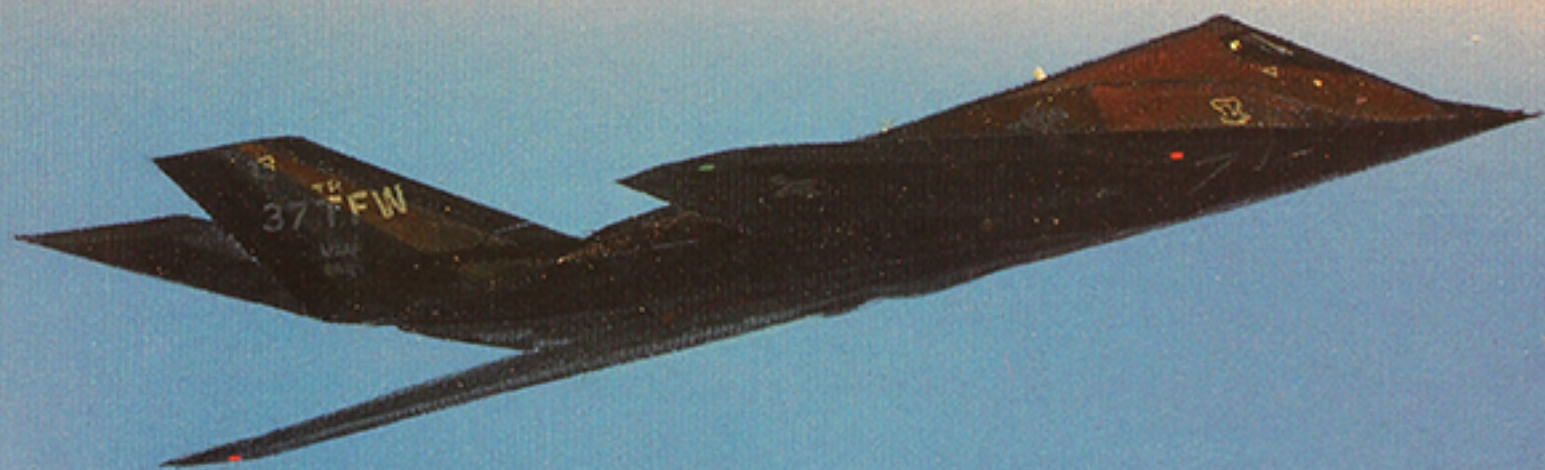


FEBRUARY 1992/\$3

# AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE



**The Force Forms Up**





**“The B-2 represents the future of long-range airpower, whether in conventional warfighting or nuclear deterrence. It is my number one priority. It’s living up to expectations in the early low observability testing and airworthiness. It is in production and the bulk of the program costs are behind us. It is the right aircraft, at the right time, for the right mission.”** Air Force Testimony before Congress, April 1991

**NORTHROP**

People making advanced technology work.

# The future of tactical air base communications

For many years the Air Force has depended on GTE for its tactical communications — secure voice and data switching, ground-to-air, and secure message switching — both inter-theater and intra-theater.

Today, GTE is putting its unique expertise to work to ensure the future of the Air Force's tactical communications, with:

- **Tactical Secure Data Communications (TASDAC)** —

For efficient, secure dissemination of vital information between HQs and deployed air elements

- **System Planning & System Control (SPSC)** — For support of tactical communications networks and air operations

- **Next Generation Switch and Line Termination Unit** — For maximum efficiency in voice/data switching and transmission

- **Modified Air Control Center (MACC)** — For voice communications at tactical HQs

GTE, then as now, *the* source for modular tactical communications.

*For full details, contact:*  
**Program Acquisition Manager**  
**Air Force Tactical**  
**Communications Programs**  
GTE Government Systems Corp.  
77 "A" Street  
Needham, MA 02194-2892  
TEL: 617-455-5348  
FAX: 617-455-3990



**Government  
Systems**

THE POWER IS ON



# Once again, the Air Force sh



1918

*The SPAD S.XIII was the U.S.A.'s fastest (139 mph) pursuit plane of World War I.*



1924

*The Curtiss PW-8 was the first aircraft fast enough to make it from coast to coast between dawn and dusk.*



1926

*Dubbed the "fastest pursuit in the world," the Curtiss P-6 Hawk was among the first to test turbo-chargers.*



1939

*Aptly nicknamed Lightning, the Lockheed P-38 was the first to cross the U.S. in just 7 hours.*



1944

*The Republic P-47 Thunderbolt was the first propeller-driven aircraft to exceed 500 mph in level flight.*



1944

*Originally built for the RAF, the North American P-51 Mustang could outrun all its contemporaries.*



1949

*The Republic XF-91 Thunderceptor used 4 rocket motors to pass the "century mark"—1000 mph.*



1953

*The North American F-86 Sabre captured three world speed records between 1948 and 1953.*



1955

*First U.S. supersonic fighter, the North American F-100 Super Sabre pushed the world record past 800 mph.*



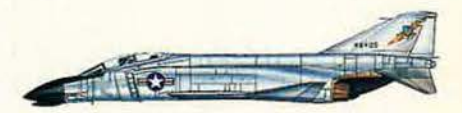
1958

*Called the "missile with a man in it," Lockheed's F-104 set records for altitude (91,000') and speed (1403 mph).*



1959

*A new world record of 1525 mph was set in December by the Convair F-106 Delta Dart.*



1961

*Still in service after 30 years, McDonnell Douglas' F-4 Phantom II moved the world record to 1600 mph.*



# atters another speed record.



1935

*Boeing's P-26 'Peashooter,' America's first all-metal monoplane, topped speeds of 230 mph.*



1938

*The Curtiss P-36 test-dove at 500+ mph, and later downed several attackers at Pearl Harbor.*



1938

*The turbo-charged Bell P-39, prototype of the Airacobra, achieved flying speeds of 400 mph.*



1945

*Never put into service, the Northrop XP-56 flew above 400 mph, powered by a 2000-hp radial engine.*



1947

*The Lockheed P-80 Shooting Star set a world speed record of 623 mph, and was a great success in Korea.*



1948

*Two Mustang fuselages sharing one wing, the North American F-82 was the first to fly Hawaii to NYC nonstop.*



1956

*At its debut, the Convair B-58 Hustler topped 1300 mph, unprecedented for a plane of its size.*



1957

*Heaviest of the "Century Series" fighters, the McDonnell F-101 Voodoo pushed the world record to 1207 mph.*



1992

*The time it takes to acquire a Sun™ SPARCstation™ 2 system suddenly drops from months to days.*



1975

*Lockheed's SR-71A Blackbird spy plane set 12 world records, routinely exceeding 2000 mph.*



1975

*The McDonnell Douglas F-15 Streak Eagle climbs to 98,424' in a record 207.8 seconds.*

The Air Force has broken more speed records than you can shake a joystick at. But here's one that's long overdue:

Instead of waiting months to procure an ordinary desktop computer, you can now get a Sun SPARCstation 2 (the world's most popular UNIX workstation) in a matter of days. And at a price that's something of a record itself. To learn more, call (800) 247-8111, and ask about Sun's Tactical Air Forces-Workstation contract.

 **Sun Microsystems  
Federal, Inc.**





# JAM SESSION.

## **MAGNAVOX STOPS IT, BEFORE IT STOPS YOU.**



Enemy jamming can put a mission in jeopardy. It can force your pilots to bug out before the objective is accomplished.

Magnavox ECCM can stop jamming. Magnavox has put more anti-jam margin in more places, for less money. And, we give you the most DB's per dollar.

With Have Quick, Have Quick II and Have Quick IIA, Magnavox offers the highest performance ECCM available. Performance that has

made Magnavox the A/J leader.

We fielded the first A/J system 25 years ago, and we've continually improved it. Today, Have Quick offers ECCM protection that breaks the noise barrier, and delivers an MTBF of 2,800 hours in an F-15.

Discover how the Magnavox "slice system" adds performance — without Group A modifications. Learn what its inherent data capabilities can do for you.

Then you'll know why Have Quick is the Tri-Service standard and the choice of NATO. And, why it's your best defense when the enemy is in session.



**Magnavox**  
Electronic Systems  
Company

For more information please contact Jim Keating:  
1313 Production Road, Fort Wayne, IN 46808 USA Phone (219) 429-6382 or FAX (219) 429-6645



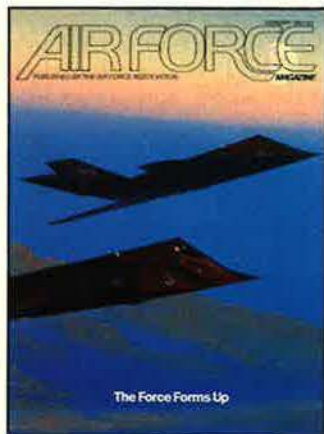
# AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

February 1992, Vol. 75, No. 2

- 8 Letters
- 11 Capitol Hill
- 13 Aerospace World
- 18 Index to Advertisers
- 19 Senior Staff Changes
- 61 Valor
- 80 AFA/AEF Report
- 83 Bulletin Board
- 84 Unit Reunions
- 88 There I Was . . .



**About the cover:** F-117s form up in this detail from Craig Koder's painting "Moon Shadows." For a look at what else is new from the Air Force Art Program, see p. 62.

- 6 **Airpower, One Year Later**  
Editorial by John T. Correll  
*It's time to lay this tired, old controversy to rest.*
- 20 **The Force Forms Up**  
By Robert S. Dudney  
*Air Force leaders plan for less of everything—except space operations.*
- 26 **The Swing-Role Fighter Search Begins**  
By Frank Oliveri  
*The F-16's successor may be a derivative instead of a brand-new airplane.*
- 32 **The Sixteenth Republic**  
By Harriet Fast Scott  
*The former superpower's military forces are demoralized but well-armed, and their loyalties are uncertain.*
- 38 **Ears of the Storm**  
By Robert S. Hopkins III  
*The Iraqis were good, but not good enough to beat the electronic sweep of the RC-135.*
- 46 **Afghan Airlift**  
By Richard Mackenzie  
*MAC provides a lift to wounded victims of the Soviet invasion.*
- 52 **Birth of the Pods**  
By August R. Seefluth  
*In the 1960s there was real resistance to putting ECM on the wing.*
- 56 **Last Days at Clark**  
By Peter Grier  
*Mount Pinatubo and Typhoon Yunya coincided in an unforgettable display of natural power.*
- 62 **The Force in Art**  
*Highlights from the Air Force Art Program*



32

- 68 **He Makes Them Fly**  
By Amy D. Marchand  
*Crew Chief of the Year SSgt. James J. Philhower views his airplane as an extension of himself.*
- 70 **The Mission**  
By Bruce D. Callander  
*A day in the life of the B-24 Home for Christmas, as experienced by the bombardier.*
- 76 **The Pigeon Project**  
By C. V. Glines  
*Here's another of those bizarre weapons projects hatched in the early, try-anything days of World War II.*

AIR FORCE Magazine (ISSN 0730-6784) February 1992 (Vol. 75, No. 2) 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. **Subscription 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 change 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 1991 by Air Force Association. All rights reserved. Pan-American Copyright Convention.



By John T. Correll, Editor in Chief

## Airpower, One Year Later

**T**HE Gulf War lasted for forty-three days, and except for the last 100 hours, nearly all of it was an air campaign. It almost—but not quite—laid to rest a fifty-year-old controversy about military airpower.

The establishment of the US Air Force as a separate service in 1947 did not sit well with those who regard airpower as an adjunct to the classic forms of military power, represented by armies and navies. That became the basis for a long-running dispute about service roles and missions that has flared up sporadically ever since.

Among those conspicuously fanning the flames recently is the military reform analyst, Jeffrey Record, who has attacked airpower in one scathing article after another since 1989. Dr. Record charges that airpower was not "decisive" in World War II, Korea, or Vietnam. He says that airpower does not deliver what its advocates promise and challenges the justification for the Air Force's continued existence as a separate service.

Such views have clearly been the extreme, but through the 1980s and into the 1990s the Air Force's image often trailed that of the Navy, which billed itself as the "force of choice" for global power projection and dominated the spotlight with its "maritime strategy."

For all of that, it was airpower—seventy-nine percent of it from the US Air Force—that struck Saddam Hussein's Iraq in the early morning hours of January 17, 1991. By sunrise, Saddam's ability to command and control his forces or mount a coherent military response had been destroyed.

In short order, airpower shut down the Iraqi electrical power grid, cut the output of Saddam's oil refineries to zero, neutralized the world's sixth largest air force, and had the world's fourth largest army hunkered down.

Twenty to forty percent of the Iraqi troops subjected to aerial attack deserted their units before the coalition ground action began. Interrogation pointed to the air strikes as the main reason for desertion.

Lest we mistake this for some noteworthy achievement by airpower, the

critics explain that the outcome was wholly predictable, an easy victory against an inept enemy. (They do not say why this was not apparent in the autumn of 1990, when the expectation was for a long, difficult conflict and massive US casualties.)



—Photo by Mark Peters, DOD/Sipa Press

**The Persian Gulf War was a convincing answer for anyone still harboring an honest doubt.**

Nobody hammers this perspective harder than Dr. Record, who finds it remarkable that airpower left some targets undestroyed in a strategic bombardment campaign he disparages as "indecisive." He deems it "a failure and an embarrassment" to the Air Force that Saddam and his regime survived the war. He complains that airpower did not get all of the Scuds and missed some of the

Iraqi nuclear, biological, and chemical weapons facilities.

Airpower did not obliterate Baghdad or destroy Iraq. That was not the objective. Had it been, a ruthless air campaign could have done an adequately awesome job of it. Instead, the coalition air forces conducted a campaign marked by precision and restraint.

The plan, marvelously executed, was to disable Saddam's military operation while avoiding collateral damage and civilian casualties. Instructions to F-117 Stealth fighters were especially precise. They stipulated hitting not merely a target but a particular part of it, such as a corner, a vent, or a door. If they hit the right target but the wrong spot, the sortie was scored as a miss.

Dr. Record sees great significance in the fact that Saddam did not agree to a cease-fire until ground forces pushed into Kuwait and southeastern Iraq.

Surely Dr. Record does not take that to mean the Army was the decisive combat element in the Gulf War. He would have even less reason to perceive the Navy or the Marine Corps as decisive. His accusations of indecisiveness, however, are for airpower and airpower alone, which gives his theory the overtones of an obsession.

The Secretary of Defense and the Chairman of the Joint Chiefs of Staff have recognized airpower as the decisive combat arm of the war. It would be difficult to reach any different conclusion.

In a different war under different circumstances, some other combat arm may be demonstrated to greater advantage. As this magazine has said before, it is pointless to argue about whether any of the individual services is automatically "decisive" in isolation. Modern warfare is a combined-arms proposition.

