. Patrick W. Taylor, pilot; and 1st Lt. Richard W. Edwards, navigator, of the 38th Reconnaissance Squadron. Crew E-44 (right) is Capt. Sheila Kirkwood, instructor EWO/mission director; Capt. Mark A. Spadaro, reconnaissance crew commander; MSgt. Walter W. Bullock, in-flight maintenance technician; and Capt. Brent A. Anderson, evaluator/instructor EWO, of the 343d Reconnaissance Squadron.

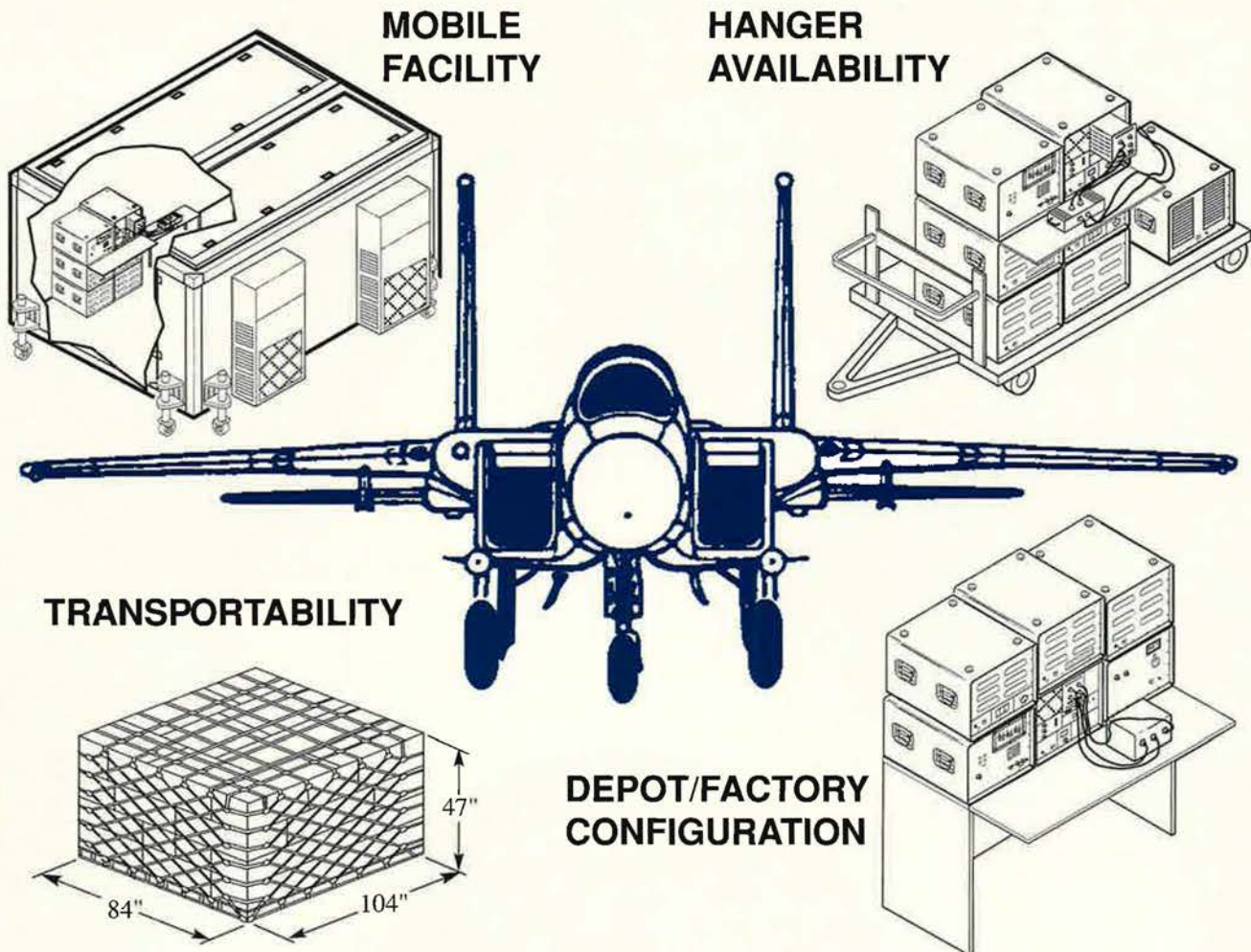


Tunner Award

Best Airlift Aircrew

A crew of the 438th Airlift Wing, McGuire AFB, N. J., showed initiative and courage in the emergency evacuation of the US embassy in Sudan when embassy staff and families were threatened by Iraqi sympathizers. Surmounting technical and diplomatic hurdles, the crew left Nairobi, Kenya, for Sudan, where within two hours it refueled, hand-loaded more than 3.5 tons of baggage and heavy equipment, and processed seventy-seven passengers, all while armed local military tried to disrupt the process. All US personnel were safely evacuated. From left: Sgt. Ronny L. Morton, instructor loadmaster; Capt. Thomas M. Beirne, flight examiner pilot; Capt. Gregory J. Garrett, instructor pilot; SSgt. Roger Lynch, instructor flight engineer, SSgt. Jeffrey C. Gingrich, flight examiner loadmaster.

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**CFC
#0486**

AFA and the Air Force pay tribute to the Outstanding Airmen of the Year.

The Twelve

THESE men and women represent the best of USAF's enlisted force. At AFA's National Convention this month, they will be recognized and honored as such. For one year, they will wear the Outstanding Airman of the Year badge; they also receive a ribbon which they may wear throughout their service careers.

TSgt.
Christopher
Batta



An expert handler of military working dogs, Sergeant Batta earned a Bronze Star for heroism in the aftermath of the Persian Gulf War. He and his military working dog, Carlo, made 167 positive "finds" of explosive ordnance during the liberation of Kuwait City, uncovering more than one million pounds of explosives.

SrA.
Kimberlie S.
Carpenter



Airman Carpenter shines in a particularly difficult role: keeping a piece of 1940s technology, the AN/MPS-9 fire-control radar, working well enough to suit the Air Force of the 1990s. She has developed troubleshooting techniques and handcrafted parts to keep the system running, saving thousands of dollars in the process. She earned the position of equipment supervisor early in her career and has won the prestigious Lt. Gen. Leo Marquez Award.

SMSGt.
Michael E.
Cloutier



Sergeant Cloutier helped both the 18th Equipment Maintenance Squadron and the 44th Fighter Squadron exceed PACAF's high standards for mission capable rates and scheduling effectiveness rates by as much as thirteen percent.

**MSgt.
George F.
Dupin III**



An acknowledged Base Contracting Automation System expert, Sergeant Dupin developed and fielded a deployable version of the BCAS within twenty-one days, allowing contracting officers in the field to process more than 50,000 transactions during Operation Desert Shield.

**SSgt. Dean
P. Handy**



Sergeant Handy has shown that the nerve-racking task of aeromedical evacuation can be performed with professionalism and calm devotion to duty. His bearing as a radio operator for the Aeromedical Evacuation Liaison Team that supported XVIII Airborne Corps's move into Iraq has been termed "exemplary."

**SMSGt.
Donald W.
Hatcher**



Sergeant Hatcher has distinguished himself in the demanding field of cryptologic linguistics. He has improved Air Training Command's teaching techniques in this vital intelligence skill, analyzing and evaluating training effectiveness, task utilization, and course productivity for the major commands and Hq. USAF.



**SrA. Robin
L. Holmes**

A munitions systems specialist for the 363d Equipment Maintenance Squadron, Airman Holmes was not satisfied with a business-as-usual approach. She revamped several training and briefing programs. Her innovative reworking and writing of the instructions for handling hazardous materials enhanced safety, helping earn the munitions branch the rating "Best in DoD."



**TSgt.
Michael G.
Lassiter**

Sergeant Lassiter played a key role throughout Desert Shield and Desert Storm, helping transform a bare base into MAC's largest aerial port through his efforts as the sole USAF purchaser of local goods and services at Dhahran Air Field, Saudi Arabia.



**A1C Jorge
A. Ospina**

As a mobile air cargo specialist, Airman Ospina handled eighty aircraft and 1,600 tons of cargo per day during Desert Shield, an average that increased by fifty percent with the onset of Desert Storm. In Operation Provide Comfort, the Kurdish relief effort, he ensured rapid delivery of 1,300 tons of supplies from eleven different countries to starving refugees.

**MSgt.
Sharon B.
Page**



As NCOIC of Electronic Computer and Switching Systems Maintenance, Sergeant Page was another standout performer in the Gulf War, maintaining secure reliable communications between the CINC and combat commanders during the seven-month deployment. She reduced the message backlog from 900 to sixty per day. Her actions earned her the Bronze Star and recognition as Outstanding Senior NCO of 1991 for the Georgia National Guard.

**A1C Ronald
S. Thomas**



Communications is also Airman Thomas's area of expertise—specifically, the systems aboard the Advanced Range Instrumentation Aircraft. His creation of a unique resistor network, an electronic logic box, and other maintenance innovations saved the Air Force \$42,000 in nine months. He was Airman of the Year for both Aeronautical Systems Division and Air Force Systems Command.

**TSgt.
John H.
Thompson**



During the Gulf War, Sergeant Thompson helped plan several classified deep-strike missions with coalition special operations forces teams, set up and maintained a 300-mile string of radar beacons that vastly improved bombing accuracy, and performed flawlessly as air traffic controller for Rafha Air Field, then the busiest airport in the world.

THE JET FOR JPATS.

The Grumman/Agusta S211A is the best trainer for the Joint Primary Aircraft Training System (JPATS). Originally designed to T-37 primary aircraft training specifications and built to U.S. Aerospace Technology and Manufacturing Standards, the S211 has more than 60,000 hours of simple, reliable, efficient training service. It allows trainees to readily transfer their skills to more advanced aircraft. Operating at the heart of the JPATS envelope, the S211A features superb low-speed handling, a cockpit conducive to learning, and low cost of ownership. And Hughes brings to the team a proven ground-based training capability. No JPATS alternative matches this cost-effective, totally integrated training system. Grumman Aircraft Systems, Bethpage, Long Island, NY 11714. Tel: (516) 575-3350.

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For some time now, we have been encouraging the U.S. Air Force to consider maximizing a very positive experience with our airplanes.

You see, the 89th Military Airlift Wing has had nothing but unqualified success with the several C-20 Gulfstreams it currently operates out of Andrews Air Force Base near Washington, D.C.

From the day they went into service with Special Air Missions in 1983, the C-20 Gulfstreams, which are versions of our Gulfstream III business jet, have proven again and again to be incredibly productive in taking our government and military leaders all over the globe. What's more, they have saved the Air Force millions of dollars in operating costs alone by augmenting big 4-engine transport aircraft.

Today, with the escalating U.S. involvement in the world's rapidly changing political and economic situations, SAM is relying even more on these versatile jets.

With all that in mind, we know SAM will have even greater global reach with the C-20H Gulfstream, which is the Air Force version of our Gulfstream IV business jet.

This remarkable airplane can fly nearly 4,200 nautical miles non-stop in about 9.5 hours. That

capability alone creates entirely new flight planning opportunities, not only between more widely-separated cities, but also to help keep the aircraft and its passengers out of harm's way.

Advanced? It has computerized flight management systems matched only in the newest commercial transports.

Reliable? It has a new generation of Rolls-Royce engines so dependable and fuel-efficient they were also chosen to power airliners.

Cost effective? The C-20H Gulfstream also complements the C-20 Gulfstreams, right down to maintenance procedures, spares and support programs, helping to compound that all-important cost savings factor even more.

Well, the Air Force evidently likes what they heard about the C-20H Gulfstream.

SAM has its first one.

That's the way it is with Gulfstreams. One good experience leads to another.