It is time, however, to stop wondering if military airpower is effective in combat and whether the US Air Force is worth keeping. The Gulf War answered those questions more than adequately for those who may have harbored an honest doubt. ■





## CTAS and Bendix Experience The Excellence

USAF C-130 and C-141 pilots deserve the finest in flight control and cockpit display avionics. CTAS integration experience on C-130 and C-141 aircraft together with the proven Bendix track record on C-141, B-52, E-3A



autopilot upgrades and numerous display programs make

this team best qualified for the USAF C-130 and C-141

Autopilot Replacement Program. CTAS excellence in systems

integration plus Bendix avionics integration experience ensures

- low risk
- improved maintainability
- high reliability
- equipment commonality

*All at substantially reduced life cycle costs.*

**Allied-Signal Aerospace Company**

Bendix Flight Systems Division



For more information contact Chrysler Technologies Airborne Systems, Inc.,

Waco, Texas 817-867-4202 or Bendix Flight Systems Division,

Teterboro, New Jersey 201-393-2065



## The Other Industrial Base

I have been critically reviewing your continuing series of articles on the industrial base, and "The Industrial Base at War" [December 1991, p. 52] has sparked me to challenge your basic thesis. In all your discussions thus far, you have failed to acknowledge the "Other Industrial Base" that is resident in the organic Department of Defense depot infrastructure. It was this other industrial base that allowed the operators to win the war.

Surge of repair and overhaul of weapon systems and components by the DoD depot structure is as much a part of the industrial base as the commercial sector is. Further, this other industrial base is only feasible in DoD. When needed, it can rapidly shift resources from lower-priority work to surge those items required to support a war. We cannot afford to pay the commercial sector the price of defaulting on other contracts to shift its resources to "higher-priority" work in the short-term scenarios envisioned by our leadership.

These two industrial bases work in synergy: The organic DoD base fills the gap until the commercial base can gear up to help. This organic base is also capable of manufacturing, as we did when the Army needed some circuit cards for its M1 tanks quicker than the commercial base could react. Further, it has unique capabilities nonexistent in the commercial sector, such as the cryospin facility in San Antonio and the automated neutron radiography facility in Sacramento.

In any discussion of the industrial base, both organic and commercial need to be addressed—for both are in equal jeopardy.

The model for the commercial base is manufacturing. The model for the organic base should be the insurance industry, maintaining capacity to respond quickly to unforeseen catastrophe—such as war—until the commercial manufacturing side can gear up. The insurance model must respond immediately to unforecasted requirements, just as the depot system did in the war.

Unfortunately, DoD is trying to mold its internal industrial base using the manufacturing model, not the insurance model, with such tactics as full-capacity utilization. As a result, the synergy of the two industrial bases is at risk, and the other industrial base might not be capable when needed in the next Desert Shield and Desert Storm.

While I applaud your efforts to get the right attention on the issue of industrial base capability, you are only addressing half the problem.

Col. Jarrett B. McGehee, Jr.,  
USAF  
Wright-Patterson AFB, Ohio

## Training Is Paramount

"The Fighter Training Shortfall" [December 1991, p. 22] introduces a new area of concern regarding our armed forces. For years I have been disturbed by articles describing the slashing of the defense budget, particularly cuts in major weapon systems. Now I read that pilot training is being cut. What next? The quality of training has not yet been drastically reduced, but "there is sure to be some drop-off," as the article stated.

Many years of studying the military, particularly the Air Force, have taught me that training is paramount in determining the quality of a fighting force. Good hardware alone will not do the job. In Chuck Yeager's autobiography, he recalls instances when, in the course of training he would be dogfighting an opponent in a more capable aircraft, yet he would emerge victorious, due, no doubt, to superior

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

flying skills—something we must let all of our pilots acquire.

Although it is not yet a serious problem (I know our pilots are still the best), if training cutbacks become a trend due to decreased funding, the effectiveness of our forces will be degraded. Congress seems to think it cannot afford to spend the necessary amount for training when, in reality, it cannot afford not to.

Gary C. Gallet  
Chicago, Ill.

## New Uniform Blues

I do not care for the sleeve stripe designation of officer's grade on the new Air Force uniform [see "Aerospace World," December 1991, p. 15].

Tradition played an important role in the pride I felt wearing the Air Force uniform in Korea with the same type of bars worn by my father, who flew in the World War I US Air Service.

The new uniform looks cheapened by the sleeve stripes, similar to the Navy's. Why can't the Air Force retain and take pride in its own traditional insignia?

Jack Milburn  
Lewistown, Mont.

Peruse any military magazine or newspaper and you will read about early outs, reductions in flying time, extending tours to the next fiscal year's budget, and the lot, all in the interest of cutbacks and reduced spending in a new "do-more-with-less" military. Turn the page and you'll see another article on the new Air Force uniform. Why are we spending money researching a new uniform? Our present uniform may have its flaws, but I think they can wait. I wonder how many good officers and enlisted were "asked" to leave who could have been kept on with the money spent on researching the new uniform.

If we get another uniform allowance, 100,045 officers at \$300 each will cost \$30,013,500—and that is only for the officers.

General McPeak wants to change us from our "blue Army uniform." We have a simple, to-the-point, good-





*Tactical*



*Reconnaissance*



*Close Air Support*



*Defense Suppression*



*Surface Attack*



*Interceptor*



*USN Adversary*

# BUY AN AIRPLANE, GET A TOTAL AIR FORCE.

In these days of tightening defense budgets, air forces are demanding more from their aircraft programs. Pound for pound, dollar for dollar, no other fighter in history has delivered more than the F-16.

It simply performs more roles with more reliability than anything else that flies. No matter

what the mission, air-to-air, air-to-ground, or air-to-surface. No matter what the weather, day or night. No matter what the tactic. One awesome force continues to set the standard in getting the job done.

The F-16.

**GENERAL DYNAMICS**  
*A Strong Company For A Strong Country*



**Publisher**  
Monroe W. Hatch, Jr.

**Associate Publisher**  
Charles E. Cruze

**Editor in Chief**  
John T. Correll

**Executive Editor**  
Robert S. Dudney

**Senior Editor**  
James W. Canan

**Associate Editors**  
Tamar A. Mehuron, Frank Oliveri

**Contributing Editors**  
John L. Frisbee  
Brian Green  
Bob Stevens  
John W. R. Taylor

**Managing Editor**  
Francine Krasowska

**Assistant Managing Editor**  
Daniel M. Sheehan

**Director of Production**  
Robert T. Shaughness

**Art Director**  
Guy Aceto

**Assistant Art Director**  
Sherryl Coombs

**Research Librarian**  
Pearlie M. Draughn

**Editorial Assistants**  
Grace Lizzio, Amy D. Marchand

**Administrative Assistant**  
Wendy L. Rivera

**Advertising Director**  
Charles E. Cruze  
1501 Lee Highway  
Arlington, Va. 22209-1198  
Tel: 703/247-5800  
Telefax: 703/247-5855

**Director of Marketing Services**  
Patricia Teevan—703/247-5800

**Assistant Director of Marketing Services**  
Elizabeth B. Smith—703/247-5800

**AREA ADVERTISING MANAGERS**  
**East Coast and Canada**  
By Nicholas—203/357-7781

**Midwest**  
William Farrell—708/295-2305

**West Coast**  
Gary Gelt—213/295-3050

**UK, Benelux, France, Scandinavia,  
Germany, and Austria**  
Powers-Overseas Ltd.  
Duncan House, Dolphin Square  
London SW1V 3PS, England  
Tel: (44) 71-834-5566  
Telex: 24924 Powers G  
Telefax: (44) 71-630-5878

**Italy and Switzerland**  
Ediconsult Internationale S.A.S.  
Piazzo Fontane Marose 3  
16123 Genova, Italy  
Tel: (010) 543659  
Telex: 211197 EDINTI  
Telefax: 10-566-578



Circulation audited by  
Business Publication Audit

## Letters

looking uniform. If it must be changed, why change it from "Army" to "Navy"? I have a lot of respect for our sister services, but I don't want to look like them. . . .

On a similar issue, my squadron is going to change from a tactical airlift squadron (TAS) to an airlift squadron (ALS), even though there is no change in our mission. Are we expected to change our squadron patch, which has existed since before the Vietnam War? We take great pride in our squadron patch and what it represents. What will be the USAF-wide cost of changing squadron names?

Capt. Frank J. Kuska,  
USAF  
Yokota AB, Japan

Please allow me to add my voice to the chorus of dismay over General McPeak's proposed new uniform.

If the idea is to give the Air Force its own proud identity, why provide us with a cheap copy of a Navy uniform? It will not build up my pride to look even less like a member of the military. In the photos of the news conference introducing the uniform, General McPeak looked like a cruise ship captain and Captain McGinn reminded me of a flight attendant. The only one who looked like he might be in the Air Force was CMSAF Gary Pfingston and only because of his stripes. Jack Anderson said it best in his column: This uniform is a \$1.5 million knockoff of a commercial airline suit.

Don't try to tell me you are saving me money. Every member of the Air Force—active-duty, Guard, and Reserve—is going to have to purchase this suit (I cannot bring myself to call it a "uniform"). For most of us, that means deciding whether we're going to spend our uniform allowance on purchasing new BDUs and other everyday uniforms, or buy this new suit. Omitting name tags and collar brass is not going to save \$3.5 million a year.

There may be some fit and comfort problems in the present design, but these can be modified (as they have been in the past) without throwing away the entire design.

I pray that the Chief of Staff and the Uniform Board will pay heed to the storm of protest they have caused. The average Air Force member (outside the Pentagon) does not want this new suit. I have spoken about this to more than six dozen people, from junior enlisted to senior NCOs, junior officers, and midlevel officers. No one favored the new uniform design.

I am proud to wear my uniform and proud of the heritage and tradition it symbolizes to the American public. I truly regret that General McPeak apparently does not share that pride.

MSgt. David W. Rogers,  
USAF  
Scott AFB, Ill.

### "Puff" and "Spooky"

I would like to make a minor correction to "Making the First Team" [*"Valor," November 1991, p. 97*].

The first Air Force gunship was an FC-47 named "Puff the Magic Dragon"—not an AC-47 named "Spooky."

In early November 1964, three 7.62-mm GAU-2/A miniguns were first mounted in the side of a C-47 attached to the 1st Air Commando Squadron at Bien Hoa AB, South Vietnam. At that time, no one knew what the official title for the aircraft should be, but it was finally decided that the only possible choice based on Air Force usage at that time was the incongruous designation of fighter/cargo. That did not sit well with a few of the fighter pilots in the organization, although most bore the indignity with an acceptable amount of grace.

The FC-47 proved to be highly effective and operated successfully in Vietnam for the next several months as the only gunship in existence.

Later, the Air Force brought the attack designation out of retirement, and the gunships were redesignated as AC-47s.

Maj. Jack B. Harvey,  
USAF (Ret.)  
Ponce Deleon, Fla.

### Tell It to the Marines

I served for two years during the Korean War, and I never heard that the C-119 was meant to be utilized for air evacuation, as the November "Valor" stated. It was a cargo and troop carrier and certainly was not configured for comfort. In defense of the C-119, I offer the following from *All the U. S. Air Force Airplanes, 1907-83*, by Andrew P. Waters.

"When the First Marine Division was cut off by the [Chinese] at Chosin Reservoir, supplies from the C-119s kept them alive and fighting for ten days. Then, when the Marines broke out . . . , a thirty-two-ton bridge was air dropped [by C-119s] for helping them across an impassable gorge to the fleet at Hungnam. That was the first time in history that a bridge has been dropped by air." Tell it to the Marines that the C-119 was a trash-hauler.

John L. Taylor  
Hagerstown, Md.



By Brian Green, Congressional Editor

## Congress Lifts IR&D Ceiling

Concerns about the US science and technology base override DoD's objections that costs will rise without adding to value.

In its Fiscal 1992 defense authorization bill, Congress lifted the ceilings on reimbursement to industry for independent research and development (IR&D) and for bid and proposal (B&P) activities. The bill also eliminated technical reviews and triservice negotiations with companies to establish IR&D and B&P amounts for the next year.

The Air Force and the Pentagon opposed the legislation, arguing that the IR&D reimbursements would rise substantially without providing the military added benefits.

Congress was mindful of the need to control near-term cost increases. The lawmakers stipulated that, for the next three years, major contractors could receive payments equal to no more than 105 percent of the previous year's reimbursement.

Reimbursements would build toward financial recovery, in 1996, of 100 percent of costs of militarily relevant IR&D and B&P. Previous law limited the DoD reimbursement of IR&D to eighty percent. In the longer term, IR&D costs would be controlled by service determinations of the relevance of IR&D efforts to military requirements and competition between contractors.

Some expressed concern that Congress, by eliminating triservice-industry negotiations and technical reviews, had impaired the services' ability to coordinate IR&D activities. The law instructs DoD to establish new "simplified but effective formal communication mechanisms for fiscal and technical information between the Department of Defense and the defense industry." The new mechanisms are supposed to reduce oversight costs, now estimated at \$100 million annually.

The IR&D provisions of the autho-

rization bill reflect broader congressional concern about the long-term viability of the US science and technology base. Proponents believe that the new IR&D rules will provide additional incentive for industry to increase IR&D expenditures and will encourage fresh technical thinking.

### CIA's Gates on Post-USSR Dangers

CIA Director Robert Gates, in recent congressional testimony, predicted that the newly independent republics of the former USSR would pose a sharply reduced threat to the West. Mr. Gates, however, warned the lawmakers to keep an eye out for the potential emergence of a "xenophobic, atavistic Russia" and for the danger posed by loss of positive control over nuclear arms in the old Soviet empire.

The testimony followed passage of legislation that earmarked up to \$100 million in the Fiscal 1992 Pentagon budget for purchases of food, medicine, and other supplies. Congress also provided \$400 million to fund technical assistance to help the republics dismantle nuclear, chemical, and other special weapons.

The CIA director said that the threat posed by forces within the former USSR has been dramatically undermined by severe economic problems and the rise of republican governments friendly to the West. He added that the fighting power of the forces has been sapped by low readiness, sagging morale, questionable reliability, lack of food and fuel, ethnic tensions, and diminished deployments.

All this led Mr. Gates to conclude that "the continued decay and breakup of the . . . armed forces" is likely. He also said that "we should not be surprised" if most or even all of the plans for modernization of Soviet strategic forces "are abandoned for the foreseeable future."

Nevertheless, said Mr. Gates, some threats still can be discerned. "Over the next year or two," he said, "there may be a greater possibility of conflict in or between various republics." He also maintained that the West might once more face a conventional mili-

tary threat if the new Russia were taken over by an autocratic, nationalist, and aggressive regime.

The cost and complexity of dismantling nuclear weapons and facilities may also prevent Russia and Ukraine from cutting their nuclear forces as rapidly as those republics might wish.

In his wide-ranging assessment of the global security outlook, Mr. Gates said that the US and its allies could face significant threats from Third World nations as nuclear proliferation accelerates and as more nations acquire highly advanced conventional weapons. He said that the breakup of the USSR has increased the danger of such Third World threats.