And another.

And another.

And another.



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Five AFA awards honor the year's top airmen and units in the Guard and Reserve.

Tops in Guard and Reserve

The President's Award Top AFRES Crew

Lt. Col. Roger G. Disrud of the 442d Fighter Wing, Richards-Gebaur AFB, Mo., was the overall USAF Top Gun and the A-10 Top Gun at this year's Gunsmoke competition. Colonel Disrud achieved perfect scores on two separate gunnery profiles, a Gunsmoke first. Before Gunsmoke, he supervised the navigation training of the 442d FW's team and developed techniques for using the Low-Altitude Safety and Targeting Enhancement (LASTE) system, which greatly improved the A-10's performance. His attention to detail before the 442d's Operational Readiness Inspection led to an Outstanding rating—the first ever awarded by 9th Air Force's Inspector General.



The Ricks Award

Outstanding Airmanship in the ANG

Powerful wake turbulence from a preceding aircraft ripped both engines from the left wing of a KC-135E during a night Gulf War mission near Jiddah, Saudi Arabia. Its crew, from the 190th Air Refueling Group, Kansas ANG, improvised emergency procedures, regained control, and landed with just two engines. It was the first time since the KC-135 was introduced in 1955 that one so badly damaged was recovered. This photo was taken when the crew was awarded the Distinguished Flying Cross. Left to right are navigator Capt. Greg Mermis, aircraft commander Maj. Kevin J. Sweeney, Kansas Adjutant General Maj. Gen. James F. Ruger, co-pilot Capt. Jay N. Selanders, and aircraft refueling technician SMSgt. Steven D. Stucky.



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Outstanding Reserve Unit

The 512th Airlift Wing, Dover AFB, Del., carried out an unprecedented number of airlift missions between April 1, 1991, and March 31, 1992. The wing flew 11,850 flying hours during that time in the drawdown from Operation Desert Storm and in the humanitarian airlift Operations Provide Comfort and Provide Hope, all with a perfect safety record, the finest of any operational flying unit. The wing activated 1,305 Reservists for Operations Desert Shield and Desert Storm, and crew members from the 512th AW earned more than 100 air medals and aerial achievement medals.

Chief Red Award

Outstanding Aerospace Maintenance

SMSgt. Joan T. Davis of the 184th Consolidated Aircraft Maintenance Squadron, McConnell AFB, Kan., is the unit's Type IV Precision Measurement Equipment Laboratory (PMEL) shop chief. She was selected for this assignment as the unit was converting to the F-16A and B in 1987. She led the PMEL to two Honor Roll certifications from the Aerospace Guidance and Metrology Center and Excellent ratings in two unit effectiveness inspections. Sergeant Davis developed an outstanding training program that resulted in twenty-two technicians being upgraded to the five-skill level, thirteen to the seven-skill level, and one supervisor to the nine-skill level, with a 100 percent pass rate for all career development courses. She also developed a start-up guide to assist units converting to the F-16.



Outstanding Guard Unit

The main body of the 174th Tactical Fighter Wing (now the 174th Fighter Wing), Syracuse, N. Y., arrived at Al Kharj AB, Saudi Arabia, just before Operation Desert Shield became Desert Storm. (Two of the 174th's units were already there). The maintenance and operations squadrons designed and built their entire operating area in less than three days, setting the standard for all flying squadrons. The wing served as part of the 4th TFW (Provisional) during Desert Storm, targeting units of the Republican Guard while maintaining an eighty-eight percent in-commission rate. The 138th TFS flew 3,714 combat hours in 1,411 combat sorties, dropping 3.1 million pounds of bombs. All wing personnel deployed to Desert Storm returned safely home.

Quick, innovative thinking and the ability to cope easily with tense situations distinguish 1992's Team of the Year.

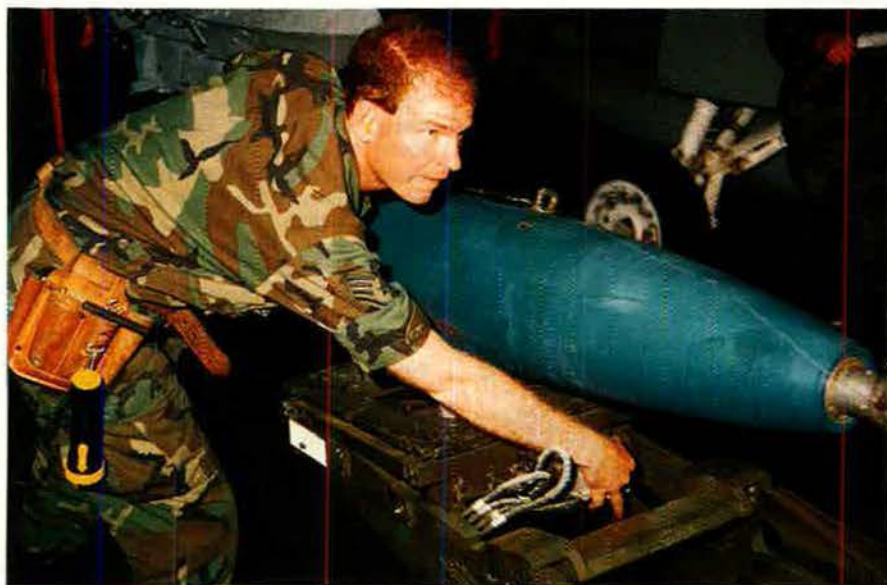
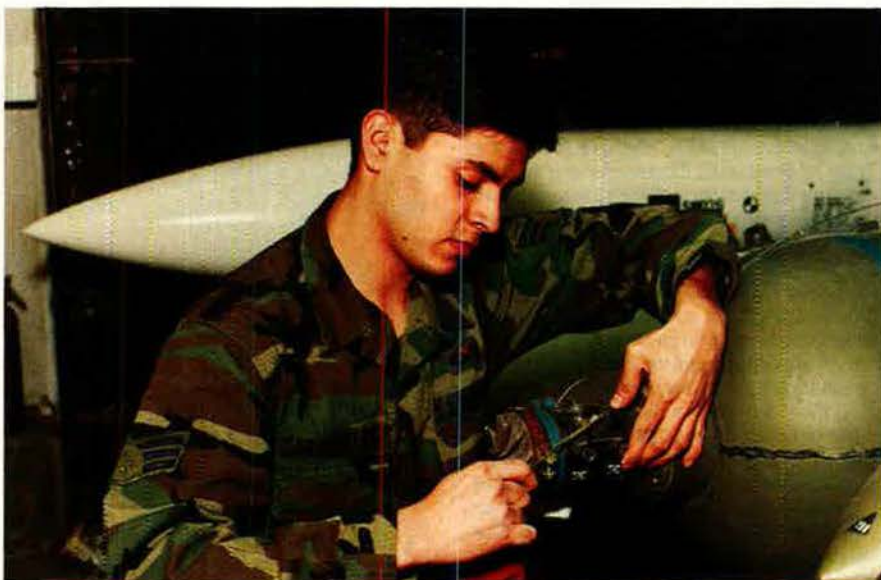
Their Mission Is Munitions

SrA. Hilario C. Carrizales

Officially, SrA. Hilario C. Carrizales's task upon arrival at Moron AB, Spain, January 11, 1991, was to support B-52 sorties. The Minot AFB, N. D., munitions maintenance specialist performed flawlessly in bomb buildup, various munitions configurations, and fuzings.

One frag order change required new fuze settings on CBUs already loaded on B-52s. Although the change called for the skilled use of a mirror, Airman Carrizales performed it efficiently, enabling the aircraft to take off on time.

Unofficially, Airman Carrizales's Spanish language skills soon became indispensable at Moron. His translation ability expedited such activities as receiving munitions shipments at the main gate, and he calmed many tense situations by emphasizing to Spanish and American forces that they shared the same goal.



TSgt. Arlyn E. Wood II

When he volunteered for service in Operation Desert Shield in January 1991, TSgt. Arlyn E. Wood II (then a staff sergeant) was deployed to Saudi Arabia to support a squadron of F-16As. The weapons loading crew chief from Buckley ANGB, Colo., faced a hazardous situation: The Mk. 389 fuze had been unintentionally armed on a Mk. 20 cluster bomb. Sergeant Wood physically stopped the arming process in time, then worked with Explosive Ordnance Disposal personnel who defuzed the bomb. The incident occurred on a flight line crowded with more than 100 aircraft. For his quick thinking and fast action, Sergeant Wood received the TAC Safety Award.



SSgt. Dexter J. Evans

SSgt. Dexter J. Evans, a munitions operations specialist from Seymour Johnson AFB, N. C., deployed to Al Kharj AB, Saudi Arabia, in support of the 336th Tactical Fighter Squadron. Aided by a partner, he built up more than 600 conventional bombs, helping the 336th become the first unit to assume alert status. Sergeant Evans built from scratch a manual account that became the largest munitions operations account in his Area of Responsibility (AOR), supporting four different systems. Sergeant Evans's exceptional skills in reconciliation reporting and document control allowed more than 30,000 pallets of munitions to be received, documented, and processed in less than thirty days at various air and seaports. As depot manager, he was responsible for munitions arriving in the AOR from CONUS and USAF units.

Sgt. William J. Kelly

SSgt. William J. Kelly, a munitions assembly crew chief from Eglin AFB, Fla., contributed expertise in critical equipment tests to a bomb that is credited with quickly ending the war. Sergeant Kelly participated in assembly, test, modification, and certification of the "bunker-buster" GBU-28 bomb. He also designed a tool that made the GBU-28 easier to assemble. His expertise extended to the weapons certification of the F-117A Stealth fighter and the electrical interface between the TMU-28 chemical spray tank and the F-15E aircraft. Sergeant Kelly is one of only a dozen USAF personnel certified to modify and repair the tank. He flawlessly and quickly assembled and tested 110 cluster bomb units, guided bomb units, and general-purpose bombs.



TSgt. Scott A. Marquart

Deployed to Incirlik AB, Turkey, in 1990, TSgt. Scott A. Marquart supported the 7440th Combat Wing (Provisional). The Castle AFB, Calif., conventional maintenance crew chief supervised the assembly of eighty different types of munitions, including more than 3,800 Mk. 82 and 1,800 Mk. 84 general-purpose bombs, twenty-four tons of laser-guided bombs, and more than 1,100 various cluster bomb units in only forty-three days. Sergeant Marquart's skills and leadership helped the wing achieve 100 percent on-time delivery of all required munitions supporting almost 5,000 Desert Storm combat sorties. Not a single sortie was lost due to lack of munitions or improper configuration. After the cease-fire, Sergeant Marquart played a crucial role in the recovery, disassembly, and inspection of more than 8,000 tons of munitions.



USAF photo by A1C Foley Black

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Technology. Systems Solutions. People.

The Academy's 22d Squadron wins AFA's Outstanding Squadron Award.

Teamwork at Its Best

By James A. McDonnell, Jr.

SQUADRONS do the heavy work of the Air Force. Squadrons are our primary fighting unit. . . . In honoring the Academy's best squadron, we acknowledge that the squadron is the Air Force's center of gravity."

Thus Gen. John Michael Loh, commander of Air Combat Command, summed up AFA's thirty-third annual salute to the Outstanding Squadron of the USAF Academy in late May.

The black-tie event, sponsored in cooperation with the Colorado Springs/Lance Sijan Chapter, each year recognizes one of the Academy's forty squadrons for highest achievement in three areas of Academy life—scholastic, athletic, and military proficiency. This is the first time that the 22d Squadron, the Tarantulas, has won.

Lt. Gen. Bradley Hosmer, Academy Superintendent and top graduate in the first Academy graduating class in 1959, told 600 guests assembled to pay tribute to the 22d, "Tonight, the 22d Squadron is receiving the award most coveted by cadets: the Air Force Association Trophy for overall excellence across the full spectrum."

In racking up the record that carried it to victory, the 22d placed among the top three squadrons in overall compe-



USAF photo by SrA. Tania Hamilton

tion in each of the six grading periods and was number one in one of them. Within its group competition, it was the squadron of the year.

The Tarantulas were intramural cross-country champions. In intercollegiate sports, three of its cadets were all-Americans—one in rifle and two in swimming.

In the professional competency evaluation, the 22d ranked number one. In the military competition, it placed first in three of the four group parades. Academically, it improved its relative squadron ranking almost sixty percent from beginning of the year to the end. In each of the three areas, General Hosmer said, the squadron was "a model of consistency" and showed "teamwork at its best."

General Loh, the traditional "returning graduate"—he was Class of 1960—emphasized the importance of

teamwork in attaining this recognition. He recalled Operation Desert Storm, noting that active-duty squadrons deployed to the Gulf "flew together, fought together, and won together. They did what no individual or flight, no matter how good, could ever accomplish alone."

General Loh said that, while he remembered "hundreds of things that happened in my four years at the Academy, . . . the most enduring memories are wrapped around my squadrons—my teams.

"Squadrons are the building blocks of airpower. Squadrons provide the leadership and support that turn a group of individuals into one cohesive team. . . . There is no limit to what squadrons can accomplish by [subordinating] individual goals to team goals—and when the team wins, each individual wins." ■

By John L. Frisbee, Contributing Editor

Valor Will Out

A twenty-two-year-old Eighth Air Force bombardier planned and led one of the most unusual escape attempts of World War II.

IN LATE 1943, one of the most heavily defended areas of Germany was the huge industrial complex in the Ruhr Valley. On November 5 of that year, the 388th Bombardment Group, based at Knettishall in the UK, sent twelve B-17s of its 560th Squadron against factories at Gelsenkirchen. As a way, the crews were reminded that if captured they were duty-bound to make every effort to escape, but they must not use force against their captors. If unsuccessful, that would be tantamount to a death sentence. The crew of *Pistol Packer Momma*, on its second mission, had the dubious honor of flying the "Purple Heart Corner." As the formation reached its initial point, swarms of Luftwaffe fighters were reinforced by a continuous barrage of flak.

During the bomb run, *Momma* took hits that did extensive structural damage, knocked out two engines, and killed two crewmen. Despite these drastic distractions, bombardier 2d Lt. Donald Naughton put his bombs on target as the doomed B-17 fell out of formation. Over Holland, pilot 2d Lt. Roy Walker ordered the crew to bail out at minimum altitude. He crash-landed the bomber with no injury to himself, but two gunners still aboard were injured in the crash. The crew was rounded up by the Germans within hours.

On November 7, the six uninjured crew members—four officers and two enlisted men—were put aboard a train bound for Amsterdam, under the custody of four armed German guards. It soon was apparent that the guards understood no English. Lieutenant Naughton then proposed an escape plan that the others agreed to, though the odds on success were questionable and the penalty for failure terminal.

The plan was simple but daring.

At dusk, on an agreed signal, the four officers would take the guards by surprise, disarming or disabling them. The enlisted men would leap from the moving train, followed by the officers. Lieutenant Naughton, who had been a Golden Gloves boxer, was confident that he could take care of his guard with one punch and the others could handle the remaining Germans.

As dusk fell, the guards stowed their machine pistols and steel helmets and broke out their evening meal. Lieutenant Naughton gave the signal, and the attack was on.

A small table between him and his guard prevented the bombardier from landing a solid blow to the guard's jaw. Naughton grabbed a grenade from the guard's belt and bludgeoned him into submission. The other five Americans went out the door into the darkness, but one of the guards revived enough to strike Lieutenant Naughton a stunning blow on the head with his pistol.

Most of the others fared little better. Navigator 2d Lt. Ken Haines was recaptured almost immediately. The Dutch and French underground got TSgt. Kenneth Shaver safely to Spain and the remaining three to Paris, where they were seized by the Gestapo.

Lieutenant Naughton was taken to Amsterdam, where he was identified as leader of the attempted escape. He was severely beaten and informed that he was to be executed.

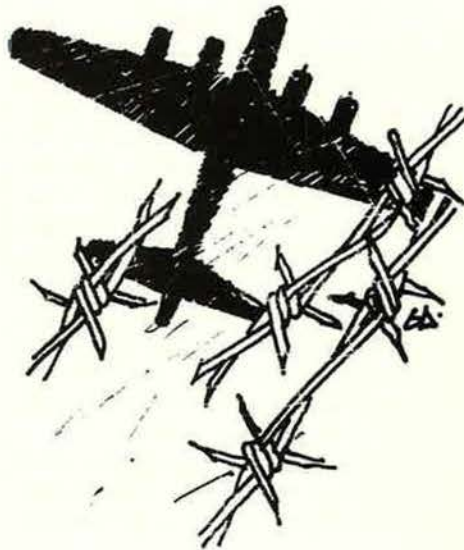
After being moved from Amsterdam to three POW camps in succession, Lieutenants Naughton and Haines were tried by a German court-martial. The prescribed penalty for attacking the guards was death. After a brilliant defense by an American POW, Maj. John Fischer, the court sentenced both men to eighteen months' solitary confinement as "war criminals," to be served in a fortress prison at Graudenz, Poland.

On January 18, 1945, Graudenz prisoners were evacuated to the west in the face of Russia's advance through Poland. Uncernourished, thinly clad, and inadequately shod, the POWs

were on the road for eight days in subzero weather. Some died or were executed as stragglers. Of those who survived to reach Stalag II-B at Hammerstein, Germany, many had such severely frostbitten extremities that amputation by prison doctors was necessary.

Following a month's recuperation, Lieutenant Naughton was sent to another POW camp further west in Germany. The prisoners at that camp were evacuated on March 9, 1945. During the march, Naughton and a Marine Corps major escaped. Ten days later, they contacted a British patrol and were sent home to the States.

Don Naughton returned to civilian life briefly, then completed pilot training and flew combat in Korea. He retired as a lieutenant colonel in 1965. Since he had not rejoined the 388th Bomb Group when freed in 1945, no recommendation for an award was made at the time. The Board for Correction of Military Records subsequently reviewed Naughton's World War II records and awarded him the Silver Star for his leadership of the attempted escape in November 1943. Due to Naughton's efforts, Kenneth Haines also was awarded the same decoration for his participation in the escape. Recognition was long in coming, but valor will out. ■





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Books

By Frank Oliveri, Associate Editor

At the Edge of Space: The X-15 Flight Program, by Milton O. Thompson. A pilot in the X-15 program from beginning to end tells the story of one of the most successful research aircraft ever flown. Smithsonian Institution Press, 470 L'Enfant Plaza, Suite 7100, Washington, DC 20560. Including photos, appendix, and index, 375 pages. 1992. \$29.95.

The Book of Stratagems: Tactics for Triumph and Survival, by Harro Von Senger. Chinese warriors used a variety of traditional strategic gambits and survival schemes to triumph over their enemies. Here, a Swiss sinologist reveals the basic elements of the Chinese stratagems. Viking, 375 Hudson St., New York, NY 10014. Including notes and index, 397 pages. 1991. \$24.95.

Doomed at the Start: American Pursuit Pilots in the Philippines, 1941-1942, by William H. Bartsch. The author tells the story of the 24th Pursuit Group, the only unit of interceptor aircraft in the Philippines during the early part of the war with Japan. Included are stories told by flyers and ground crews, detailing the operational record of the Philippines pilots over a five-month campaign, from December 1941 to May 1942. Texas A&M University Press, Drawer C, College Station, TX 77843-4354. Including photos, notes, and index, 503 pages. 1992. \$24.50.

Driven Patriot: The Life and Times of James Forrestal, by Townsend Hoopes and Douglas Brinkley. The story of the first US Defense Secretary deals with one of the most celebrated and tragic lives of postwar America. Alfred A. Knopf, Inc., 201 E. 50th St., New York, NY 10022. Including photos, notes, and index, 587 pages. 1992. \$30.00.

Experience of War, edited by Robert Cowley. This selection of fifty-one articles seeks to recreate the feel of combat through the centuries. The authors examine popular myths, often providing unexpected information. W. W. Norton & Co., Inc., 500 Fifth Ave., New York, NY 10110. 574 pages. 1992. \$35.00.

Fifty Mission Crash, by Lt. Col. Donald R. Currier, USAF (Ret.). This personal account of a World War II B-24 navigator tells the story of the *Wood Chopper* and its crew as it confronted such targets as Ploesti, Regensburg, Steyr, Vienna, and Bucharest. White Mane Publishing Co., P. O. Box 152, Shippensburg, PA 17257.

Including photos and index, 176 pages. 1992. \$24.95.

Flying Blind: The Politics of the US Strategic Bomber Program, by Michael E. Brown. Analyzing the role of organizational forces in initiating and shaping weapons programs, the author documents how programs begin and why they turn out the way they do. Cornell University Press, 124 Roberts Pl., Ithaca, NY 14850. Including photos and index, 358 pages. 1992. \$47.50.

Hirohito: The Emperor and the Man, Edwin P. Hoyt. This view of the Japanese emperor challenges the conventional portraits of him as either a naïve scientist or a swashbuckling conspirator who tried to conquer the globe with military might. Praeger Publishers, One Madison Ave., New York, NY 10010. Including photos, bibliography, and index. 214 pages. 1992. \$24.95.

Mekong Delta Riverine: A Brown-Water Sailor in the Delta, 1967, by Don Sheppard. This is a personal account of a Navy officer who commanded Navy river boats on the Bassac River in South Vietnam in 1967. Presidio Press, 505 B San Marin Dr., Suite 300, Novato, CA 94945-1340. Including photos, 326 pages. 1992. \$22.95.

Sheridan: The Life and Wars of General Phil Sheridan, by Roy Morris, Jr. Sheridan was one of the few generals who could boast that he never lost a battle—either in the Civil War or the Indian Wars that followed. Morris takes a fresh look at this talented military tactician. Crown Publishing Group, 201 East 50th St., New York, NY 10022. Including photos, notes, index, and bibliography, 464 pages. 1992. \$25.00.

Sitting it Out: A World War II POW Memoir, by David Westheimer. The author tells of his twenty-eight months in captivity after his B-24 ditched off the coast of Italy in the early months of US involvement in the war. Rice University Press, P. O. Box 1892, Houston, TX 77251. Including photos and index, 358 pages. 1992. \$24.95.

Sydney Camm and the Hurricane: Perspectives on the Master Fighter Designer and His Finest Achievement, edited by John W. Fozard. This book brings together rare material on the creation of the Hawker Hurricane, which played a vital role in the

defense of the UK in 1940. Smithsonian Institution Press. Including photos and index, 258 pages. 1991. \$47.50.

"To the Last Man!" Kulbes' Mongrels at the Chosin Reservoir, Korea, 1950, by Maj. Franklin D. R. Kestner, Sr., and James Livingston. The authors deliver an account of Major Kestner's own experiences as an Army private during the Chosin breakout, a grim battle of horrible cold and relentless slaughter. Westernlore Press, P. O. Box 35305, Tucson, AZ 85740. Including photos, 163 pages. 1991. \$19.95.

Vietnam: The Helicopter War, by Philip D. Chinnery. Chinnery presents the Vietnam War from 1961 through 1975 from the viewpoint of the helicopter crewmen. Every type of helicopter from every service during this period is covered. Naval Institute Press, Annapolis, MD 21402. Including photos and index, 189 pages. 1991. \$30.00.