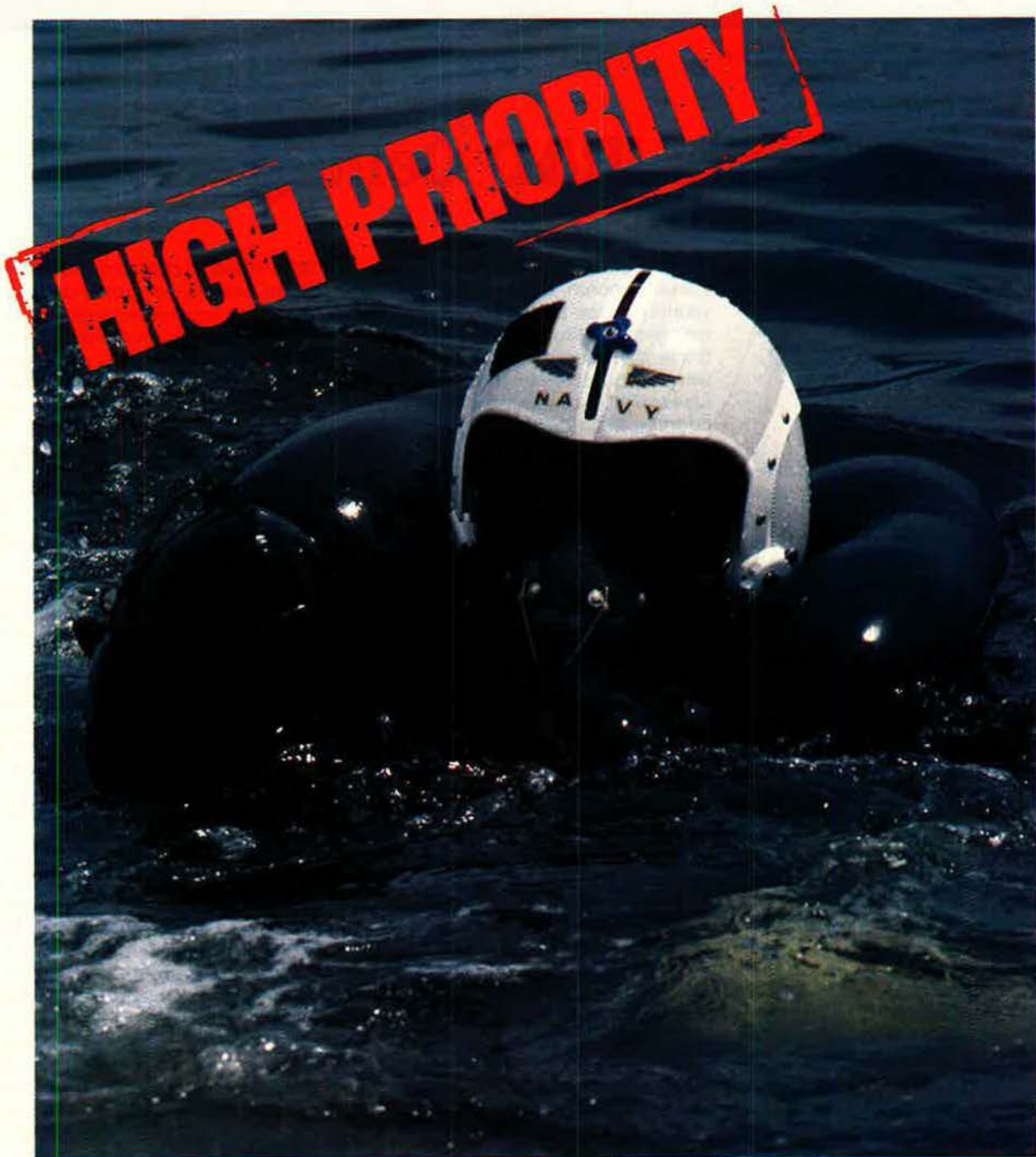
The possibility of nuclear war between Pakistan and India and Chinese strategic modernization remain serious concerns, but the direct threat to the US from the "special weapons" of other nations will not increase "for at least another decade," the CIA director reported.

Nuclear proliferation, however, could increase the threat to Europe, the Middle East, and Asia. Several nations, with the help of China, North Korea, and emigrant Soviet nuclear scientists and engineers, are developing weapons of mass destruction and long-range ballistic missiles. US or allied forces in these regions, said Mr. Gates, "could face an increased threat of air-delivered weapons before the end of the decade, [and] some inaccurate but serviceable ballistic missiles with nuclear warheads are likely to be fielded by a number of countries in coming years."

Other military threats emanating from the Third World may well be increased by "leakage" of "highly sophisticated Soviet conventional military technology and equipment, such as stealth, lasers, or thermal-imaging technology," Mr. Gates said. While the "technological sophistication of the global military threat to US interests in coming years will be lower than we projected before the collapse of the Soviet Union . . . many foreign military forces will acquire advanced Soviet and Western weaponry, which we expect will be available at bargain prices." ■



Assault Medium Lift ■ National Executive Transport ■ Combat Rescue and Special Warfare ■ Special Operations ■ Light Intratheatre Transport ■ Surface, Subsurface, Surveillance Coordination ■ Over-the-Horizon Targeting ■ Range Support



Airborne Refueling ■ Forward Air Control/Observation/Armed Reconnaissance ■ Carrier/Surface Ship On-Board Delivery ■ Gunship/Close Air Support ■ Battle Group Surveillance-Intelligence ■ Airborne Early Warning-Surface Combatants

**01 MAY 95, 2030Z; PILOT DOWN 150 MILES FROM CARRIER. 30 MINUTES TO SURVIVE.**

Scenario: Pilot down at sea. Enemy closing in.  
 Fortunately, this time it was just an exercise. But with the V-22 Osprey, the multimission, vertical-lift aircraft, it was an exercise that could be successfully completed. The V-22 is the only aircraft with the range and speed to get in quickly, help recover the downed airman and get out before an enemy converges. The Collier Award-winning V-22 is the first aircraft that meets or exceeds 32 multiservice mission requirements. And testing continues. Let's keep our edge. Let's produce the V-22.

**BELL BOEING**  
**The V Tiltrotor Team**  
**A JOINT SERVICE PROGRAM**

© 1991 Bell® Helicopter Textron Inc./Boeing Helicopters





# Aerospace World

By Frank Oliveri, Associate Editor

## JPATS Requirements

The Air Force and Navy released the long-awaited joint system operational requirements for their Joint Primary Aircraft Training System (JPATS). The document indicated that allied nations could become heavily involved in the program.

The JPATS program is one of the largest remaining potential aircraft purchases projected for the next decade. The so-called JSORD (joint system operational requirements document) calls for the new trainer to have selectable nose-wheel steering, toe-activated wheel brakes in both crew positions, the ability to climb (fully fueled) to 18,000 feet above sea level in eight minutes or less on a normal day, air-data instruments positioned to facilitate cross-check without excessive eye movement, digital avionics, and seats capable of ejecting crew members at all airspeeds and altitudes.

The services released the JSORD in November. JPATS is expected to replace the aging Air Force T-37B by the year 2004 and the Navy's T-34C by 2007. The T-37B came on line in 1959 and has been updated continually.

## New Separation Benefits

The Fiscal 1992 defense authorization act, which covers the year that started October 1, 1991, contains two new programs that provide incentives for active-duty military personnel to separate from the service voluntarily.

The Voluntary Separation Incentive (VSI) and the Special Separation Benefit (SSB) will help military personnel most affected by the drawdown. Service members with more than six years and fewer than twenty years in service in selected job specialties may participate.

Personnel must volunteer for release from active duty and serve in the Guard or Reserve. They must choose either VSI or SSB. Service secretaries must approve or disapprove applications based on the specific needs of the services.

According to DoD, the VSI program provides annual payments to the separating member equal to 2.5 percent



*In October, the IA 63 Pampa completed its twelfth demonstration tour throughout the US, stopping at numerous Naval and Air Force bases. LTV and Fábrica Militar de Aviones (FMA) of Argentina are teamed to offer a variant of the aircraft with updated avionics and a US-developed head-up display, the Pampa 2000. It has been entered in the USAF-Navy Joint Primary Aircraft Training System competition. JPATS will replace aging Air Force T-37 and Navy T-34 jet trainers by 2007.*

of annual basic pay multiplied by the member's years of service. The payments will be made in equal installments for a period equal to twice the number of years of service of the member. If the separated serviceman or -woman should die, the remaining installments may be bequeathed to a member of his or her family.

Under the SSB plan, DoD would provide a lump sum payment equal to fifteen percent of annual pay multiplied by the member's number of years in service.

For example, an E-6 with ten years of service who chooses SSB will receive a lump sum payment of \$28,172. That same E-6 could also receive \$4,695 per year for twenty years under VSI, netting a total of \$93,900. The member will be taxed on the incentive payments in the years in which they are received.

The first offers of incentives were set for early 1992. DoD plans to reduce the force from 1.98 million at the end of 1991 to 1.65 million in 1995.

## USAF's Safest Flying Year

The Air Force disclosed in late November that Fiscal 1991 was the safest flying year in its history. The service reported 1.11 mishaps per 100,000 flying hours. The previous record, set in Fiscal 1990, was 1.49 mishaps.

The service reported records in every major category. In a total of 3,687,335 flying hours (excluding 65,000 combat sorties in Operations Desert Shield and Desert Storm), the Air Force recorded eighteen fatalities, well below the ten-year average of sixty-four. The total was far less than the Fiscal 1990 total of forty-three fatalities. The total number of aircraft lost was thirty-eight.

## Troop Reductions Postponed

The US has postponed planned force reductions in South Korea, citing North Korea's continued pursuit of nuclear weapons capability.

Defense Secretary Dick Cheney declared that the US had become convinced North Korea was developing



the infrastructure to support a military nuclear capability. In fact, he said, the US suspected North Korea of building a nuclear reprocessing plant to produce weapon-grade plutonium. Secretary Cheney also voiced concern about Pyongyang's ability to deliver weapons of mass destruction.

North and South Korea have since signed a treaty of reconciliation and nonaggression, but US concerns about North Korea's nuclear potential remain high.

The US had projected certain drawdowns under a plan called "A Strategic Framework for the Asian Pacific Rim," formulated early in the Bush Administration. Phase I, which has already been implemented, reduced US strength in South Korea by 7,000 troops. Phase II has been postponed. It had been expected to continue reductions in 1993-95. The final phase would place the US in a clearly supportive role behind the much more numerous forces of South Korea.



*On-Site Inspection Agency Director Maj. Gen. Robert Parker presents former President Ronald Reagan a fragment of the last Soviet SS-20 intermediate-range ballistic missile, destroyed at Kapustin Yar on May 12, 1991. The fragment was presented on behalf of the Soviet people and is now on display in the Reagan Presidential Library in Simi Valley, Calif. President Reagan signed the INF Treaty in 1987.*

### Women's Combat Roles Delayed

DoD will delay for at least a year a decision to allow women to compete for fighter pilot positions. It awaits a Presidential commission report on the assignment of military women.

Pentagon spokesman Pete Williams said it was his "hunch" that the Commission on the Assignment of Women in the Armed Forces would be allowed to complete its work before a final decision is made. Congress

passed legislation in the Fiscal 1992 authorization bill that eliminated regulations barring women from flying combat missions.

The legislation requires the formation of the commission. The move was sought by legislators opposed to putting women in combat roles, and they proposed it to delay any action on the issue. The commission's report is due December 15, 1992. Female pilots in all services are currently restricted to combat support roles.

### New Laser Bomb Kits

The Air Force will buy new laser guidance kits to install on bombs in its inventory. The move is intended not only to replace the laser-guided weapons expended in the Persian Gulf War but also to upgrade and make "smart" the older, dumb bombs still in stock.

In a written statement, Pentagon Comptroller Sean O'Keefe told the House Appropriations Committee's

Defense Subcommittee that kits for the GBU-24 and GBU-27 would be used to partially replace older and less capable GEU-10s and GBU-12s. The Air Force plans to buy 7,728 kits at a cost of \$664 million, a figure approved in final congressional defense bills.

The statement responded to questions posed in a closed session on July 11 and released by the committee in December.

### "Friendly Fire" Task Force

In December, the military services emphasized their commitment to reduce "friendly fire," creating a joint service task force to reexamine incidences during Operation Desert Storm and to make specific suggestions and recommendations.

Maj. Gen. Jerry Harrison, the commander of Laboratory Command in Army Materiel Command, told a press conference in mid-December that technology is not yet in hand to eradicate friendly fire incidents, also known as "fratricide." General Harrison said that efforts will be stepped up in training and technology programs to reduce the risk of fratricide. For now, he added, the services must rely on such optical means as infrared lights, chemical lights, and thermal tape to identify friendly forces. Communication and coordination between aircraft and ground vehicles will also be targeted for improvement.

Near-term solutions, such as laser warning receivers that indicate to ground vehicles whether they are being lased or not and GPS receivers in Army vehicles, are being eyed for deployment. Midterm solutions would require improved situational awareness, optics, and identification, friend from foe (IFF) systems.

For the long term (beyond 2000), the task force will focus on through-the-sight target identification with identification systems in every vehicle, according to Maj. Gen. Wesley Clark, deputy chief of staff for Concepts, Doctrine, and Development at Army Training and Doctrine Command.

The Air Force will study the effectiveness of thermal beacon solutions to prevent air-to-ground mishaps involving the Maverick missile, General Clark said. Lights and rotating beacons that would be visible at long ranges and forward-looking infrared (FLIR) devices are among the measures being studied.

### AWPGM Set in Motion

Air Force Chief of Staff Gen. Merrill A. McPeak approved the Mission Needs Statement for the service's Adverse Weather Precision Guided Munition (AWPGM).

Official plans are to get under way early next year. About \$30 million has been set aside in the Fiscal 1993 amended budget submission to start the program. The system stems from lessons learned in the Gulf War, when precision guided munitions were instrumental in the quick collapse of Iraqi forces. When faced with cloud



cover, however, some precision munitions malfunctioned.

The Phase I weapon would not be a precision type but would improve accuracy to within 100 feet of a target. Phase II would reduce the distance to ten feet.

Competition for the program will be open, the service said. An RFP for engineering and manufacturing development of Phase I is expected at the end of Fiscal 1992. The program will actually begin in mid-1993. Phase II will begin in Fiscal 1994.

### C-17 Successes and Warnings

In early December, the C-17 transport test vehicle demonstrated a stable airspeed of eighty-three knots, remarkably slow for a transport flying at a weight of 360,000 pounds and an eighteen degree angle of attack. Air Force officials considered this an achievement, and it is critical to the airlifter's ability to land on short runways.

The reduced airspeed is possible through powered lift from the engines blowing on the flaps. The C-17 has a wing area of 3,800 square feet. Full stall tests began in January and will reach an angle of attack of around thirty degrees, but engine thrust against the flaps could damage them at a full forty degree angle. The eighty-three-knot speed was achieved with a forty degree angle at only partial throttle.

In Washington, a General Accounting Office (GAO) official said that McDonnell Douglas could face a significant loss on the C-17 program and that DoD should keep a close eye on

its progress. Nancy Kingsbury, GAO's director of Air Force issues and a noted C-17 critic, said in November that the size of the loss, if it does materialize, will not be known for three or four years.

### Air Force Stands by Stealth Chart

The Air Force declared in late November that it stands by its "Value of Stealth" chart, despite criticisms by the press and Congress that it inflates the importance and utility of low-observable technology.

The chart, first released shortly after the conclusion of the Gulf War, depicts the numbers of certain types of tactical aircraft needed to perform an attack mission. The chart, which compares a strike package of stealthy F-117s with one comprising conventional tactical fighters, bombers, and electronic warfare aircraft, indicates that stealth can reduce the number of planes needed on a given mission, also saving money by eliminating support aircraft.

Initially, the Air Force seemed to admit unofficially that the chart was incomplete and misleading. Now, however, the service says the chart accurately portrays usage of the F-117 in the Gulf War. USAF officials blamed the press and Congress for misinterpreting the charts.

### McDonnell Douglas Sale Controversy

McDonnell Douglas's decision to sell part of itself has stirred fears in Congress and elsewhere that the US is selling its future to Asian competitors.

Late last year, McDonnell Douglas agreed to sell forty percent of its commercial jetliner business to Taiwan Aerospace Corp. for \$2 billion. The move was undertaken to give the company a much-needed cash infusion.

The deal is subject to federal approval. In Congress, twenty-eight senators cosigned a letter to the President, citing their objections. They noted widespread fear that the sale will transfer to Taiwan a large amount of aerospace technology, "much of which was paid for by American taxpayers."

McDonnell Douglas officials do not believe that technological issues should block the deal because McDonnell Douglas will continue to control the most technologically sophisticated parts of the program. The sale, if approved, would propel the Taiwan firm into the top ranks of the aerospace industry.

McDonnell Douglas Board Chairman John F. McDonnell said that, without the sale, the firm would be unable to grow as a commercial airplane firm.

### THAAD a Top Priority

The Army Strategic Defense Command (ASDC) has set aside nearly \$2 billion for forty-one programs in Fiscal 1992, according to an acquisition requirements list released by ASDC in December.

The list indicates that the Theater High-Altitude Area Defense (THAAD) systems and the theater missile defense ground-based radar (TMD GBR) will enter demonstration/validation, with THAAD cited as the command's top priority. Between \$600 million and \$800 million will be set aside for an effort to seek proposals in Fiscal 1992.

### DARPA Makes Progress Against Mobile Targets

The Defense Advanced Research Projects Agency (DARPA) has made significant progress in countering mobile missiles and has been developing technologies to provide a robust response to such threats by the mid-1990s, according to testimony by Dr. Victor Reis, DARPA's director.

Dr. Reis told the House Appropriations Committee's Defense Subcommittee that \$50 million to \$100 million would be required annually to achieve DARPA's goals for the capability. The committee provided \$28 million for counter-relocatable-target programs in Fiscal 1992. While not what Dr. Reis said was required, the sum was nearly three times what the Pentagon had sought.



*This C-17 P-2 aircraft is having a coat of gray paint applied to its primed surface at McDonnell Douglas's Long Beach, Calif., facility. The P-2, scheduled to be the second production aircraft to come off the assembly line, recently completed fuselage proof-pressure testing and is about eighty percent complete.*



**Representative Panetta's Plan**

House Budget Committee Chairman Rep. Leon Panetta (D-Calif.) outlined a plan last December to reduce defense spending by five percent each year in real, inflation-adjusted dollars through Fiscal 2001.

The ten-year plan would reduce an additional \$40 billion in budget authority over and above present DoD projections, through Fiscal 1995. Representative Panetta said that the reduction would save \$419 billion in cumulative outlays over ten years, putting real spending nearly fifty percent below the budget summit baseline and thirty percent below the Administration's planned levels.

**F-22 vs. Stolen Stealth**

Maj. Gen. Joseph W. Ralston, formerly the Air Force's director of Tactical Programs, said the forthcoming F-22 Advanced Tactical Fighter will likely face enemy aircraft incorporating stealth technology stolen from the US. This development will make close-in dogfights more likely.

General Ralston told the Senate Armed Services Committee in April that stealth will likely be applied to the follow-on to the Su-27, the so-called Air-Superiority Fighter (ASF), which will result in close-in combat, requiring greater agility in the F-22. Both aircraft would find it difficult to detect each other, and this would lead to a smaller engagement area.

"We have to accept the fact that the battle arena is smaller. We may very well get into a dogfight, and we need superior maneuverability on this airplane as well as stealth technology," General Ralston said.

He indicated that the assessment, which places the scenario in the 1998-2003 period, is shared by the CIA, DIA, and NSA. The testimony further emphasized that short-range and medium-range air-to-air missiles will play a greater role in future combat scenarios than will longer-range missiles. While the recently declassified testimony came several months prior to major changes in the now-defunct Soviet Union, USAF officials say that design work continues on the ASF.

**More Ill Wind Charges**

As Ill Wind investigations continue, former Navy Deputy Assistant Secretary James Gaines has been charged with fraud and former Air Force Deputy Assistant Secretary for Tactical Warfare Systems Victor Cohen has been sentenced.

Mr. Gaines, who faces a maximum prison term of thirty-seven years, al-



*As if Maverick were not effective enough in the Persian Gulf War, Hughes Aircraft Co. has adapted the missile's airframe for an extended-range variant, the Longhorn. A turbine engine designed to travel about forty nautical miles will triple the range of current variants. An infrared seeker or a millimeter-wave radar configuration will allow the new missile to be launched with devastating accuracy.*

legedly received a lithograph, theater tickets, and other gifts from defense consultants to illegally aid defense contractors to win surveillance and weapon systems contracts.

Mr. Cohen was sentenced in November in US District Court, Alexandria, Va., to three months in jail and fined \$10,000 for conspiracy and bribery. He pleaded guilty to charges in August.

The Ill Wind probe began in 1988.

**F-16XL Achieves Laminar Flow**

The NASA F-16XL research plane demonstrated laminar (smooth) airflow over a significant part of the aircraft's wing while flying at supersonic speeds in November.

Laminar flow occurred over a series of twenty-eight flights at NASA's Ames Dryden Flight Research Facility at Edwards AFB, Calif. NASA said the F-16XL "mounted a suction device, or glove, to remove turbulent air moving over a test area on the upper wing surface." The glove was designed by Rockwell International.

The demonstration could lead to major reductions in fuel consumption by future supersonic airliners.

The titanium wing section, covering forty percent of the top of the wing and about fifty percent of its leading edge, draws off most of the turbulent surface air through millions of laser-cut holes. A foam and Fiberglass fairing blends the raised glove shape into the wing's upper surface.

In the next step, NASA engineers will use information from the F-16XL flights to design a larger experimental device to cover more than half the wing area of an aircraft.

**IPEs on Track**

Flight service evaluation of Pratt & Whitney's F100-PW-229 Increased Performance Engine (IPE) resumed in December following a flight suspension due to blade problems, the firm said.

The engines are being tested in F-16s at Nellis AFB, Nev. The problem occurred with the fourth turbine blade, but the blades were re-machined by P&W and are ready for service. In addition, the company developed a new fourth blade that will solve the problems over the long term. A fourth turbine blade cracked in an F-16C in flight, which led to failure of the engine and a subsequent belly landing at Edwards AFB, Calif., in July. A number of P&W IPEs are also being tested in F-15s.

(In other P&W news, the Air Force Reserve's 482d Tactical Fighter Group in November became the first F-16 unit to achieve operational status using the P&W F100-PW-220E engine.)

General Electric's F110-GE-129 IPE has accumulated more than 1,500 flight hours of testing, the firm reported in December.

GE officials indicated that the program is so far ahead of schedule on



its field service evaluation that its IPE may see operational service in the spring. The engine's sortie completion rate is 99.3 percent, 100 percent since August, and its IPEs have flown more than 1,500 hours through December. Initial problems with the IPE's digital controls have been solved.

#### LEAP Success

The Strategic Defense Initiative Organization successfully tested a new miniature solid propulsion system for the Lightweight Exoatmospheric Projectile (LEAP) kinetic-kill vehicle in late November.

The projectile simulated a space engagement while strapped to a laboratory test fixture at a Thiokol test facility at Elkton, Md., according to Rich Matlock, SDIO's LEAP program manager at a Pentagon briefing.

#### Industry Outlook Dismal

Aerospace Industry Association President Don Fuqua painted a dismal picture in his annual assessment of the industry in December, placing the blame squarely on the government.

Mr. Fuqua said defense profits are declining steadily, debt is increasing, and investment in R&D is declining. In addition, he said, for the first time in a decade industry's backlog is declining rather than increasing.

#### Seawolf Follow-On

The Joint Requirements Oversight Council approved the Navy's mission needs statement for the N-SSN *Centurion* submarine, which will serve as the follow-on to the current *Seawolf* SSN-21 attack submarine program.

The approval came in mid-November. After the Defense Acquisition Board initiates the acquisition process, the Navy will begin cost and operational effectiveness trade-off assessments.

#### News Notes

- Maj. Gen. Stephen B. Croker, the Air Force's former director of Strategic, Special Operations Forces, and Airlift Programs, took command of the provisional Air Combat Command on January 15, 1992. Maj. Gen. Walter Kross, the former USAF director of Operations, took command of the provisional Air Mobility Command. The new commands will be officially activated June 1, 1992. Permanent commanders for the new commands have not yet been named.

- Clark AB was officially turned over to the Philippines on November 26, ending nearly ninety years of US occupancy. The last of almost 10,000

personnel departed from the 9,285-acre base, USAF's largest overseas base before the changing of control. [See "Last Days at Clark," p. 56.]

- TRW and Grumman Corp. have teamed to compete for the right to build the next-generation missile early warning system, the Air Force's Follow-On Early Warning System (FEWS). Aerojet and Rockwell Corp. have also teamed. FEWS is being sought to replace the existing Defense Satellite Program. The Air Force plans to announce two awards worth about \$225 million each to launch an eighteen-month demonstration/validation phase. Engineering and manufacturing development is expected to begin in 1994.

- TRW Inc. plans to cut about 10,000 jobs, write off \$250 million, and sell several business lines in a restructuring plan to cut costs, the firm announced in December. TRW absorbed \$250 million in losses when it divested several information business units, restructured its information systems and services business, streamlined its automotive operations, sliced jobs from core business units, and trimmed capital spending by \$100 million.

- Italy will design and build two modules for space station Freedom, station program chief Richard Kohrs said in December. The Italian Space Agency has agreed to pay for the two modules. The Italians will provide one large logistics module and a smaller module that may eventually contain the station's centrifuge. The larger module is expected in 1997, with the second to be completed before 2000.

- The Fiscal 1992 defense appropriations act provided \$2 million for the Navy to remain a part of the Air Force's F-22 Advanced Tactical Fighter program. The Navy did not request the funds, but Congress indicated that the service should continue to identify opportunities to capitalize on ATF technologies.

- DoD proposed a \$3.3 billion Patriot air defense missile sale to Saudi Arabia in December under a Foreign Military Sales proposal. The sale would involve twelve Patriot fire units, one training fire unit, one maintenance float fire unit, 758 missiles, fourteen AN/MPQ-53 radar sets, fourteen engagement control stations, seventy-five launching stations, support equipment, and logistic support.

- The Senate ratified the Conventional Forces in Europe Treaty by a vote of 90-4 in late November but added conditions that the US would seek parallel agreements with the Soviet Republics.

- The US should assist the Soviet

# 50% Off Hotel Rates

## A New Benefit For AFA Members

**J**ust imagine! Over 1,500 hotels, motels and resorts, all available to you at a consistent 50% savings! Quest International is the nation's leading hotel savings program—and through AFA, you have preferred access to Quest at a special low rate!

A Quest membership normally sells for \$99.00. But, through a special agreement with Destinations, Inc., (Quest's group distributors), AFA members get in at a fraction of that! Just \$29.95!



## A Partnership You Can Trust

You'll find locations from virtually every major chain, plus terrific resort facilities. Your 80-page, full-color Quest hotel directory has all the details. And you get an updated copy every 90 days!

Remember, your Quest membership is fully guaranteed! If you're not satisfied, you get a hassle-free refund at any time during the life of your membership! Call 1-800-"STAY-4-50".

### Official AFA/Quest Enrollment Form

name \_\_\_\_\_  
 address \_\_\_\_\_  
 city, state, zip \_\_\_\_\_  
 daytime phone (\_\_\_\_) \_\_\_\_\_  
 signature \_\_\_\_\_

**Select One**

\$29.95 AFA/Quest Membership  
 \$36.96 AFA/Quest Membership  
 -- including an additional spouse card

-- spouse name \_\_\_\_\_

**Method of Payment**

Here's my check  
 Visa  M/C  Am/Ex exp. \_\_\_\_/\_\_\_\_

card # \_\_\_\_\_

Checks drawn on U.S. banks only. Credit cards welcome. Annual membership renewal automatically billed or charged to credit card shown until cancelled by member.

**To Order:**

Mail to: AFA/Quest Offer, One Lake Aspen Park, P.O. Box 22800 Yakima, WA 98907-2800  
 Fax credit card orders to: 509-452-3569  
 Call Toll Free: **1-800-STAY-4-50**  
 1-800-782-9450

**AFA Access # 1890-9**



Union in command and control so that it may have a better handle on its nuclear arsenal, according to a report released by Senate Armed Services Committee Chairman Sen. Sam Nunn (D-Ga.) in November. The report warns that Soviet missiles could fall into the wrong hands.

- The Army and Navy should merge their laboratories and realign them beginning in January 1992, according to a report by the Federal Advisory Commission on Consolidation and Conversion of Defense Research and Development released in November.

- One of two Soviet prototype Yak-141 "Freestyle" advanced short take-off and vertical landing fighters crashed in a landing attempt on the aircraft carrier *Admiral Gorshkov* in November, almost certainly killing the program. The pilot ejected safely.

- Congress provided \$62.3 million for the AIM-9 program, of which \$13.5 million will go to the development of the AIM-9M Plus, the Air Force's preference over the AIM-9R upgrade the Navy is pushing. Only \$5 million was allocated for the AIM-9X.

- The Perseus high-altitude atmospheric research prototype drone

made its first flight in early November at Edwards AFB, Calif. Aurora Flight Sciences built the prop-driven aircraft under a NASA contract. The drone is designed to fly at 85,000 feet.

- The Air Force launched the second Titan IV booster in November, carrying a classified payload. The service said this marked the beginning of operational use of the booster.

- In November, the Air Force reported that the Joint Tactical Information Distribution System (JTIDS) completed a reliability growth test that resulted in a rate of 400 hours mean time between failures. During the test, 5,000 operating hours were accumulated on networking terminals. The systems tested will be installed on the Air Force E-3 and the Navy E-2C.

- A number of sensors in the US Geologic Survey's 220-sensor system for pinpointing earthquakes detected two atmospheric shock waves in late October along the west coast of the US. Scientists were able to determine that unidentified aircraft were traveling at about Mach 3 at an altitude of about 30,000 feet. The two booms, less than two minutes apart, were detected at different ground tracks but heading in the same direction.