The Wars of Japan, by Ronald L. Tarnstrom. The third book in a proposed series of thirty, *Wars* is aimed at the serious student of military history and is not for the casual reader. It covers the development of Japan's armed forces during peacetime and in obscure wartime operations, in addition to major battles. Trogen Books, Rte. 1, Box 4, Linsborg, KS 67456. Including photos, illustrations, and index, 291 pages. 1992. \$25.95.

Other Titles of Note

Aces Against Japan: American Aces Speak, by Eric Hammel. First-person accounts from forty US fighter aces of the Pacific war. Presidio Press. Including photos and index, 318 pages. 1992. \$24.95.

Chappie, America's First Black Four Star General. The Life and Times of Daniel James, Jr., by J. Alfred Phelps. A story of the trials of a military man through four decades. Presidio Press. Including photos and index, 366 pages. 1991. \$9.95.

Everybody Had His Own Gringo: The CIA & the Contras, by Glenn Garvin. Tales of relationships between Nicaraguan contras and their CIA sponsors. Brassey's Book Orders, c/o Macmillan Publishing Co., 100 Front St., Box 500, Riverside, NJ 08075. Including index, 238 pages. 1992. \$23.95.

Lighter than Air: An Illustrated History of the Airship, by Lee Payne. First-hand accounts provide the story of airships. Crown Publishing Group. Including photos and index, 310 pages. 1992. \$35.00. ■



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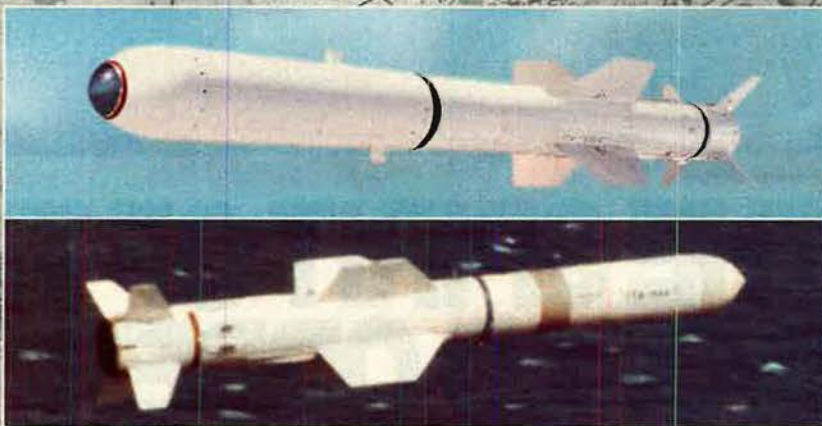
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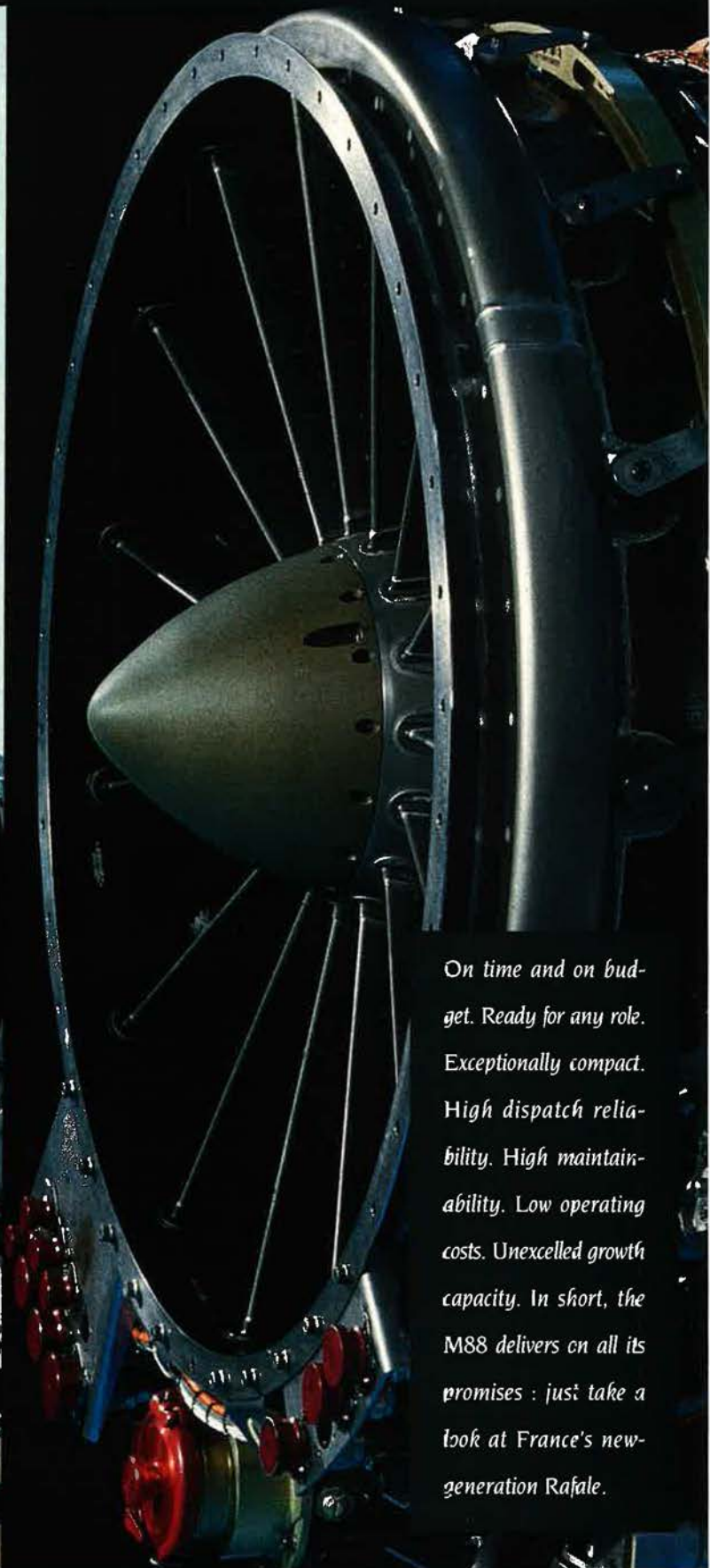
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Maj. Gen. Robert M. White	Heidelberg, Germany
Netherlands Eagle	Soesterberg, the Netherlands
Spangdahlem	Spangdahlem AB, Germany
Wiesbaden	Lindsey AS, Germany
Pacific Air Forces (PACAF)	
Captain Joseph McConnell, Jr.	Osan AB, South Korea
Keystone	Kadena AB, Japan
Manila	Manila, the Philippines
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1954	Santa Monica Area Chapter (Calif.)
1955	San Fernando Valley Chapter (Calif.)
1956	Utah State AFA
1957	H. H. Arnold Chapter (N. Y.)
1958	San Diego Chapter (Calif.)
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1960	San Diego Chapter (Calif.)
1961	Chicago Chapter (Calif.)
1962	Fort Worth Chapter (Tex.)
1963	Colin P. Kelly Chapter (N. Y.)
1964	Utah State AFA
1965	Utah State AFA
1966	New York State AFA
1967	Utah State AFA
1968	Utah State AFA
1969	(no presentation)
1970	Georgia State AFA
1971	Middle Georgia Chapter (Ga.)
1972	Utah State AFA
1973	Langley Chapter (Va.)
1974	Texas State AFA
1975	Alamo Chapter (Tex.) and San Bernardino Area Chapter (Calif.)
1976	Scott Memorial Chapter (Ill.)
1977	Thomas B. McGuire, Jr., Chapter (N. J.)
1978	Thomas B. McGuire, Jr., Chapter (N. J.)
1979	General Robert F. Travis Chapter (Calif.)
1980	Central Oklahoma (Gerrity) Chapter (Okla.)
1981	Alamo Chapter (Tex.)
1982	Chicagoland-O'Hare Chapter (Ill.)
1983	Charles A. Lindbergh Chapter (Conn.)
1984	Scott Memorial Chapter (Ill.) and Colorado Springs/Lance Sijan Chapter (Colo.)
1985	Cape Canaveral Chapter (Fla.)
1986	Charles A. Lindbergh Chapter (Conn.)
1987	Cari Vinson Memorial Chapter (Ga.)
1988	General David C. Jones Chapter (N. D.)
1989	Thomas B. McGuire, Jr., Chapter (N. J.)
1990	General E. W. Rawlings Chapter (Minn.)
1991	Paul Revere Chapter (Mass.)
1992	Central Florida Chapter (Fla.) and Langley Chapter (Va.)

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Hon. George E. Brown, Jr.	Bob Hope AFA Charity Golf Tournament
Lt. Gen. Gordon E. Fornell, USAF	Iron Gate Chapter
Lyle T. Niswander	Paul Revere Chapter
William J. Gibson	Ogden Chapter
John H. Jordan	Mobile Chapter
Jerrald W. Smith	Dallas Chapter
Col. Raymond Williams, USAF	Dallas Chapter
Hon. Alfred A. McCandless	Riverside County Chapter
Lt. Gen. Charles McCausland, USAF	Iron Gate Chapter
(1992)	
Walter P. Morton, Jr.	Personal
Maj. Gen. John A. Corder, USAF	Seattle Chapter
Dennis L. Sexton	Thomas B. McGuire, Jr., Chapter
Gen. Michael P. C. Carns, USAF	Central East Region
Arthur L. Littman (<i>in memoriam</i>)	California State AFA
Count Gianni Caproni di Taliado (<i>in memoriam</i>)	Associazione Arma Aeronautica, North Babylon High Flight Club, New York Chapter—Italian AFA
Mary Foley Benson (<i>in memoriam</i>)	Personal
Tennessee Ernie Ford (<i>in memoriam</i>)	Members of the Tennessee Ernie Ford Chapter
Hon. Martin C. Faga	Iron Gate Chapter
Col. T. L. Keal, USAF	Dixie Held and Ark-La-Tex Chapter
Bobby and Kay Case	South Central Region
Lt. Gen. Bob Springer, USAF (Ret.) and Bonnie Springer	Angel Flight/Silver Wings Society
John S. "Connie" Sparks	Friends of "Connie" Sparks

Individual Ira C. Eaker Fellows

(Listed in order of affiliation. Represents \$1,000 contribution)

NAME	SPONSOR
(1991)	
Lois J. Larson	Maj. Gen. Doyle E. Larson, USAF (Ret.)
Gen. E. W. Rawlings, USAF (Ret.)	General E. W. Rawlings Chapter
Elaine Griebenow	General E. W. Rawlings Chapter
Lesa McDowell	General E. W. Rawlings Chapter
Daniel McDowell	General E. W. Rawlings Chapter
August A. Busch III and Anheuser-Busch Employees	Air Force Ball of Mid-America
United Service Organization World Headquarters	Air Force Ball of Mid-America
Men and Women of the 375th Military Airlift Wing	Air Force Ball of Mid-America
Peterson AFB Complex	Colorado Springs/Lance Sijan Chapter
Leo D. O'Halloran	Paul Revere Chapter
Maj. Gen. Billy McCoy, USAF	Nevada State AFA and the Thunderbird and Dale O. Smith Chapters
Walter G. "Gibby" Vartan	Great Lakes Region
Joe Clark	Nation's Capital Chapter
Tommy G. Harrison	Central Florida Chapter
(1992)	
Dr. Hans von Ohain	Central Florida Chapter
Capt. Warner Miller, USAF	Central Florida Chapter
Benjamin A. Cosgrove	Central Florida Chapter
Ben R. Rich	Central Florida Chapter
Forrest S. McCartney	Cape Canaveral Chapter
Gen. John M. Loh, USAF	Iron Gate Chapter
Gen. Charles C. McDonald, USAF	Iron Gate Chapter
Gen. Ronald W. Yates, USAF	Iron Gate Chapter
Gen. George L. Butler, USAF	Iron Gate Chapter
Gen. H. T. Johnson, USAF	Iron Gate Chapter
Hon. John J. Welch	Central East Region
Prince Bandar Bin Sultan	Nation's Capital Chapter
Gen. Donald J. Kutyna, USAF	Colorado Springs/Lance Sijan Chapter
Maj. Gen. Richard B. Myers, USAF	Charles A. Lindbergh Chapter
MSgt. Shelia Russell	CMSgt. Richard E. Russell, USAF (Ret.)