- The Marine Corps has terminated the Light Armored Vehicle 105 R&D program because it lacks production funds between Fiscal 1993 and 1996 to support the program.

- In November, the Navy successfully test launched a Tomahawk sea-launched cruise missile with Block III systems improvements and a WDU-36B warhead for the first time. The

warhead is smaller than the typical 1,000-pounder but has the same lethality. That is significant because the Tomahawk would be able to carry more fuel and therefore would have greater range.

- The Rockwell/USAF AGM-130 standoff weapon system successfully completed its first separation/jettison test from an F-15E at Eglin AFB, Fla., in November. This was the first of four tests. The system was launched at Mach .85 at 7,500 feet.

- The Navy chose the team of Texas Instruments and LTV as the winner of the \$700 million development contract for the Advanced Interdiction Weapon System in December. Before the full contract may be awarded, the contracting team must wait for the Defense Acquisition Board to approve Milestone 2, full-scale development.

- In November, two F-16s successfully launched two Advanced Medium-Range Air-to-Air Missiles each at four oncoming target drones, with each missile guiding to within lethal distance of the targets with one direct hit.

- This year, the Air Force will be converting from JP-4 to JP-8 fuel in the US, primarily for safety, survivability, and environmental reasons. The Air Force has already made the conversion in Europe. JP-4 is a naphtha-based fuel; JP-8 is kerosene-based.

- The General Dynamics Atlas II booster launched a Eutelsat II communications satellite on its first flight in December. The booster's first flight was delayed in November because of



## IF YOUR KIDS' DREAM IS TO FLY, HELP THEM SOAR.

Encourage your children's imagination to take flight while they train like America's top jet fighter pilots -- at AVIATION CHALLENGE, from the same people that bring you U.S. SPACE CAMP.®

7th - 12th graders will acquire and apply a knowledge of aerodynamics ... engineering ... propulsion ... and flight systems. Try their hand at authentic water and land survival techniques. Train on advanced simulators and feel what it's like to land on an aircraft carrier.

Call 1-800-63 SPACE today for a 24-page brochure and application. Act today, flights are filling up fast.



U.S. Space & Rocket Center, Huntsville, AL

**1-800-63 SPACE**

AF02Z

## Index to Advertisers

Bell Helicopter Inc./Boeing Helicopter Co. ....	12
Chrysler Technologies Airborne Systems .....	7
Destinations .....	17
General Dynamics Corp. ....	9
GTE Government Systems Corp. ....	1
Lockheed Corp. ....	44-45
LTV Aerospace & Defense, Aircraft Product Group .....	31
Magnavox Electronic Systems Co. ....	4
McDonnell Douglas Corp. ....	Cover IV
Northrop Corp. ....	Cover II
Pentastar Electronics Inc. ....	Cover III
Robertson Aviation .....	19
Sun Microsystems Federal, Inc. ....	2-3
U.S. Space & Rocket Center .....	18
USAA .....	51
AFA Insurance .....	86-87
AFA Member Supplies .....	85
AFA Résumé Critique Service .....	85



faulty transistors in the Honeywell-built power supply of the system's inertial navigation unit.

• The Air Force in November removed the first Minuteman II missile from its 341st Strategic Missile Wing silo at Malmstrom AFB, Mont. The removal was a response to the President's order in September to take Minuteman II missiles off alert.

• The Department of Veterans Affairs increased compensation to disabled veterans by 3.7 percent on December 1. Two million veterans will be affected.

#### Honors

Grumman Technical Services Division and Thiokol Corp. have won the 1991 George M. Low Trophy, NASA's Quality and Excellence Award. Grumman provides hardware and support services to the integrated launch team at the Kennedy Space Center. Thiokol provides the redesigned solid rocket motor propulsion system that produces eighty percent of the thrust for space shuttle liftoff.

Members of three space shuttle crews were honored with the Vladimir M. Komarov Diploma by the National Aeronautic Association for outstanding achievements in the exploration of outer space. The three missions were the January 1990 STS-32, the October 1990 STS-41, and the December 1990 STS-35.

#### Purchases

The Navy awarded Westinghouse Electric Co. a \$57.6 million firm, fixed-price contract option for materials and production of one main propulsion unit and related equipment for the SSN-21-class submarine. Expected completion: July 1995.

The Navy awarded Grumman Aerospace a \$10.7 million advanced acquisition contract for procurement of an E-2C aircraft for Egypt. Expected completion: January 1993.

The Navy awarded General Dynamics, Air Defense Systems Division, a \$42 million firm, fixed-price contract for 142 Standard missile II, Block III all-up rounds. Expected completion: December 1993.

The Air Force awarded McDonnell Douglas Corp. a \$57 million face-value increase to a fixed-price incentive fee contract for additional funds for Lot IV FY 1992 advanced buy and long lead items for four C-17 aircraft. Expected completion: August 1994.

The Air Force awarded Raytheon Co. an \$8.4 million face-value increase to a fixed-price incentive firm contract for AIM-120 Advanced Medium-Range Air-to-Air Missile producibility enhancement program

learn-to-build Block II projects. Expected completion: March 1993.

#### Obituary

Prolific aircraft designer Edward H. Heinemann died November 26 of kidney failure at his Rancho Santa Fe, Calif., home. He was eighty-three. Mr. Heinemann designed such famous aircraft as the A-4 Skyhawk, the Dauntless dive bomber, and the A-3D Skywarrior. He is often credited with leading designers into the jet age with his attack aircraft designs. In a biography of the designer, retired Adm. Thomas H. Moorer, former Chairman of the Joint Chiefs of Staff, referred to Mr. Heinemann as "Mr. Attack Aviation." In 1953, President Dwight Eisenhower presented Mr. Heinemann and James H. Kindelberger with the Collier Trophy for developing the nation's first supersonic fighter. In 1983, he was awarded the National Medal of Science by President Ronald Reagan. Mr. Heinemann is survived by his wife Zell, daughter Joan, stepdaughter Victoria Wall, and five grandchildren.

#### Senior Staff Changes

**RETIREMENT:** B/G Frank K. Martin.

**PROMOTION:** To be ANG Brigadier General: Donald E. McAuliffe.

**CHANGES:** M/G John L. Borling, from Dir., Operational Requirements, DCS/P&O, Hq. USAF, Washington, D. C., to DCS/Air, AFNORTH, SHAPE, Kolsaas, Norway, replacing M/G Ronald C. Spivey . . . B/G George K. Muellner, from Ass't DCS/Requirements, Hq. TAC, Langley AFB, Va., to DCS/Requirements, Hq. TAC, Langley AFB, Va., replacing B/G Richard B. Myers . . . B/G Richard B. Myers, from DCS/Requirements, Hq. TAC, Langley AFB, Va., to Dir., Tactical Prgrms., Ass't Sec'y of the Air Force for Acquisition, OSAF, Washington, D. C., replacing M/G Joseph W. Ralston . . . M/G Joseph W. Ralston, from Dir., Tactical Prgrms., Ass't Sec'y of the Air Force for Acquisition, OSAF, Washington, D. C., to Dir., Operational Requirements, DCS/P&O, Hq. USAF, Washington, D. C., replacing M/G John L. Borling . . . M/G Ronald C. Spivey, from DCS/Air, AFNORTH, SHAPE, Kolsaas, Norway, to Special Ass't to Cmdr., Hq. TAC, Langley AFB, Va.

**SENIOR EXECUTIVE SERVICE (SES) CHANGE:** John M. Ledden, from Ass't DCS/Air Transportation, Hq. MAC, Scott AFB, Ill., to Ass't DCS/P&P, Hq. MAC, Scott AFB, Ill. ■



## MISSION ACCOMPLISHED.

Robertson Aviation's combat-proven **GUARDIAN**® range extension fuel systems helped the U.S. Air Force meet their goal to increase Pave Hawk flight time.

CLEAN INSTALLATION, 2X FLIGHT TIME. Two **GUARDIAN**® auxiliary fuel tanks double the Pave Hawk's range. The system fits compactly against the cabin's rear bulkhead, taking up minimum space and allows complete access to the cargo hook. After initial installation, tanks can be removed or reinstalled in 5 minutes or less *without tools*.

CRASHWORTHY AND RELIABLE. The **GUARDIAN**®, the most dependable auxiliary fuel system available, exceeds stringent

U.S. military crashworthy and functional requirements.

SELF-SEALING BLADDER. The **GUARDIAN**® has passed .50 cal., 14.5mm and 20mm gunfire tests, and has been drop tested from 65 ft. — *without leakage*.

GO THE EXTRA DISTANCE.

Find out how to maximize your mission capabilities. Call (602) 967-5185 now. FAX (602) 968-3019 anytime. Or write P.O. Box 968, Tempe, AZ 85280.



**ROBERTSON**  
AVIATION  
Range Extension Fuel Systems



**Air Force leaders plan for less of almost everything—except space operations, which are expanding.**

# The Force Forms Up

By Robert S. Dudney, Executive Editor

**T**HE smaller, leaner, more agile Air Force of the 1990s is forming up, but it faces difficulty. It will preserve core capabilities—high-quality people, superior technology, and realistic training—but it will be hard to sustain this small force, given Washington's budget-cutting fever.

Space is a "growth business" for the Air Force. The space segment of USAF will expand, even as the service shrinks.

Such was the basic message delivered by the Air Force's senior uniformed and civilian leaders at AFA's national symposium "The US Air Force: Today and Tomorrow," held late last year in Los Angeles. These officials pointed with pride to USAF's success in adapting to radically changed security and budget situations but with concern to dangers that threaten Air Force plans.

The immediate worry concerned the B-2 Stealth bomber program. It has been placed in jeopardy just as USAF has begun to count on it as a linchpin of conventional and nuclear power. More broadly, Air Force leaders expressed apprehen-

sion about budget cuts and the prospect of more in 1992.

Addressing the issue head-on were Gen. Merrill A. McPeak, USAF's Chief of Staff, and the Secretary of the Air Force, Donald B. Rice. "Our budget is headed south," said General McPeak. "Our budget this year, in real terms, is about the same size it was in 1981, ten years ago, near the beginning of the Reagan buildup. And our projections show nothing but continued decline."

Under current plans, reported Secretary Rice, the Air Force "is looking at purchasing power in the 1995 budget that is some forty percent below the peak in 1985. In fact, in our procurement accounts, we'll have only about half the purchasing power that we had at the peak of the Reagan buildup in 1985."

Even as the two USAF leaders fretted, however, they left no doubt that they are determined to do whatever they must to keep the Air Force viable. The sentiment was echoed by Gen. John M. Loh of Tactical Air Command, Gen. H. T. Johnson of Military Airlift Command, Gen. Jimmie V. Adams of Pacific Air



250

200

150

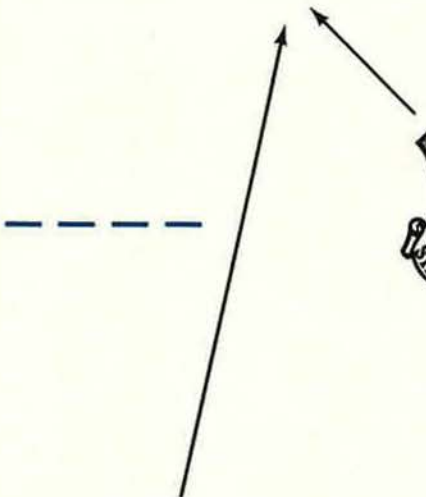
0

1994

1996

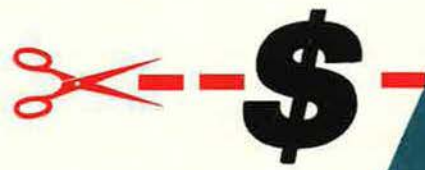
1998

2000



\$

6-16-00 07





Forces, and Lt. Gen. Robert D. Beckel of Strategic Air Command's 15th Air Force.

General McPeak, the initiator of much of the change now sweeping the Air Force, reaffirmed plans for streamlining and reorganizing USAF [see "The 'Back To Basics' Plan," November 1991, p. 82].

### Fitting the "Base Force"

Most important, the General put into perspective the Air Force's place in overall US defense strategy, noting that the service, far from planning to go it alone, is expected to play a primary role within the new "base force" concept of US power.

The base force, the idea of Gen. Colin L. Powell, Chairman of the Joint Chiefs of Staff, represents the minimum multiservice force needed for President Bush's national security strategy.

General McPeak maintained that "the Air Force will play a key role in the base force," adding that "the whole concept, in fact, leverages decisive airpower capabilities." He explained that the Air Force's powers provide a close matchup with the needs of the base force's four conceptual "baskets" of power:

- *The Strategic Force.* Nuclear deterrence, maintained General McPeak, will continue to be Job One for the military as a whole and the Air Force in particular. To manage the deterrent mission of Air Force and Navy systems alike, Washington has formed the new unified US Strategic Command, to be activated on June 1 and headquartered at Offutt AFB, Neb.

The Air Force will continue to play the pivotal role in deterrence, contributing to STRATCOM an alert force of Minuteman III and Peacekeeper ICBMs and a reserve force of B-52, B-1, and B-2 bombers, which could go back on alert.

These units will be managed by USAF's prospective new Air Combat Command and will be placed under the operational control of STRATCOM as the world security situation dictates, much the same way as TAC provides alert-force interceptors to North American Aerospace Defense Command. Strategic Air Command, General McPeak said, "will roll up its flag after years of distinguished service"

and after having, in effect, won the cold war.

- *The Atlantic Force.* This US force must not only support the NATO commitment but also deal with contingencies further east, in the Persian Gulf and southwest Asia. General McPeak said he expects US Air Forces in Europe (USAFE) to shrink to three or four wings, down from seven wings kept in Europe in recent years.

### **The Air Force is consolidating activities, disestablishing layers of command, decentralizing power, cutting headquarters staff, and merging commands.**

However, he pointed out, USAF's contribution to the Atlantic Force will include US-based tactical units, configured for rapid movement overseas.

The Chief of Staff said the Atlantic Force will be certain to have the Air Force's most advanced systems. "In this region," said General McPeak, "we are likely to run into high-tech opposition, as we did recently in Desert Storm. So this Atlantic Force is our baseline for cutting-edge requirements, like the F-22 [fighter] and the C-17 [transport]."

- *The Pacific Force.* Forces here will cover not only the vast Pacific but also southeast Asia and the Indian Ocean. General McPeak said that, "from the Air Force viewpoint, this is an economy of force theater because the Pacific Force will be predominantly maritime," meaning it will be drawn principally from the Navy and Marine Corps.

Even so, the Air Force will maintain a surprisingly robust presence. General McPeak projects that the Air Force will keep "one or two

wings" of fighters each in South Korea, Japan, and Alaska. With USAF's presence in Europe shrinking rapidly, "PACAF eventually may be as large as, maybe even a little larger than, USAFE," he reported.

- *The Contingency Force.* This force, General McPeak said, will be used to react to "the unexpected and the uncertain." It will "place a premium on speed, mobility, and lethality."