Barry Goldwater Fellows

(Listed in order of affiliation. Represents \$5,000 contribution)

NAME	SPONSOR
(1991)	
Maj. Bruce Robin Stoddard, ANG	Mrs. H. H. Timken, Jr.

W. Stuart Symington Award Recipients

Since 1986, AFA's highest honor to a civilian in the field of National Security has been the W. Stuart Symington Award. The award, presented annually, is named for the first Secretary of the Air Force.

YEAR	RECIPIENT
1986	Hon. Caspar W. Weinberger, Secretary of Defense
1987	Hon. Edward C. Aldridge, Jr., Secretary of the Air Force
1988	Hon. George P. Schultz, Secretary of State
1989	Hon. Ronald W. Reagan, former President of the United States
1990	Hon. John J. Welch, Assistant Secretary of the Air Force (Acquisition)
1991	Hon. George Bush, President of the United States
1992	Hon. Donald B. Rice, Secretary of the Air Force

H. H. Arnold Award Recipients

Until 1986, AFA's highest Aerospace Award was the H. H. Arnold Award. Named for the World War II leader of the Army Air Forces, it is presented annually in recognition of the most outstanding contributions in the field of aerospace activity. In 1986, the Arnold Award was redesignated AFA's highest honor to a member of the armed forces in the field of National Security. It continues to be presented annually.

YEAR	RECIPIENT(S)
1948	Hon. W. Stuart Symington, Secretary of the Air Force
1949	Maj. Gen. William H. Tunner and the men of the Berlin Airlift
1950	Airmen of the United Nations in the Far East
1951	Gen. Curtis E. LeMay and the personnel of Strategic Air Command
1952	Sens. Lyndon B. Johnson and Joseph C. O'Mahoney
1953	Gen. Hoyt S. Vandenberg, former Chief of Staff, USAF
1954	Hon. John Foster Dulles, Secretary of State
1955	Gen. Nathan F. Twining, Chief of Staff, USAF
1956	Sen. W. Stuart Symington
1957	Edward P. Curtis, Special Assistant to the President
1958	Maj. Gen. Bernard A. Schriever, Commander, Ballistic Missile Division, ARDC
1959	Gen. Thomas S. Power, Commander in Chief, Strategic Air Command
1960	Gen. Thomas D. White, Chief of Staff, USAF
1961	Hon. Lyle S. Garlock, Assistant Secretary of the Air Force
1962	Dr. A. C. Dickieson and John R. Pierce, Bell Telephone Laboratories
1963	The 363d Tactical Reconnaissance Wing, TAC, and the 4080th Strategic Wing, SAC
1964	Gen. Curtis E. LeMay, Chief of Staff, USAF
1965	The 2d Air Division, PACAF
1966	The 8th, 12th, 355th, 366th, and 388th Tactical Fighter Wings and the 432d and 460th Tactical Reconnaissance Wings
1967	Gen. William W. Momyer, Commander, Seventh Air Force, PACAF
1968	Col. Frank Borman, USAF; Capt. James Lovell, USN; and Lt. Col. William Anders, USAF, Apollo 8 crew
1969	<i>(No presentation)</i>
1970	Apollo 11 team (J. L. Atwood; Lt. Gen. Samuel C. Phillips, USAF; and Astronauts Neil Armstrong, Col. Edwin E. Aldrin, Jr., USAF, and Col. Michael Collins, USAF)
1971	Dr. John S. Foster, Jr., Director of Defense Research and Engineering
1972	Air Units of the Allied Forces in southeast Asia (Air Force, Navy, Army, Marine Corps, and the Vietnamese Air Force)
1973	Gen. John D. Ryan, USAF (Ret.), former Chief of Staff, USAF
1974	Gen. George S. Brown, USAF, Chairman, Joint Chiefs of Staff
1975	Hon. James R. Schlesinger, Secretary of Defense
1976	Sen. Barry M. Goldwater
1977	Sen. Howard W. Cannon
1978	Gen. Alexander M. Haig, Jr., USA, Supreme Allied Commander, Europe
1979	Sen. John C. Stennis
1980	Gen. Richard H. Ellis, USAF, Commander in Chief, Strategic Air Command
1981	Gen. David C. Jones, USAF, Chairman, Joint Chiefs of Staff
1982	Gen. Lew Allen, Jr., USAF (Ret.), former Chief of Staff, USAF
1983	Ronald W. Reagan, President of the United States
1984	The President's Commission on Strategic Forces (the Scowcroft Commission)
1985	Gen. Bernard W. Rogers, USA, Supreme Allied Commander, Europe
1986	Gen. Charles A. Gabriel, USAF (Ret.), former Chief of Staff, USAF
1987	Adm. William J. Crowe, Jr., USN, Chairman, Joint Chiefs of Staff
1988	The men and women of the GLCM team
1989	Gen. Larry D. Welch, Chief of Staff, USAF
1990	Gen. John T. Chain, Commander in Chief, Strategic Air Command
1991	Lt. Gen. Charles A. Horner, Commander, US Central Command Air Forces and 9th Air Force
1992	Gen. Colin L. Powell, USA, Chairman, Joint Chiefs of Staff

AFA's "Man of the Year" Award Recipients

State names refer to winner's home state at the time of award.

YEAR	RECIPIENT(S)
1953	Julian B. Rosenthal (N. Y.)
1954	George A. Anderl (Ill.)
1955	Arthur C. Storz (Neb.)
1956	Thos. F. Stack (Calif.)
1957	George D. Hardy (Md.)
1958	Jack B. Gross (Pa.)
1959	Carl J. Long (Pa.)
1960	O. Donald Olson (Colo.)
1961	Robert P. Stewart (Utah)
1962	<i>(no presentation)</i>
1963	N. W. DeBenardinis (La.) and Joe L. Shosid (Tex.)
1964	Maxwell A. Kriendler (N. Y.)
1965	Milton Caniff (N. Y.)
1966	William W. Spruance (Del.)
1967	Sam E. Keith, Jr. (Tex.)
1968	Marjorie O. Hunt (Mich.)
1969	<i>(no presentation)</i>
1970	Lester C. Curl (Fla.)
1971	Paul W. Gaillard (Neb.)
1972	J. Raymond Bell (N. Y.) and Martin H. Harris (Fla.)
1973	Joe Higgins (Calif.)
1974	Howard T. Markey (D. C.)
1975	Martin M. Ostrow (Calif.)
1976	Victor R. Kregel (Tex.)
1977	Edward A. Stearn (Calif.)
1978	William J. Demas (N. J.)
1979	Alexander C. Field, Jr. (Ill.)
1980	David C. Noerr (Calif.)
1981	Daniel F. Callahan (Fla.)
1982	Thomas W. Anthony (Md.)
1983	Richard H. Becker (Ill.)
1984	Earl D. Clark, Jr. (Kan.)
1985	George H. Chabbot (Del.) and Hugh L. Enyart (Ill.)
1986	John P. E. Kruse (N. J.)
1987	Jack K. Westbrook (Tenn.)
1988	Charles G. Durazo (Va.)
1989	O. R. Crawford (Tex.)
1990	Cecil H. Hopper (Ohio)
1991	George M. Douglas (Colo.)
1992	Jack C. Price (Utah)

Christa McAuliffe Memorial Award Winners

YEAR	RECIPIENT	SPONSOR
1986	Allen T. King	Fort Wayne—Baer Field Chapter, Ind.
1987	Betty Ann Mosen	Sacramento Chapter, Calif.
1988	John W. Barainca	Salt Lake Chapter, Utah
1989	Dr. Ben P. Millsbaugh	Mile High Chapter, Colo.
1990	Sue Ellen Darnell	Lexington Chapter, Ky.
1991	Melba Iris Harris	Mobile Chapter, Ala.
1992	Arthur I. Kimura	Hawaii Chapter, Hawaii

Sam E. Keith Aerospace Education Award of Excellence

YEAR	RECIPIENT	SPONSOR
1991	Jule Zumwalt	Sacramento Chapter, Calif.
1992	Col. Kenneth O. Wofford, USAF (Ret.)	General E. W. Rawlings Chapter, Minn.

Aerospace Education Foundation 1991-92 AFJROTC Contest Winners

Subject: Our Best Community Service Project

First-Place Winner (\$1,000)
Ramstein American High School, Ramstein, Germany

Second-Place Winner (\$750)
Seventy-First High School, Fayetteville, N. C.

Third-Place Winner (\$500)
Scotch Plains-Fanwood High School, Scotch Plains, N. J.

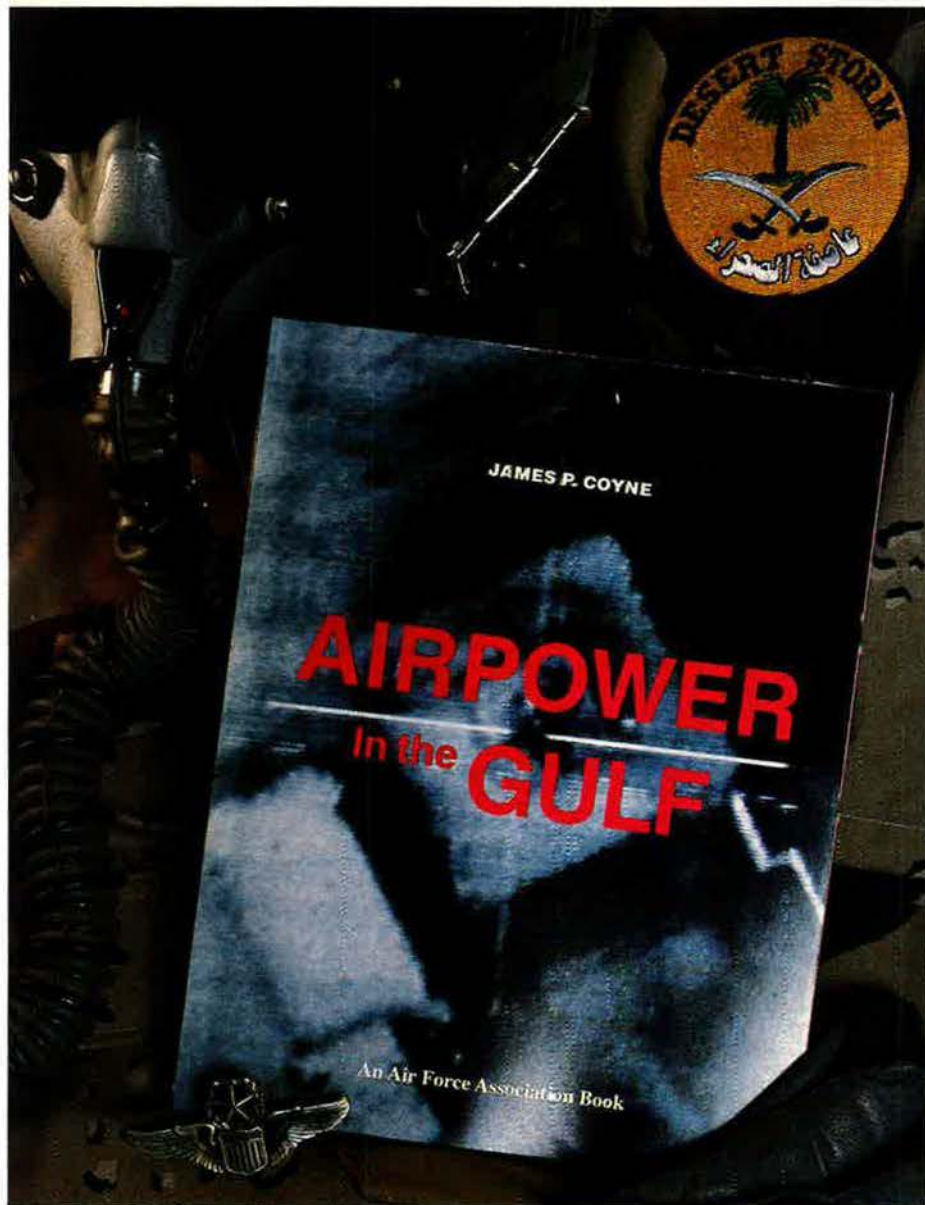
AFA's Regions, States, and Chapters

The figures on the right indicate the number of affiliated members as of June 30, 1992. Listed below the name of each region is the National Vice President for that region.