General McPeak sees the B-2 bomber as the ideal weapon to use in such situations. Moreover, he noted that the Air Force already is forming an "intervention" wing of fighters, attack aircraft, bombers, reconnaissance planes, and tankers at Mountain Home AFB, Idaho.

"The Mountain Home intervention wing fits perfectly with this concept," General McPeak said. Such composite wings, said the General, "will be major players because they emphasize quick, hard-punching power." They will not need much warning and will incorporate their own flight line maintenance personnel.

For the Contingency Force mission, the Air Force will keep seven fighter wings available. Special operations units also come under the Contingency Force.

In contributing to the various elements of the new US base force, said General McPeak, Air Force power will be enhanced by its ongoing reorganization. "Make no mistake," said the Chief of Staff. "These are the most significant organizational changes made since we became a separate service in 1947."

The Air Force is consolidating activities, disestablishing layers of command, decentralizing power, cutting headquarters staff, and merging commands, all of which, said General McPeak, aim to create "a more streamlined, more agile outfit."

In September, General McPeak and Secretary Rice announced the disestablishment, merger, and reconstitution of Strategic Air Command, Tactical Air Command, and Military Airlift Command into two new units—Air Combat Command and Air Mobility Command. The Chief said this eliminates "the artificial distinction" between tactical and strategic airpower and allows



the Air Force to be ready to use integrated airpower in war.

Air Combat Command will control all ICBM forces, bombers, US-based tactical fighter forces, and battle management aircraft. How will Air Combat Command fit into the larger US posture?

"In some contingencies, such as Desert Storm, we can expect to be the mainstay," said General McPeak. "In other cases, we will play a supporting role." When it comes to strategic nuclear deterrence, says the General, "our nuclear forces will continue to provide the most reliable leg of the triad—ICBMs—and the most flexible leg—manned bombers."

By putting all of its US-based bombers and fighters under Air Combat Command, he added, the Air Force accelerates reaction times and makes it easier to integrate large air packages.

#### **Model for PACAF, USAFE**

The impact of Air Combat Command will be felt in another way. According to General McPeak, it is to serve as the model for reorganization of the major overseas commands, PACAF and USAFE. Both will continue to exist, and both will formally take command of all Air Force aircraft and systems stationed in their respective theaters, whether they are fighters, airlifters, or support aircraft.

At base level, the Air Force is moving rapidly to formally tie together existing composite operations by putting them into single wings, the Chief remarked. That has happened at three sites: Andrews AFB, Md., Seymour Johnson AFB, N. C., and Kadena AB, Okinawa, Japan.

"It's working beautifully," said General McPeak.

In the United States, he added, USAF will create, "from the ground up," two new composite wings, the one at Mountain Home and another at Pope AFB, N. C., teamed with the 82d Airborne Division.

In addition, General McPeak said he was "very close" to approving a third composite wing. The new wing, to be located at Moody AFB, Ga., would include F-16s.

In response to a question from the audience, General McPeak argued that not every wing has to be a com-

posite type, especially if it is in the continental US, and said that he has every intention to continue operating a large number of "monolithic" wings, those containing only one type of aircraft.

For example, he said, "it is quite economical to have an operation like the 388th Wing at Hill [AFB, Utah], which is an F-16 wing. It happens to be sitting at Ogden, at the F-16 depot, so it's very easy to support it. Those squadrons can go anywhere in the world and fall in on an existing composite operation."

Air Force officials envision an equally critical role for Air Mobility Command, which is to have control of US airlift and, in a major shift, most aerial refueling tankers, which have been controlled by SAC. Air Mobility Command provides a single manager to deal not just with airlift but also with the broader problem of mobility.

#### **Air Mobility Command will control US airlift and, in a major shift, most aerial refueling tankers, which have been controlled by Strategic Air Command.**

USAF's space operation, perhaps the only area immune to consolidation and downsizing, will continue to function under the day-to-day control of a separate entity, Air Force Space Command.

"I call Desert Storm the first space war," said General McPeak. "We can't think about Desert Storm without thinking about the variety of space assets that were brought to bear on the problem." These included reconnaissance, communications, missile warning, navigation, and other types of satellites.

Partly as a result of the Persian

Gulf War, which showed how well space systems can support combat commanders, Air Force Space Command will double in size to 30,000 persons. The number of space wings will expand from three to five. The two new wings will take shape at Patrick AFB, Fla., and Vandenberg AFB, Calif.

#### **"A Growth Business"**

Air Force Space Command, formerly a three-star billet, will be turned over to Gen. Donald J. Kutyna, a four-star officer who now heads US Space Command. General McPeak pointed out that the Air Force will increase its complement of generals in Air Force Space Command, even as the absolute number of general officers declines.

"Space is a growth business as far as the Air Force is concerned," General McPeak reported, "and it will grow even during this time of decline in many other dimensions of our activity."

If anything, Secretary Rice sounded even more bullish about the Air Force's space operations. He noted that "several dozen" US satellites played vital roles in the Gulf War. At the height of the hostilities, the Secretary said, eighty-five percent of US communications traveled through military satellites.

Secretary Rice said that a DSCS satellite was moved from over the Pacific Ocean to over the Indian Ocean to provide better coverage, the first time this had happened in combat. Weather satellites were vital.

The Secretary paid special tribute to the sixteen Global Positioning System (GPS) navigation satellites, which operated on a twenty-four-hour-a-day basis. With GPS, one was guaranteed to find his position within sixteen meters, and often within ten.

When the war began, US forces had only several hundred GPS receivers in theater, but heavy demand resulted in distribution of more than 4,000 to the troops by the end of the war. Some troops wrote to manufacturers, ready to pay with their credit cards.

Secretary Rice averred that the Air Force could do still more in space, and he challenged contractors to help. "We can improve the ability to destroy enemy missiles on the ground or intercept



them while they're still over enemy territory," he said. "We could use more effects-oriented, near-real-time bomb-damage assessment."

He said that the Air Force was struggling to find funds for new early warning systems and that the service would be reviewing its options over the next year or so. Space-based wide-area surveillance, said the Secretary, "is more likely to stay in a technology-advancement category for a while to come," at least until a bit more money becomes available.

The Secretary identified areas of special interest to the Air Force in years ahead. "The threat's not as black and white as when the hammer and sickle flew on the far side of the Fulda Gap," he said. "The nation now needs core capabilities, and will continue to need core capabilities," to counter aggressors.

He cited seven: the ability to maintain global situational awareness, to paralyze an enemy's fighting power, to defend against ballistic missile attack, to keep access to air and sea-lanes and space, to forward-deploy forces, to assist in relief and law enforcement, and to preserve a defense industrial base.

Virtually every commander at the symposium underscored the importance of high technology to the emerging Air Force of the 1990s, but none more so than General Loh, commander of TAC.

For the Gulf War, said General Loh, "technology gave us advantages like stealth, precision weapons, global situational awareness—primarily from space-based systems—and the ability to operate around-the-clock. It was the first war where we could be effective at night. We leveraged these advantages into one of the most impressive military victories of all time."

As General Loh sees it, the need to reduce the size of the Air Force shouldn't shake the service from its present course.

#### **"No Cause for Panic"**

"We must change," he said. "That's no cause for panic. Tomorrow's Air Force will be smaller. We'll have one-third fewer fighters and forty percent fewer bombers and about half of the ICBM force that we had just a year ago. That

doesn't mean we won't be effective against the threat that we face."

He said that USAF can sustain its combat punch with new systems and a new organization and by continuing to attract and retain "the finest men and women ever to wear this nation's uniform."

General Loh predicted that, "despite our austere budgets," the Air Force "will not abandon the advantages that technology gives us. We will not allow our present systems to stagnate."

Of greatest importance, said he, is that the Air Force be permitted to proceed with the F-22 air-superiority fighter. "We can't depend on the F-15 to shoulder that mission for the next twenty to thirty years," said General Loh. "We need the F-22."

Though he acknowledged that "it may not be popular" today to plan for the possibility of nuclear war, the TAC Commander warned that

**"The Air Force that faced the Iraqis in the Gulf is not the Air Force that will defend America's interests in the future. . . . We may be victims of our own success."**

that danger "still exists for the foreseeable future" and that the Air Force must modernize its bombers. "The B-1 has taken on a high proportion of that responsibility and is a magnificent airplane," said the General, "but we still need the B-2."

General Loh said the "rapid air intervention wing" at Mountain Home will be a "relatively autonomous strike force" that contains F-16s, F-15Cs, F-15Es, E-3s, B-52s, and KC-135s.

"It has all the assets to wage a small-scale air campaign and command and control it . . . over a rela-

tively long period of time," he added. "When theater commanders . . . call for an immediate application of airpower, this wing will be ready to fight on arrival—fight on arrival—with multimission assets."

The composite wing at Pope AFB will strengthen ties to the Army. Though it will train with the 82d Airborne Division, the wing will be prepared to support any ground operation.

"The Air Force that faced the Iraqis in the Gulf is not the Air Force that will defend America's interests in the future," said General Loh. "We know now that we may be victims of our own success. The American people are going to expect us to win the next war 100 to one, not 100 to ninety-nine in double overtime. And we don't intend to let them down."

General Adams, the commander in chief of PACAF, also took note of dramatic change occurring in the Pacific region, which he called "a beehive of political, economic, and military activity," with potential hot spots in Korea, the Philippines, the India-Pakistan border, and other areas.

One thing that had not changed very much, said General Adams, was the size of the residual military presence of the now-defunct USSR, which he said is still potentially the greatest military threat in the Pacific. The upshot, said the General, is that "we've traded in a fairly static . . . global threat for a much more unpredictable array of regional ones."

#### **Escaping the Knife—So Far**

The Pacific Air Forces have emerged relatively intact—so far—in the Air Force drawdown. General Adams noted that, though the overall USAF fighter force structure will be cut by thirty percent, sixty percent of this cut will come out of USAFE units. In PACAF, the cut is "only around fifteen percent, or about half a wing," he said.

The General noted that, in most cases, turbulence has not affected PACAF forces. The big exception is the dramatic change affecting 13th Air Force, formerly headquartered at Clark AB in the Philippines [see "Last Days at Clark," p. 56]. "The eruption of Mount Pinatubo last June covered Clark with more than



eight million cubic yards of ash," the General noted. "From all indications, the mountain isn't quiet. . . . Volcanologists tell us it could be active six more years." He observed that these factors and the high cost of cleaning up Clark made the Air Force's decision to close the base "a very easy one."

F-4 fighters from the 3d Tactical Fighter Wing, which now has F-15Es, were moved out before the eruption and relocated to Alaska.

Guam is the new headquarters for 13th Air Force. Other bases throughout the Pacific have been pressed into service to provide alternative warehouse space and munitions storage. The 353d Special Operations Wing was temporarily bedded down in Okinawa, pending a decision on a final location.

PACAF is going to new wing structures in a big way. At Kadena, said General Adams, "we've combined all those forces that were there under the one base, one wing, one boss concept so that there is a single wing—the 18th Wing—that combines three squadrons of F-15s, a tanker squadron, and an AWACS unit." The wing has 8,500 people, headed by a brigadier general. Four of the six PACAF wings have now reorganized into the new wing structure. The final two—those located in South Korea—were to make the changeover soon.

General Johnson, who serves not only as MAC commander in chief but also as commander in chief of the unified US Transportation Command, told the audience that Air Mobility Command will be headquartered at Scott AFB, Ill., along with a tanker and airlift control center.

The command will consist of three numbered air forces: 21st Air Force at McGuire AFB, N. J.; 22d Air Force at Travis AFB, Calif.; and 15th Air Force at March AFB, Calif. Support, aeromedical evacuation, and rescue planes will also be assigned.

The majority of USAF's tanker and airlift assets will be merged. Air Mobility Command will have all C-5 and C-141 assets, including in-theater maintenance, aerial port, and command-and-control assets. Approximately two-thirds of the KC-10 assets, the majority of the KC-135 assets, and about half of the

C-130 assets will be assigned to Air Mobility Command. The relatively small remainder of the KC-10, KC-135, and C-130 assets will go to Air Combat Command or theater commands.

The Air Force plans to activate Air Mobility Command in the summer of 1992. General Johnson said the major challenge will be to establish command and control. Airlift

**"Why disestablish Strategic Air Command?  
. . . What forces could possibly compel this kind of step? What was broken so badly that it needed this kind of fixing?"**

divisions have been eliminated, and numbered air forces have shrunk significantly. The command-and-control structure will run from the command center at Scott directly to the wings.

**The Big Question**

SAC's General Beckel, noting that he was "representing" the SAC commander in chief, Gen. George L. Butler, came prepared to provide, on General Butler's behalf, the answer to a single question.

The question, said General Beckel, was this: "Why disestablish Strategic Air Command? This remarkable outfit, created by Gen. Curtis LeMay, has been in existence longer than the Air Force itself. What forces could possibly compel this kind of step? In short, what was broken so badly that it needed this kind of fixing?"

When General Beckel spoke, SAC forces were set to disappear into Air Combat Command and Air Mobility Command, and SAC's basic planning function was to be taken over by STRATCOM at Offutt AFB.

"General Butler's answer is very clear," said General Beckel. "SAC wasn't broken. To the contrary, it did its job so well for over forty years that it helped create an entirely new world order."

General Beckel reported that the transformation of SAC came about as a result of radical changes in the Soviet nuclear threat, the Persian Gulf War's exposure of certain weaknesses in the SAC structure, the need to reorganize for conventional as well as nuclear missions, the disappearance of differences between strategic and tactical missions, the shrinking defense budget, and the rise of a new ecumenism among US service leaders. These factors all argued for eliminating a separate Air Force strategic command and dispersing its assets and functions.

When General Butler assumed command of SAC on January 25, 1991, the US already had decided to retire the Minuteman II missiles, more than 100 B-52G bombers, and seventy-five KC-135A tankers and to close six SAC bases. "Based on just these reductions, by mid-1996 Strategic Air Command will be smaller than any of its component parts in 1961," says General Beckel.

That year, SAC had sixty-eight bases and thousands of airplanes. In 1996, even without further reductions, SAC would have had only sixteen bases, 550 missiles, and fewer than 1,000 aircraft.

Withal, the disappearance of SAC remains a tender spot. Addressing the hypothetical question, "What would Curt LeMay have to say?," Secretary Rice quoted retired Gen. Russ Dougherty, whom he described as "one of the few . . . who could answer that question credibly." General Dougherty's words: "He'd say, 'What took you so long?'"

Still, Secretary Rice conceded that there was "a destabilizing aspect," not just of SAC's demise, but in the rapid overall change sweeping the Air Force. "As we start down this road, the Chief and I realize that interrupting established ways of doing business can be unsettling to the troops," said the Secretary. "The Chief and I hope our people realize we're not tearing down our heritage or traditions. We're building on them." ■



**The successor to the F-16 may be a derivative instead of a brand-new airplane.**

# The Swing-Role Fighter Search Begins

By Frank Olverl, Associate Editor

**T**HE Air Force would like to have a new-design Multirole Fighter, a so-called "clean sheet" aircraft, to replace the aging F-16. Industry would like to provide it. But can industry provide a clean-sheet MRF that meets the threats of the twenty-first century for a mere \$25 million per copy, USAF's self-imposed cost target?