CENTRAL EAST REGION	15,291	Bakersfield	85	Lexington	244
R. Donald Anderson		David J. Price/Beale	755	West Kentucky	70
Delaware	1,073	Fresno*	494	Michigan	3,179
Blue Hen	57	General B. A. Schriever Los Angeles	1,438	Battle Creek	306
Delaware Galaxy	755	Orange County/Gen. Curtis E. LeMay	1,253	Hoyt S. Vandenberg	393
Diamond State	131	General Doolittle Los Angeles Area*	2,280	Huron	378
Henlopen Area	36	General Robert F. Travis	1,932	James H. Straubel	538
University	43	Golden Gate*	716	Kalamazoo	230
Wilmington	51	High Desert	768	Lake Superior Northland	696
District of Columbia	1,361	Maj. Gen. Charles I. Bennett, Jr.	793	Lloyd R. Leavitt, Jr.	153
Nation's Capital	1,361	Monterey Bay Area	292	Mid-Michigan	88
Maryland	3,264	Pasadena Area	480	Mount Clemens	321
Baltimore*	906	Redwood Empire	412	PE-TO-SE-GA	76
Central Maryland	430	Riverside County	1,333	Ohio	7,512
College Park Airport	101	Robert H. Goddard	1,102	Buckeye Skypower	223
Thomas W. Anthony	1,827	Sacramento	2,776	Capt. Eddie Rickenbacker Memorial*	694
Virginia	9,286	San Bernardino Area	1,735	Cincinnati	330
Danville	47	San Diego	1,227	Cleveland	518
Donald W. Steele, Sr., Memorial	4,133	Tennessee Ernie Ford	1,196	Frank P. Lahm	315
Gen. Charles A. Gabriel	780	Ventura County	294	Mid-Ohio	314
Jack Manch	115	Guam	361	Steel Valley	217
Langley	2,790	Guam-Arc Light	361	Wright Memorial*	4,901
Leigh Wade	111	Hawaii	1,491	Wisconsin	1,273
Lynchburg	126	Hawaii*	1,467	Badger State	235
Richmond	416	Maui	24	Billy Mitchell	723
Roanoke	288	Nevada	2,430	Madison	315
Tidewater	328	Dale O. Smith	458	MIDWEST REGION	7,934
William A. Jones III	152	Thunderbird	1,972	James M. McCoy	
West Virginia	307	GREAT LAKES REGION	19,865	Iowa	716
Chuck Yeager	307	Cecil H. Hopper		All-Iowa	402
FAR WEST REGION	32,189	Illinois	5,074	Eastern Iowa	62
Robert A. Munn		Chicagoland-O'Hare	1,227	Gen. Charles A. Horner	107
Arizona	5,677	Greater Rockford	78	Richard D. Kisling	145
Barry Goldwater	231	Illini	666	Kansas	1,320
Cochise	106	Land of Lincoln	207	Contraits	60
Frank Luke	1,388	Quad Cities	139	Lt. Erwin R. Bleckley	842
Green Valley	300	Richard E. Carver	179	Topeka	418
Phoenix Sky Harbor	1,385	Scott Memorial	2,164	Missouri	2,240
Prescott	151	West Suburban	414	Central Missouri	504
Tucson	2,116	Indiana	2,020	Harry S. Truman	540
California	22,230	Central Indiana	461	Ozark	204
Antelope Valley	869	Falls Cities	29	Spirit of St. Louis	992
		Fort Wayne	189	Nebraska	3,658
		Grissom Memorial	491	Ak-Sar-Ben	3,381
		Gus Grissom	150	Lincoln	277
		Lawrence D. Bell Museum	49	NEW ENGLAND REGION	6,646
		Lester W. Johnston	32	Robert N. McChesney	
		P-47 Memorial	55	Connecticut	1,283
		South Bend	291	Central Connecticut	168
		Southern Indiana	166		
		Terre Haute-Wabash Valley	107		
		Kentucky	807		
		Gen. Russell E. Dougherty	493		

*These chapters were chartered prior to December 31, 1948, and are considered original charter chapters; the Major John S. Southrey Chapter of Massachusetts was formerly the Chicopee Chapter.

A Bolt From the Blue!



Cloaked by darkness and stealth, more than 400 allied aircraft crossed the border into Saddam Hussein's Iraq in the early morning hours of January 17, 1991, and struck a blow from which the Iraqi armed forces never recovered. It was the beginning of the most impressive air campaign in history.

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Charles A. Lindbergh	182	Iron Gate	290	SOUTH CENTRAL REGION	11,165
First Connecticut	219	Lawrence D. Bell	409	H. R. "Bobby" Case	
Flying Yankees	176	Lloyd Schloen-Empire	47	Alabama	3,128
General Bennie L. Davis	62	Nassau Mitchel	263	Birmingham	456
General George C. Kenney	71	New York Air Reserve & CAP	33	Gadsden	38
Igor Sikorsky	151	Niagara Frontier	121	Mobile	334
Northern Connecticut	193	Plattsburgh	307	Montgomery	1,939
Sergeant Charlton Heston	61	Queens	229	Tennessee Valley	361
Maine	666	Suffolk County	202	Arkansas	1,716
Eastern Maine	227	Thomas Watson, Sr., Memorial	183	David D. Terry, Jr.	1,197
Major Charles J. Loring, Jr.	288	Westchester Falcon	238	Fort Smith	90
Southern Maine	151	Pennsylvania	3,854	General Ira C. Eaker	218
Massachusetts	3,298	Altoona	80	Ouachita	52
Boston	254	Beaver Valley	106	Rozarback	159
Laurence G. Hanscom	292	Brandywine	171	Louisiana	2,386
Major John S. Southrey*	296	Bucks County	19	Alexandria	313
Minuteman	322	Colonel Stuart E. Kane, Jr.	165	Ark-La-Tex	1,299
Otis	198	Eagle	103	Baton Rouge	271
Paul Revere	1,403	Erie	109	Greater New Orleans Area	503
Pioneer Valley	164	Freedom	383	Mississippi	1,870
Taunton	164	Greater Pittsburgh*	494	Golden Triangle	523
Worcester*	205	Jimmy Stewart	41	Jackson	183
New Hampshire	895	Joe Walker-Mon Valley	140	John C. Stennis	1,164
Amoskeag	308	Lehigh Valley	272	Tennessee	2,065
Pease	587	Lt. Col. B. D. "Buzz" Wagner	78	Chattanooga	131
Rhode Island	245	Metropolitan Philadelphia*	390	Everett R. Cook	468
Metro Rhode Island	245	Mifflin County*	112	General Bruce K. Holloway	531
Vermont	259	Olmsted	409	H. H. Arnold Memorial	384
Burlington	259	Pocono Northeast	204	Lt. Gen. Frank Maxwell Andrews	551
NORTH CENTRAL REGION	3,621	Steel Valley	105	SOUTHEAST REGION	26,540
Doyle E. Larson		Total Force	235	Stanley V. Hood	
Minnesota	1,340	York-Lancaster	238	Florida	13,915
General E. W. Rawlings	1,065	NORTHWEST REGION	8,708	Cape Canaveral	1,501
Richard I. Bong	275	Alwyn T. Lloyd		Central Florida	1,287
North Dakota	1,209	Alaska	1,793	Citrus Belt	153
General David C. Jones	503	Anchorage	1,210	Col. H. M. (Bud) West	256
Happy Hooligan	169	Fairbanks Midnight Sun	583	Eglin	3,080
Red River Valley	537	Idaho	832	Falcon	369
South Dakota	1,072	Boise Valley	520	Florida Gulf Coast	294
Dacotah	283	Magic Valley	95	Florida Highlands	177
Rushmore	789	Snake River Valley	217	Gainesville	157
NORTHEAST REGION	12,541	Montana	761	General James R. McCarthy	298
Robert W. Gregory		Big Sky	662	General Nathan F. Twining	511
New Jersey	3,623	Bozeman	99	Gold Coast	446
Admiral Charles E. Rosendahl	148	Oregon	1,301	Indian River	103
Aerospace Founders	42	Eugene	325	Jerry Waterman	1,203
Atlantic City Area	182	Klamath Basin	132	John C. Meyer	237
Brig. Gen. Frederick W. Castle	196	Portland*	844	John W. DeMilly, Jr.	527
Garden State	32	Washington	4,021	Miami	478
Hangar One	168	Greater Seattle	1,348	Morgan S. Tyler	237
High Point	96	Inland Empire	1,030	Ocala	107
Hudson*	94	Tacoma	1,643	On Wings of Eagles	141
John Currie Memorial	50	ROCKY MOUNTAIN REGION	9,082	Panama City	1,256
Mercer County	225	Nuel E. Sanders		Peace River	121
New Jersey Public Affairs	32	Colorado	5,740	South Bay	149
Passaic-Bergen*	256	Colorado Springs/Lance Sijan	3,220	Southwest Florida	250
Sal Capriglione	109	Flatirons	241	Spacecoast	80
Teterboro-Bendix	60	General Robert E. Huysler	113	St. Augustine	38
Thomas B. McGuire, Jr.	1,482	Long's Peak	223	West Palm Beach	459
Tri-County	64	Mel Harmon	124	Georgia	5,264
Union Morris	322	Mile High	1,819	Athens	149
Wings	65	Utah	2,708	Atlanta	648
New York	5,064	Gold Card	219	Carl Vinson Memorial	2,672
Albany*	296	Ogden	719	Chatahoochee Valley	91
Brooklyn "Key"	360	Rocky Mountain	474	Coosa Valley	64
Chautauqua	78	Salt Lake City	456	Dobbins	873
Colin P. Kelly	808	Ute	573	Savannah	253
Forrest L. Voster	329	Wasatch	267	South Georgia	451
General Daniel "Chappie" James, Jr., Memorial	138	Wyoming	634	Southeast Georgia	63
Genesee Valley	286	Cheyenne Cowboy	634	North Carolina	3,825
H. H. Arnold	297			Blue Ridge	244
Hudson Valley	150			Cape Fear	126
				Eastern Carolina	85
				First in Flight	80
				Foothills	42
				Kitty Hawk	72

Piedmont	394	Ladewig-Shine Memorial	467	Altus	783
Pope	996	Strom Thurmond	318	Central Oklahoma (Gerrity)	3,182
Roanoke Valley	37	Swamp Fox	1,026	Enid	779
Scott Berkeley	1,048			Tulsa	437
Tarheel	447	SOUTHWEST REGION	29,321		
Triad	254	Aaron C. Burleson		Texas	21,022
				Abilene	865
Puerto Rico	207	New Mexico	3,118	Aggieland	199
San Juan	207	Albuquerque	1,634	Alamo	7,617
		Fran Parker	749	Austin	1,800
South Carolina	3,329	Llano Estacado	735	Concho	545
Charleston	1,021			Corpus Christi	161
Columbia	497	Oklahoma	5,181	Dallas	1,270

AFA's First National Officers and Board of Directors

This panel of officers and directors acted temporarily until a representative group was democratically elected by membership at the first National Convention.