Not likely, according to senior USAF and aerospace industry officials, though still not totally out of the question. Maj. Gen. Joseph Ralston maintained not long ago that the Air Force plans to consider all swing-role aircraft options ranging from Block 60 F-16 fighters up to and including a new-design fighter.

When General Ralston made that statement, he was the director of tactical acquisition and thus in the thick of MRF matters. The General recently moved up to become the Director of Operational Requirements and will continue to oversee the MRF program through Milestone 0.

"We have to keep our options open," General Ralston told AIR FORCE Magazine. "I think it would be premature to say that it [the

MRF] will in fact be a derivative. Certainly, a derivative is a prime contender." However, he added, if industry showed that it could "build a new airplane that would be cost-competitive with the derivative, then you would have to look at that."

Don't bet on it, though. Most fighters now cost far more than the \$25 million that the Air Force has targeted for the MRF. Each copy of the new F-22 Advanced Tactical Fighter is expected to cost \$59.4 million (in Fiscal 1991 dollars). Each F-15E costs \$34.4 million (in Fiscal 1990 dollars).

These aircraft are more sophisticated than the MRF is expected to be, but the Air Force warns that any new-design aircraft will cost eighty percent more, at a minimum, than its predecessor.

Block 50 F-16s will cost \$21.3 million apiece in Fiscal 1992 dollars, largely because the Air Force funded a huge production run of more than 2,000 aircraft and foreign nations have flocked to buy it, creating economies of scale. However, the cost has grown for F-16s because of recent negative economies of scale as a

*The Air Force may find that, in its search for a new Multirole Fighter, it need look no further than an upgraded F-16 to replace aircraft like this F-16C from the 944th Tactical Fighter Group (AFRES), Luke AFB, Ariz.*







result of congressional reductions in multiyear procurements.

The Air Force says that it will be looking to buy about 2,000 MRFs to replace its F-16s on a one-for-one basis, but even such a large order might not result in a low-cost airplane.

### The Smart Play?

For that reason and others, many think that the smart play for the Air Force will be to go for a derivative or upgrade of the F-16 as its MRF. General Dynamics, the F-16 prime contractor, has the inside track on the MRF, having facilities already in place for indefinite manufacture of the F-16 and its successors. However, the Air Force is signaling that it will use competition to drive down the cost of the F-16 derivative.

"It's going to be very difficult to have a brand-new airplane," acknowledges one Air Force insider, "but [we're] also not interested in giving General Dynamics a free ride and paying more for a derivative or a modest improvement than what the taxpayers need to pay."

Cost is one of the few aspects of the MRF that the service has been able to pin down. The rest of the program is still unclear. General Ralston says it is too early in the program for the Air Force to start buttoning down details, but it is also true that the Air Force has not yet figured out exactly what it wants the MRF to be and to do.

One case in point is the matter of stealthiness. How much stealth does the MRF need to survive over the battlefields of the twenty-first century? No one knows.

"We haven't made the decision yet on how much stealth is enough," reported General Ralston. "Our thinking right now is that the first characteristic of the MRF is that it has to meet the threat, do the job it's required to do. The second characteristic is that it has to be affordable. Sometimes you have to work those in conjunction with one another. We envision that the MRF will be used in the same way as the F-16, but the exact trades on how much stealth is enough vs. the cost that you pay for that . . . have yet to be done."

The Air Force says it will study use of an internal weapons carriage system or conformal carriage for a new MRF, the better to reduce the

plane's radar cross section. While internal carriage offers benefits in terms of stealth, it is unlikely to gain final acceptance. Internal carriage for the MRF would require an increase in size—enough to carry a major load of ordnance inside its fuselage. General Ralston points out, however, that more size and weight translate directly into higher cost. He contends that a large, heavy MRF likely would exceed the \$25-million-per-plane cost target.

As an alternative, the Air Force is studying the feasibility of reducing the radar signature of the F-16 by giving it a new set of wings.

As it sorts through the welter of cost and technology issues, the Air Force will keep the experience of the Persian Gulf War uppermost in its mind. With a mix of old and new platforms, each complementing and reinforcing the power of the others, the Air Force showed that a few highly specialized aircraft were able to open the door for swarms of older, less stealthy aircraft. Stealthy F-117s and radar-busting F-4G Wild Weasels armed with high-speed antiradiation missiles smashed enemy defenses in ways that permitted F-15s, F-111s, F-16s, A-10s, and other aircraft to operate in a less threatening environment.

### Balanced Observables

In planning for the MRF, the Air Force has embraced similar operational concepts. "One of the things that you may be forced to do is to go in with another airplane, make it [the MRF] a less stealthy airplane, but go in with F-117s, A-Xs, F-22s to get air superiority and suppress the defenses," General Ralston said. "Then that allows you to come in with a less stealthy airplane. The MRF can do its job."

The MRF buzzword will be "balanced observables," a term that has two distinct meanings. The first is that no one facet of the aircraft's signature—radar, visual, infrared, or acoustic—should be more detectable than all the others. The second meaning calls for the airplane to strike a balance between the push for signature reduction and the need to hold down cost. When it comes to the MRF, both meanings apply.

Two aircraft proposals likely to fall in the middle of the range of MRF candidates are General Dy-

namics' Falcon 21++ (an F-16 derivative) and the McDonnell Douglas Hornet 2000 (an F/A-18 derivative), both of which had been seen as alternatives to the F-22 air-superiority fighter in years gone by. Both proposals incorporate significant low-observable factors into the original airframes. However, the cost of constructing these upgraded aircraft would approach that of the F-22, which could quickly negate their appeal.

The MRF cost "needs to be around \$25 million," said General Ralston. "So a \$40 million airplane, in my view, is a nonstarter."

The MRF will have to be useful in roles as dissimilar as air-to-air combat, offensive counterair operations, long-range interdiction, battlefield air interdiction, and close air support. The F-16 carries out this daunting array of missions like no other fighter in the world, though it is not as capable in any single area as aircraft optimized for the particular mission.

The Air Force will ask the MRF to handle the same broad mission. "MRF will be a good airplane, but not at the extreme," one Air Force official says. "You need a few airplanes—very, very good airplanes like the F-22—to do air superiority. You need a very good . . . deep interdictor, but the vast majority of the force structure, sixty-six percent of our force structure, is [based on] the Multirole Fighter, which can be a less capable airplane."

"I can say that without saying anything bad about the F-16. It's a very good airplane, but it has never been as capable in the interdiction role as the F-111. It can't go as far. It has never been as capable in the air-to-air role as the F-15. It does not have as good a radar, doesn't have all the radar missiles."

Though the F-16 is not exactly an old aircraft, in ten years the Air Force will have to begin taking the older models out of service, and those aircraft must be replaced. On average, it takes fifteen years from development to production for new fighters.

### Three Critical Factors

The Air Force recently completed its preliminary MRF Mission Needs Statement, crafted by Tactical Air Command on behalf of all

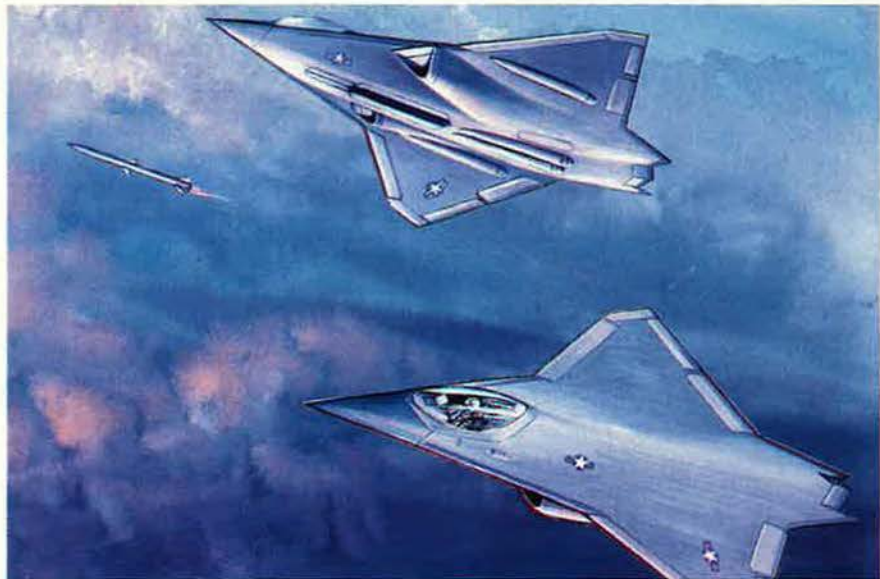


using commands. The formal statement is due in the spring. The Mission Needs Statement looks at three critical factors: the threat the service will have to meet in the future, the commitments the Air Force must keep around the world, and the advancing age of the existing F-16 fleet.

The document cites a need for the MRF stemming from the threat that could be posed by potential adversaries who may well receive front-line Soviet fighter technology. The Mission Needs Statement suggests that, because the Commonwealth of Independent States (formerly part of the Soviet Union) is desperate for hard currency, it is likely to sell its top equipment to any customer, including Third World nations hostile to the US. Such equipment would include MiG-29 and Su-27 fighters.

In the bureaucratic progression of the MRF program, the next step is for the Joint Requirements Oversight Council and a Defense Acquisition Board review to approve the Mission Needs Statement. This will move the MRF concept to Milestone 0, where it can be funded as concept exploration. Milestone 1, to begin in 1994-95, will define MRF as a program. General Ralston said those reviews are likely to take place in the late spring or early summer of 1992.

The Air Force says it has ear-



*Despite tight cost goals, several contractors are studying new-design MRF aircraft. This conceptual drawing provided by Rockwell shows a tailless, single-engine aircraft with two inlets, internal and external weapons carriage, and, possibly, a gun position. The four external weapons points look to be of conformal design. The Air Force will consider new designs if they can meet cost targets.*

marked sufficient funding to get the program rolling. For example, it will initiate the Supportable Technology for Affordable Fighter Structures (STAFS) program, which is expected to produce technologies that can be inserted in future aircraft. That program's funding, only \$140,000 this year, will rise to \$1.5 million in Fiscal 1996. In all, the Air Force plans to spend \$5.9 million for an advanced development effort to

look at aircraft structures, airframe design, structural analysis, and structural testing.

The service has set up notional program schedules for the MRF, whether it be a clean-sheet program or an F-16 derivative. For the former, concept definition will formally begin in early 1992. The Air Force will determine later whether such a new-design aircraft is feasible. If the service decides to pursue the new aircraft, it will begin the demonstration/validation phase late in 1995. Engineering and manufacturing development (EMD) would begin in 1999 and production in 2003.

At present, plans call for the first production aircraft to emerge in mid-2005. This timetable, General Ralston concedes, is optimistic, and a new aircraft might not come out of production until 2009.

By contrast, the service could begin EMD for an F-16 derivative in early 1997 and start production in early 2000. The plane would achieve initial operational capability in 2004. EMD for a Block 60 F-16 could begin three to four years sooner than the derivative.

The major issue, says General Ralston, is timing, particularly as it relates to the age of the F-16. "You don't need an MRF prior to ten years [from today], but about that time you'd have to have something



*McDonnell Douglas will compete for the MRF contract, possibly with a derivative of its F/A-18, such as the F/A-18E/F "stretch" model (pictured here) or a Hornet 2000, which is said to incorporate significant stealth characteristics. The E/F variant is being developed for the Navy and increases strike potential and range of the aircraft. Significant cost savings could be achieved through economies of scale.*



because your F-16s start to age out of the force," General Ralston said.

Furthermore, the Air Force must phase the F-22, B-2, and C-17 production programs so that enough funding will be available in the long term for the MRF.

### **Congressional Concern**

Congress is expressing concern about the Air Force's plan to end F-16 production after the Fiscal 1993 buy. The Air Force sought approval to buy forty-eight F-16s in Fiscal 1992 and twenty-four in 1993. At that point, says the service, it will have all the F-16s it needs for a new, smaller force structure. Congress recently approved funds for forty-eight F-16s in Fiscal 1992, long-lead procurement funding for twenty-four aircraft in 1993, and more funds beyond the President's request, a move aimed at keeping the General Dynamics production line open in anticipation of future needs.

The service says that, even had production been halted after Fiscal 1992, General Dynamics would still be building F-16s for a couple of years. In addition, the Air Force is counting on foreign military sales to keep the line open beyond the end of Air Force production. General Ralston admits that the service is dealing with many unknowns, however.

On Capitol Hill, defense-minded members of Congress and aides are following the MRF issue with considerable interest. Some Capitol Hill staffers say that the Air Force, if it goes with a new-design airplane, will be forced to trade off force structure, operational readiness, or both. Most believe that, of the two, the Air Force would choose to sacrifice more of its force structure.

"You'll have to trade off force structure for modernization," says one congressional staff member, "just like they are doing with the Advanced Tactical Fighter."

Obviously, the Air Force could readily and quickly work a Block 60 F-16 into the force. The move would require GD to make only minor changes in the production process. In fact, General Ralston says, a modestly modified F-16 would come into the force around 2000.

"That's one of those factors that goes in there along with cost, capa-

bility, and schedule," General Ralston said. "The Block 60 F-16 may not do anything that the current F-16 cannot do. . . . You say, 'Well, why would you want to do that?' Well, I want to do it because my current F-16s are getting old. They're out of flying time. So there's nothing wrong, if in fact it'll meet the threat, with doing that."

Aeronautical Systems Division Commander Lt. Gen. Thomas R. Ferguson, Jr., has briefed representatives from Boeing, General Dynamics, Lockheed, LTV, Grumman, McDonnell Douglas, Northrop, and Rockwell on a request for information. The Air Force asked industry to participate in planning to analyze potential replacements for the F-16. A draft request for proposal (RFP) will be released for concept studies around April 1992, and a final RFP in the summer. Milestone 0 approval for concept exploration and definition studies is targeted for June 1992. Contract awards are anticipated in January 1993.

### **Developing Exotic Technologies**

The F-16 derivative may have the inside track, but the Air Force will continue to seek new technologies for the aircraft. A number of Program Research and Development Announcements (PRDAs) seek advanced development proposals for the MRF.

For example, one PRDA seeks development and demonstration of advanced metallic structures for application to an affordable, supportable MRF. The PRDA says, "Projected acquisition and life-cycle costs and weight should be reduced when compared to an existing Multirole Fighter structure, with corresponding improvement in performance."

Furthermore, the Air Force will attempt to install in the swing-role a suite of improved electro-optical sensors, the better to provide terrain awareness to pilots flying at night in poor weather. The service claims that the current combination of night vision goggles and forward-looking infrared sensors does not work in all weather conditions and does not provide adequate awareness over featureless terrain or open water.

The service wants to produce a

system that generates a terrain image from on-board data without having to use sensors. "The objective of this effort," says one Air Force document, "is to produce a real-time terrain image on the pilot's helmet-mounted display from stored digital terrain data."