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AFA's National Presidents

AFA's Board Chairmen

Pictured are Chairmen who never served as National President.

							
James H. Doolittle (1946-47)	Thomas G. Lanphier, Jr. (1947-48)	C. R. Smith (1948-49)	Robert S. Johnson (1949-51)	Harold C. Stuart (1951-52)	Arthur F. Kelly (1952-53)	Edward P. Curtis (1946-47)	Carl A. Spaatz (1950-51)
							
George C. Kenney (1953-54)	John R. Allison, Jr. (1954-55)	Gill Robb Wilson (1955-56)	John P. Henebry (1956-57)	Peter J. Schenk (1957-59)	Howard T. Markey (1959-60)	James M. Trail (1958-59)	Julian B. Rosenthal (1959-60)
							
Thos. F. Stack (1960-61)	Joe Foss (1961-62)	John B. Montgomery (1962-63)	W. R. Lovelace II (1963-64)	Jess Larson (1964-67)	Robert W. Smart (1967-69)	Jack B. Gross (1963-64)	Daniel F. Callahan (1979-81)
							
George D. Hardy (1969-71)	Martin M. Ostrow (1971-73)	Joe L. Shosid (1973-75)	George M. Douglas (1975-77)	Gerald V. Hasler (1977-79)	Victor R. Kregel (1979-81)	Edward A. Stearn (1985-86)	
							
John G. Brosky (1981-82)	David L. Blankenship (1982-84)	Martin H. Harris (1984-86)	Sam E. Keith, Jr. (1986-88)	Jack C. Price (1988-90)	O. R. Crawford (1990-92)		

Del Rio	460
Denton	236
Fort Worth	3,287
Ghost Squadron	164
Heart of the Hills	180
Houston	1,376
Lee Glasgow-Waco	259
Lubbock	635
Northeast Texas	338
Panhandle	152
Paso Del Norte	205
Permian Basin	150
Wichita Falls	1,123

Unit Reunions

Battle of the Bulge

Veterans of the Battle of the Bulge will hold a reunion October 8-11, 1992, in Nashville, Tenn. **Contact:** Nancy C. Monson, P. O. Box 11129, Arlington, VA 22219-2129. Phone: (703) 528-5403.

F-15 CTF

The F-15 Combined Test Force will hold a twentieth-anniversary reunion in conjunction with the Air Force Flight Test Center Open House October 16-18, 1992, at Edwards AFB, Calif. **Contact:** F-15 CTF, 20 Years of Eagles, P. O. Box 351, Edwards AFB, CA 93523. Phone: (805) 277-2028. DSN: 527-2028.

Flight Checkers

USAF Flight Checkers will hold a reunion October 1-3, 1992, at the Howard Johnson's Hotel in Lenexa, Kan. FAA flight checkers are also invited. **Contact:** Bill Livesay, 4047 N. W. 62d Terrace, Oklahoma City, OK 73112.

Graham AFB Alumni

Primary pilot training classes (1953-60) of Graham AFB, Ga., a former USAF contract flying school, will hold a reunion October 9-10, 1992, in Marianna, Fla. Former employees, students, and permanent party military personnel are invited. **Contact:** James W. Purvis, 1921 Wahalaw Ct., Tallahassee, FL 32301. Phone: (904) 877-4564.

Lewistown AAF

Personnel who served at Lewistown Army Air Field, Mont., will hold a fiftieth-anniversary reunion September 12-13, 1992. **Contact:** Jack Milburn, Giltedge Stage, Lewistown, MT 59457. Phone: (406) 538-8314.

Red Pants

Members of the Squadron Officer School "Red Pants" will hold a reunion October 17, 1992, at

Readers wishing to submit reunion notices to "Unit Reunions" should mail their notices well in advance of the event to "Unit Reunions," AIR FORCE Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information.

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Yuma AAF

Officers and cadet graduates of Yuma Army Air Field, Ariz., are planning to hold a fiftieth-anniversary reunion February 25-27, 1993, in Yuma, Ariz. **Contact:** Lloyd D. Collins, 325 Myrtle St., Laguna Beach, CA 92651. Phone: (714) 494-4695.

4th Fighter Squadron

The 4th Fighter Squadron (All Weather/F-82) will

hold a reunion October 9-11, 1992, in Dayton, Ohio. **Contact:** Keith Morehouse, P. O. Box 635, Bismarck, ND 58502. Phone: (701) 222-4423.

4th Tow Target Squadron

Veterans of the 4th Tow Target Squadron (World War II) will hold a fiftieth-anniversary reunion October 29-31, 1992, at the La Quinta Inn in San Antonio, Tex. **Contacts:** Dick Barrie, P. O. Box 374, Hubbard, OR 97032-0374. Phone: (503) 981-0583. Charles A. McCown, P. O. Box 1418, Tullahoma, TN 37388.

17th Photo Recon Squadron

The 17th Photo Recon Squadron, 4th Recon Group, 13th Army Air Force, will celebrate the

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Unit Reunions

fiftieth anniversary of its formation with a reunion in Colorado Springs, Colo., September 17–20, 1992. **Contacts:** Lon Berry, 2335 S. Queen St., Arlington, VA 22202. Ken Hyman, 4944 Lindell Blvd., St. Louis, MO 63108.

20th Ferrying/ATS/TCS/MAS

Members of the 20th Ferrying Squadron, 20th Air Transport Squadron, 20th Troop Carrier Squadron, and 20th Military Airlift Squadron will hold a fiftieth-anniversary reunion October 8–11, 1992, at the Sheraton Airport Inn in Charleston, S. C. **Contacts:** Capt. Ron Hannenberg, P. O. Box 0407, Charleston AFB, SC 29404-0407. Phone: (803) 566-2180. DSN: 673-2180. Harold "TC" Ward, 113 Henrietta Dr., Ladson, SC 29456. Phone: (803) 873-6567. Elmer R. Andrews, 898 S. E. Seahouse Dr., Port St. Lucie, FL 34983. Phone: (407) 878-2486.

Class 43-B

Members of Pilot Class 43-B (Luke and Williams Fields, Ariz.) will hold a fiftieth-anniversary reunion February 4–6, 1993. **Contact:** Col. John V. Back, USAF (Ret.), 3463 E. Pasadena Ave., Phoenix, AZ 85018.

Class 48-A

Pilot Training Class 48-A (Guinea Pigs) will hold a reunion October 22–25, 1992, at Randolph AFB, Tex. **Contact:** Jack Oliver, P. O. Box 296, Salado, TX 76571. Phone: (817) 947-8030.

51st Fighter Squadron

Veterans of the 51st Fighter Squadron, 6th Air Force (World War II), are planning to hold a reunion October 22–25, 1992, at the Air Force Museum at Wright-Patterson AFB, Ohio. **Contacts:** H. H. Schmid, 3901 Linden, Pine Bluff, AR 71603. Phone: (501) 536-2576. L. Derick, 19 Mermaid Rd., Toms River, NJ 08753. Phone: (908) 270-0889.

61st Tactical Airlift Squadron

The 61st Tactical Airlift Squadron "Green Hornets" will hold a fiftieth-anniversary reunion October 22–24, 1992, in Little Rock, Ark. **Contact:** Lt. Mike Minihan, 61st ALS/DOP, Little Rock AFB, AR 72099-5000. Phone: (501) 988-7048.

62d Troop Carrier Group

Veterans of the 62d Troop Carrier Group (World War II) will hold a reunion October 21–25, 1992, in Columbus, Ga. **Contact:** Glenn V. Shaw, 1307 Cameo Ln., Fullerton, CA 92631. Phone: (714) 993-2574.

96th Bomb Group

Veterans of the 96th Bomb Group, 8th Air Force (World War II), will hold a reunion October 6–11, 1992, in Louisville, Ky. **Contact:** Thomas L. Thomas, 1607 E. Willow Ave., Wheaton, IL 60187. Phone: (708) 668-0215.

96th Bomb Wing

Veterans of the 96th Bomb Wing/96th Bomb Group will hold a reunion September 24–27, 1992, in Colorado Springs, Colo. **Contact:** Col. Burton C. Andrus, Jr., USAF (Ret.), 505 Hidden Valley Rd., Colorado Springs, CO 80919. Phone: (719) 598-2206.

390th Bomb Group Ass'n

Veterans of the 390th Bomb Group, 8th Air Force (World War II), will hold a reunion October 7–10, 1992, in Orlando, Fla. **Contacts:** 390th Memorial Museum Foundation, P. O. Box 15087, Tucson, AZ 85708. Phone: Bob Waltz (602) 996-5105 or Al Buehler (602) 577-3909.

438th Troop Carrier Group

The 438th Troop Carrier Group, along with the 87th, 88th, 89th, and 90th Troop Carrier Squadrons, will hold a reunion September 17–20, 1992, at the Shilo Airport Inn in Portland, Ore. **Con-**

tact: Keith Nelson, 3215 W. Willow, Lansing, MI 48917.

443d Fighter Squadron

The 443d Fighter Squadron and the 327th Fighter Group (World War II) will hold a reunion September 22-25, 1992, in Anaheim, Calif. **Contact:** Lon Pharris, Jr., 219 S. Lillie, Apt. 10, Fullerton, CA 92631. Phone: (714) 525-2239.

453d Bomb Group

Veterans of the 453d Bomb Group will hold a reunion October 4-7, 1992, in Las Vegas, Nev. **Contact:** Dan Reading, P. O. Box 792, La Habra, CA 90633. Phone: (310) 691-2994.

529th Fighter Squadron

Veterans of the 529th Fighter Squadron, 311th Fighter Group, will hold a reunion September 17-20, 1992, in Dayton, Ohio. **Contact:** Michael L. Janis, 9510 Iris Dr., Cincinnati, OH 45241. Phone: (513) 777-9257.

555th Fighter Squadron

The 555th Fighter Squadron "Triple Nickel" will hold a fiftieth-anniversary reunion for past and present members on November 14, 1992, at Luke AFB, Ariz. **Contacts:** Lt. Col. John Wyatt, USAF, Commander, 555th Fighter Squadron, Luke AFB, AZ 85309-5000. Phone: (602) 856-7650 or Capt. John Sims (602) 856-7126. DSN: 853-7126.

603d AC&W Squadron

Personnel stationed with the 603d Aircraft Control and Warning Squadron at Giebelstadt AB, West Germany, between 1950 and 1954 will hold a reunion September 16-20, 1992, at the Oak Hills Motor Inn in San Antonio, Tex. **Contact:** George Nichols, 8002 Red Willow Dr., Austin, TX 78736. Phone: (512) 288-0535.

2955th CLSS/LG

The 2955th Combat Logistics Support Squadron will hold a twenty-fifth-anniversary reunion September 25-27, 1992, at Robins AFB, Ga. **Contact:** Lt. Urdzik, 2955th CLSS/LGM, Robins AFB, GA 31098. Phone: (912) 926-6729. DSN: 468-6729.

4135th SW/39th BW

The 4135th Strategic Wing and the 39th Bomb Wing will hold a reunion October 23-25, 1992, at Hurlburt Field, Fla. **Contacts:** Al Halloran, 1008 Regatta Dr., Niceville, FL 32578. Phone: (904) 729-2467 or Dick Kahout (904) 651-6008.

6555th Aerospace Test Group

The 6555th Aerospace Test Group will hold a reunion in October 1992. Former members are also invited. **Contact:** Charles H. MacGregor, 4020 Richey Rd., Mims, FL 32754. Phone: (407) 269-6631.

Class 43-A

I am seeking former members of Class 43-A (Williams Field, Ariz.) who are interested in holding a fiftieth-anniversary reunion in January 1993. **Contact:** Lt. Col. A. Dahl, USAF (Ret.), P. O. Box 246, Keyport, WA 98345. Phone: (206) 692-2190.

Class 44-K

For the purpose of holding a reunion in 1993, I am seeking contact with former members of Class 44-K who completed training or had training with this class. **Contact:** Fredrick H. Medenwald, 5901 Elaine St., Speedway, IN 46224. Phone: (317) 293-3348.

Class 53-B

Seeking members of Class 53-B to plan a reunion for fall 1993 in Las Vegas, Nev. **Contact:** Frank J. O'Brien, 6 Westham Ct., Palmyra, VA 22963. Phone: (804) 589-5839.

Class 54-I

Seeking contact with members of Class 54-I (Foster AFB, Tex.) for the purpose of organizing a

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fortieth-anniversary reunion in 1994. **Contact:** W. Oldhoff, Leusderweg 288, 3817 KJ Amersfoort, Holland.

Class 54-R

Seeking contact with members of Class 54-R who are interested in holding a fortieth-anniversary reunion. **Contact:** S. J. Hart, 3027 Bridgestone Dr., Jacksonville, FL 32216.

66th FIS

Members of the 66th Fighter Interceptor Squadron, 10th Air Division, are planning to hold a reunion in February or March 1993, in Laughlin, Nev. **Contact:** Col. Jerry D. Collinsworth, 310 E. Sharon Ave., Phoenix, AZ 85022. Phone: (602) 993-0615.

76th ATS/76th MAS

Seeking veterans of the 76th Air Transport Squadron (Kelly AFB, Tex.) and 76th Military Airlift Squadron (Charleston AFB, S. C.) for a fiftieth-anniversary reunion in 1993. **Contact:** 76th MAS Association, P. O. Box 61101, North Charleston, SC 29419-0101.

178th TFG

The 178th TFG of the Ohio Air National Guard will be hosting a reunion, tentatively scheduled for April or May 1993, for A-7 pilots and aircrew members. **Contact:** 1st Lt. Barry James or Lt. Doug Cligrow, 178th TFG, Springfield-Beckley Muni Airport, Springfield, OH 45501-0178. Phone: (513) 328-8319. DSN: 346-2319.

274th Army Air Base Unit

Seeking members of the 274th Army Air Base Unit who were stationed at Herington AAF, Kan. (1943-45), who are interested in holding a reunion in April or May 1993. **Contact:** Lt. Col. Robert W. Burnett, USAF (Ret.), 18 S. Landing Rd., Rochester, NY 14610. Phone: (716) 381-6349. ■

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ELIGIBLE APPLICANTS

All AFA members under age 65 who are receiving retirement pay based on their military service, spouses under age 65 of active duty or retired members and their unmarried dependent children under age 21, or 23 if in college, are eligible. Upon reaching age 65, your coverage may automatically be converted to AFA's Medicare Supplement Program.

RENEWAL PROVISION

Your coverage will continue as long as you remain eligible for CHAMPUS benefits, the Master Policy with AFA remains in force, your membership continues, and you pay your premiums.

There is no waiting period for active duty members who enroll within 30 days of retirement if their dependents have been insured for two years previously.

EXCEPTIONS AND LIMITATIONS

Coverage will not be provided under this plan for pre-existing conditions (conditions which were treated during the 6 months prior to the effective date), until the expiration of 6 consecutive months of coverage during which time no further treatment is received for the condition. After the coverage has been in effect for 12 consecutive months, ALL pre-existing conditions will be covered. Children of active duty members over age 21 (age 23 if in college) will continue to be eligible if they have been declared incapacitated and if they are insured under **CHAMPLUS[®]** on the date so declared. Contact AFA for details.

EXCLUSIONS

This plan does not cover and no payment shall be made for: routine physical examinations or immunizations; domiciliary or custodial care; dental care (except as a necessary adjunct to medical or surgical treatment); well-baby care after the age of 2 years; injuries or sickness resulting from declared or undeclared war or any act thereof or due to acts of intentional self-destruction or attempted suicide, while sane or insane; treatment for prevention or cure of alcoholism or drug addiction; eye refraction examinations; prosthetic devices (other than artificial limbs and artificial eyes), hearing aids, orthopedic footwear, eyeglasses and contact lenses; expenses for which benefits are or may be payable under Public Law 89-614 (CHAMPUS).



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Inpatient military hospital care	the daily subsistence fee	the daily subsistence fee
Outpatient care (covers emergency room treatment, doctor bills, pharmaceuticals, and other professional services; see exclusions for limitations)	the 25% of allowable charges not paid by CHAMPUS, after the deductible has been satisfied, plus 100% of covered charges after out-of-pocket expenses exceed \$1,000 per person (or \$2,000 per family) during any single calendar year	the 20% of allowable charges not paid by CHAMPUS after the deductible has been satisfied, plus 100% of covered charges after out-of-pocket expenses exceed \$1,000 per person (or \$2,000 per family) during any single calendar year

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Rank Last First Middle

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Month/Day/Year

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PLAN & TYPE OF COVERAGE REQUESTED

Plan Requested (check one) AFA CHAMPUS PLAN I (for military retirees & dependents) AFA CHAMPUS PLAN II (for dependents of active-duty personnel)

Coverage Requested (check one) Inpatient Benefits Only Inpatient and Outpatient Benefits

Person(s) to be insured (check one)
 Member Only Member & Spouse
 Spouse Only Member & Children
 Children Only Spouse & Children
 Member, Spouse & Children

PREMIUM CALCULATION

All premiums are based on the attained age of the AFA member applying for this coverage. Plan I premium payments are normally paid on a quarterly basis, but, if desired, they may be made an annual (multiplied by 4) basis. Plan II premiums are payable annually ONLY.

Quarterly (annual) premium for member (age _____) \$ _____

Quarterly (annual) premium for spouse (based on members' age) \$ _____

Quarterly (annual) premium for _____ children @ \$ _____

Total premium enclosed \$ _____

If this application requests coverage for your spouse and/or eligible children, please complete the following information for each person for whom you are requesting coverage.

Names of Insured Dependents Relationship to Member Date of Birth (Month/Day/Year)

(To list additional dependents, please use a separate sheet.)

In applying for this coverage, I understand and agree that (a) coverage shall become effective on the last day of the calendar month during which my application together with the proper amount is mailed to AFA, (b) only hospital confinements (both inpatient and outpatient) or other CHAMPUS-approved services commencing after the effective date of insurance are covered and (c) any conditions for which I or my eligible dependents received medical treatment or advice or have taken prescribed drugs or medicine within 6 months prior to the effective date of this insurance coverage will not be covered until the expiration of 6 consecutive months of insurance coverage without medical treatment or advice or having taken prescribed drugs or medicine for such conditions. I also understand and agree that all such preexisting conditions will be covered after this insurance has been in effect for 12 consecutive months.

Date _____, 19____ (Member's Signature)
9/92

Application must be accompanied by a check or money order. Send remittance to:
Air Force Association, Insurance Division, 1501 Lee Highway, Arlington, VA 22209-1199



RATES

Plan I: For Military Retirees QUARTERLY PREMIUM SCHEDULE *In-Patient Benefits Only*

Member's Age	Member	Spouse	Each Child
Under 50	\$ 34.11	\$ 73.10	\$24.25
50-54	\$ 50.97	\$ 79.69	\$24.25
55-59	\$ 74.72	\$ 85.29	\$24.25
60-64	\$ 89.27	\$107.54	\$24.25
65 & over*	\$116.66	\$148.51	

Plan I: For Military Retirees and Dependents QUARTERLY PREMIUM SCHEDULE *In-Patient and Out-Patient Benefits*

	Member	Spouse	Each Child
Under 50	\$ 52.65	\$107.08	\$55.13
50-54	\$ 69.18	\$117.90	\$55.13
55-59	\$ 95.64	\$155.69	\$55.13
60-64	\$120.15	\$179.28	\$55.13
65 & over*	\$156.37	\$246.29	

*Not eligible for Medicare

Rates for incapacitated children who reach the limiting age for coverage will still be based on the sponsoring member's rate for the coverage.

Plan II: For Dependents of Active Duty Personnel ANNUAL PREMIUM SCHEDULE *In-Patient Benefits Only*

	Member	Spouse	Each Child
All Ages	N/A	\$17.40	\$10.42
<i>In-Patient and Out-Patient Benefits Only</i>			
All Ages	N/A	\$69.55	\$52.12

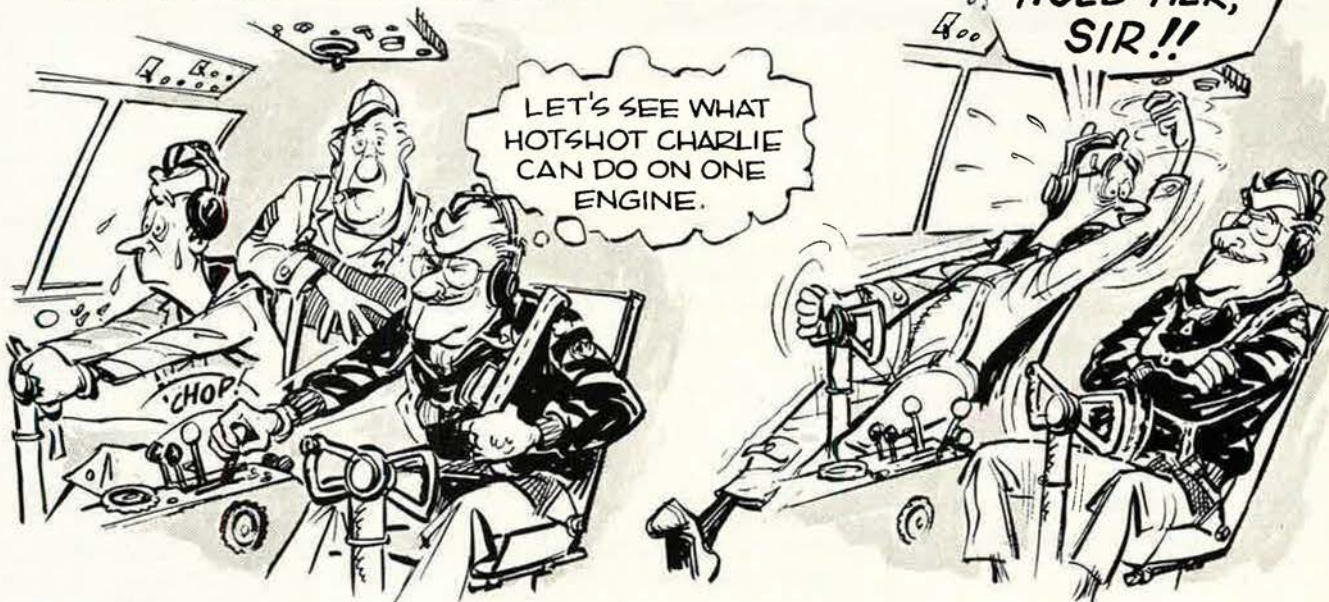


Bob Stevens'

"There I was..."

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From which these monsters get their kicks,
But here's a ploy that's just too shoddy,
So, Sarge, let's jettison the body . . .

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