Contractors will be asked to evaluate leading-edge technologies that enhance pilot effectiveness, survivability, and spatial orientation. The service would also like to incorporate technologies that prevent G-induced loss of consciousness [see "G-Lock and the Fighter Jock," *October 1991*, p. 50]. Some specific technologies that will be sought are Pilot's Associate software, which would include voice control, three-dimensional audio, flat-panel displays, helmet-mounted displays, and pilot state monitoring.

Also in store are technologies for improved crew escape, laser protection for the eye, multiple target attack capability in poor weather on a single pass, and cooperative information sharing with other elements of the tactical force.

The fighter contractor base is eagerly awaiting the start-up of the MRF program. In addition to the McDonnell Douglas Hornet 2000, the General Dynamics Falcon 21++, and a GD new-design aircraft, Northrop likely will propose a derivative of its YF-23 prototype, which lost to the Lockheed YF-22 in the recent ATF competition. Boeing, Grumman, Rockwell, and Lockheed all proposed new aircraft for the MRF.

Both General Electric and Pratt & Whitney, the only US fighter engine builders, are currently testing derivative engines in the 35,000-pound-thrust class. Such an engine may be used on the MRF. However, General Ralston says the program could also make use of the 29,000-pound-thrust Increased Performance Engines.

General Ralston indicates that the MRF will be a single engine fighter and that the engine will have to be a derivative of an existing engine. "We clearly want to emphasize life-cycle costs, and you want to minimize the manpower that you have to have to maintain the system," General Ralston said. "You also want to minimize the logistics support tail that goes with it." ■





## LTV/FMA team has 130-year headstart on JPATS.

In the search for our country's next trainer, LTV evaluated more than two dozen candidates from around the world.

Jets. Turboprops. Different seating and wing configurations. Until we singled out an aircraft that we believe has all the features to provide the best training to generations of future Air Force and Navy pilots: the Pampa 2000.

The Pampa 2000 is a team effort from LTV and Fabrica Militar de Aviones (FMA) of Argentina. LTV has more than 70 years' experience in

aviation, making history with aircraft like the F4U Corsair and the A-7 Corsair II. FMA has been building military aircraft for more than 60 years. Since 1988, the Pampa has proven itself with a flawless record in the Argentine Air Force. Together, LTV and FMA are making the Pampa 2000 a world-class JPATS contender.

Watch for the Pampa trainer as it makes a U.S. flight demonstration tour this year.



Aerospace and Defense

**FMA**

---

L T V : L O O K I N G A H E A D

---



**The former superpower's military forces are demoralized and drifting, but they are well armed, and their loyalties are uncertain.**

# The Sixteenth Republic

By Harriet Fast Scott

**S**OVIET armed forces in the late 1980s and early 1990s were rocked by tremendous shocks: huge force cuts, the sudden collapse of communism, the loss of eastern Europe, and the display of US firepower in the Persian Gulf War.

By the start of 1992, the once-proud force was demoralized, discontented, and drifting, divided along generational and ethnic lines, drowning in recriminations, and fearful of the future.

People's Deputy Victor Minin once described the military establishment as the former USSR's "sixteenth republic," one nobody wanted. It was "hungry and poorly provided for," he said, but well armed, its loyalties unknown.

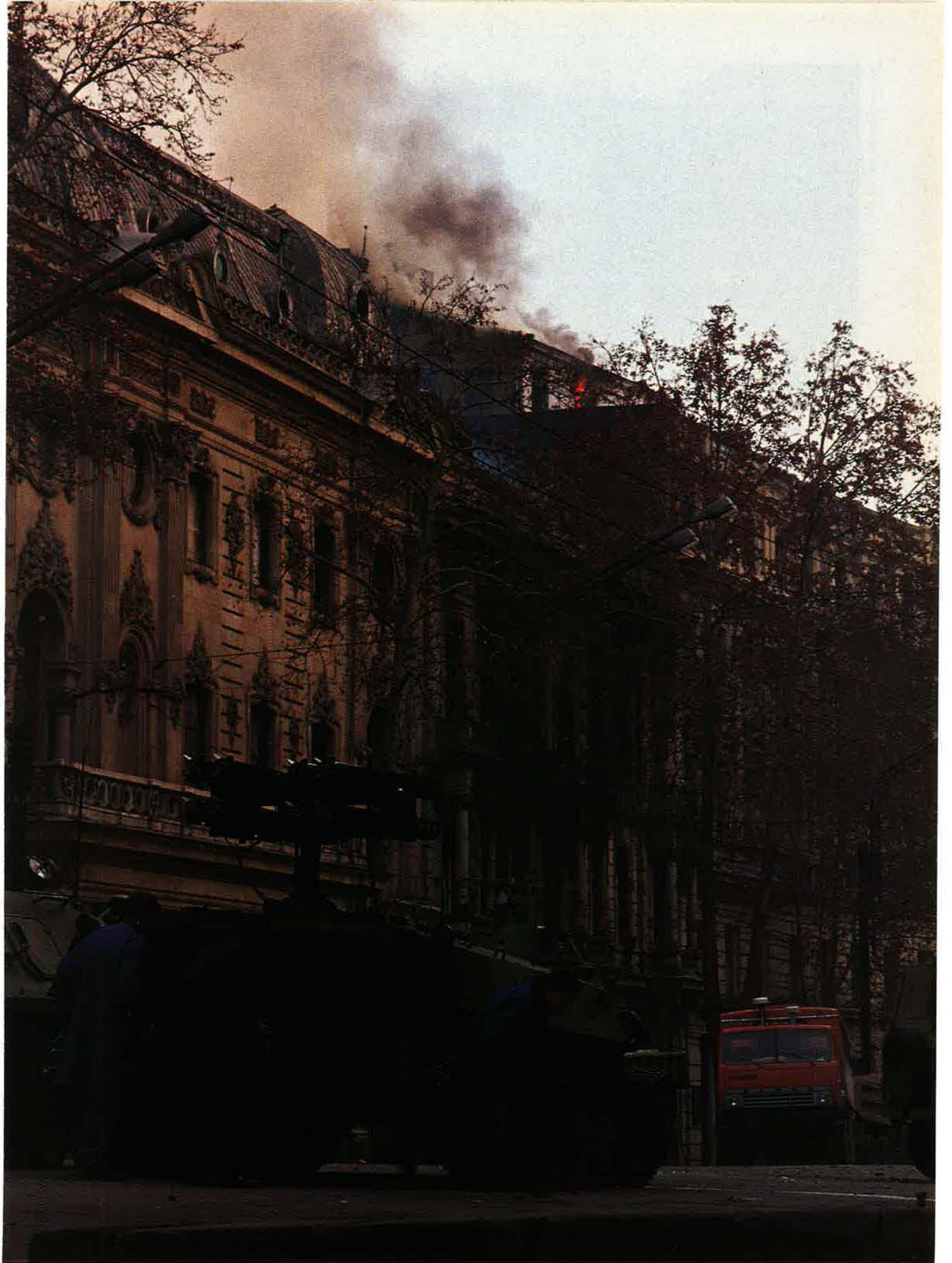
Its recent distress had been intensified by another shock, a backblast from last August's putsch. Minister of Defense Dmitri Yazov, Commander in Chief of Ground Forces Valentin Varennikov, and others fell into disgrace for their complicity in the plot.

The failure of the putsch essentially snuffed out the USSR, which staggered into extinction on December 25. Its armed forces continued



*Although eleven of the former Soviet republics have formed a commonwealth, the disposition of military resources there is almost as uncertain as in the Baltic republics and Georgia. Civil unrest in those states (above and opposite, street fighting and burning buildings in Tbilisi) bodes ill for the cohesion of former Soviet military forces.*









**Shortages of food, fuel, and housing, severe throughout the republics, were exacerbating morale, retention, and recruiting problems in the military even before the breakup of the USSR. Hundreds of thousands of officers and troops returning from eastern Europe have further strained the republics' economies.**

to exist, nuclear weapons and all, operating day by day without any clear-cut chain of command.

On December 21, the leaders of eleven republics of the old fifteen-republic state announced replacement of the Soviet Union with the new "Commonwealth of Independent States." The eleven participants included Russia, Ukraine, Belarus, and Kazakhstan, and excluded only Georgia and the three Baltic nations.

The CIS charter, produced at Alma-Ata, gave Russian president Boris Yeltsin the dominant role in controlling the nuclear weapon arsenal of the dead superpower. CIS leaders confirmed the preeminence of Russia by voting unanimously for it to assume the permanent seat on the UN Security Council previously reserved for the Soviet Union.

The Alma-Ata charter, however, left many loose ends. Among them were how to guard the land frontiers of the CIS and who has the final say in controlling the armed forces. "The Commonwealth is not a state," declared President Yeltsin, underlining the muddled and precarious state of the CIS command arrangements.

Last December, CIA Director Robert Gates outlined the depth of the military's travails. "General-purpose forces are losing cohesion," he observed.

Even so, said Mr. Gates, "it is

important . . . to distinguish between their near-term capabilities and their long-term potential. . . . We must acknowledge the possibility that a new conventional military threat could reemerge in a former Soviet territory, particularly in Russia."

### **Bitterness and Dislocation**

Nothing caused more bitterness and dislocation in the military establishment than the recent force reductions.

Arms-control agreements required the military to eliminate large numbers of weapons, nuclear and conventional. Many experienced officers whose careers were linked to specific weapon systems, such as SS-20 missiles, suddenly found they had bleak futures in the armed forces. For the new jobs, preference was given to retraining younger rather than senior officers. Peace was soaking up much of the military's budget. Treaty-mandated destruction of chemical and nuclear weapons turned out to be so costly that Russia and the other republics had a hard time finding the money to pay for it. Even on-site arms-control inspection teams proved expensive to transport, house, and feed.

Arms control created another, albeit indirect, cost. In 1990, the general staff sought to circumvent certain arms treaty limits by trans-

ferring tens of thousands of tanks, armored personnel carriers, and other weapons east of the Urals. This transfer of heavy equipment damaged the railways and tied up freight for months. It slowed down the harvest and delivery of crops that year and contributed to a decline in production.

Some 77,000 tanks and APCs wound up in Siberia. More than a year later, rail traffic had not returned to normal. Meanwhile, city residents had to stand in line for hours for basic foodstuffs.

Before the August coup, the Ministry of Defense did everything it could to evade a planned two-year, 500,000-man force cut. Officials transferred units to the KGB and MVD. Personnel officers connived to keep brother officers on the rosters long enough to qualify for pensions.

Military training suffered. The quality of new recruits became suspect. "Today's conscript is vicious," said Maj. Yuri Mantulin. Another officer wrote, "When I lead my men on a run, I'm expecting to be shot from behind at any time."

Even personnel in main combat units found that half their time might be spent helping collective farms with planting or harvesting. Soldiers were assigned to meaningless tasks, like painting the grass green for a visiting general.

In a recent opinion poll, soldiers complained that their officers fulfilled only about ten to fifteen percent of their leadership duties.

"The gap of estrangement between the officers and the ranks is widening," wrote Capt. Vladimir Kudelko. "An officer has too many concerns of his own. No one cares that the soldiers' lives are miserable."

He believed the problem was getting worse. "The best of the officers, those who had the soldiers' respect and admiration, opted for retirement from the service," said he. "The soldiers' frustration manifests itself in disobedience, neglect of duty, or even aggression."

The military had long been plagued with *dedovshchina*, older soldiers' hazing of new arrivals. Soldiers were driven to suicide. Brutal murders occurred. Maiming was not uncommon. In recent times, a more alarming problem arose:



*zemlyachestvo*, wherein soldiers from the same region formed gangs to protect themselves from rival gangs in the same unit but from a different region. Weaker soldiers were protected by their *zemlyaks*.

For some soldiers, desertion was the only way out of the mess. Nurbek Nurpolatov went AWOL after being transferred from one construction unit near Moscow to another. Officers were at a loss to explain why eleven soldiers had deserted this unit in three months. The answer: The new group was run by ethnic Chechens. In his old unit, Nurpolatov's *zemlyaks* predominated.

Ethnic gangs selected their own candidates to become NCOs. In the constant process of staking out turf, violence did not always prove necessary; often the mere threat of violence was enough to produce the desired effect. The military mafias maintained their own discipline.

### Desertion, Draft-Dodging

Fear for their lives and dread of conditions in military service drove many potential draftees to hole up in remote areas of the Transcaucasus and central Asia, where they lived with relatives out of reach of the authorities. Failure to answer the call-up and desertion after induction had a major impact, with the armed forces coming up short by 360,000 soldiers. By December, only seventy percent of the call-up plan had been fulfilled.

Equally destabilizing for the old defense establishment was the sudden and total loss of its east European rampart. The breakaway area comprises not only former Warsaw Pact nations but also the Baltic states. Officers and troops in the hundreds of thousands have been streaming back to Russia and the other republics.

For many, the return from eastern Europe was a shock. "In Germany, it is nine to six, then take your car and be off, but here we don't have time for leisure at all," complained one army major.

"You should see the residential areas of bases we left behind in Germany," said another officer. "Neat, with fine tall buildings and paved roads."

Col. Valery Ochirov, once deputy chairman of the now-defunct Su-

preme Soviet Committee for Defense and Security Affairs, said that a severe housing problem existed. At least 185,000 troops, 43,000 of them officers and warrant officers, had returned from Hungary, Czechoslovakia, and Mongolia. More than 370,000 were headed out of Germany. Some 100,000 were officers and warrant officers, with 185,000 dependents.

Even before these withdrawals began, however, 175,000 officers and warrant officers had no apartments. Colonel Ochirov noted that housing had not been provided for a significant proportion of the 150,000 discharged through earlier troop reductions. Tent cities sprang up around military bases. "The total number of homeless could reach 300,000," said Colonel Ochirov.

"The withdrawal of a half-a-million-strong force over [the last] four years was poorly planned," conceded Col. Yevgeny Nikulin. "Virtually no housing has been built to receive them."

In one barracks for officers' families, three or four lived in rooms designed for one. The kitchen had three stoves to serve ten families. Although the wives had university educations, the only jobs available in the area were on assembly lines.

Senior officers talked about the future with bitterness. They had served their country, they said. They had earned comfortable re-

tirement. Instead, the country had abandoned them. Anxiety and despair became widespread.

When the Baltic republics achieved independence, 1st Capt. V. Drobot, a fifty-two-year-old naval officer, found he was dwelling in a foreign country. His dreams of retiring in a tiny cottage in an Estonian village on the sea ran aground. Homemade posters, written in Russian, appeared everywhere: "Suitcase—station—Russia." "Russian, go home!"

Even if he knew where to go, Captain Drobot would have had to wait five to seven years for quarters. Where would he live in the meantime? With all military offices in Estonia closed, where could he register for retirement? Where would he get his pension or medical treatment? After thirty-one years in the navy, he had a two-room apartment, shared with his daughter and her eight-year-old son; no dacha, no car, no substantial savings.

In cities, officers routinely changed into civilian clothes before leaving work. A joke made the rounds: "In the past, retired officers retained a right to wear their uniforms. Now they may demand a right to retain their weapons."

### Demoralized by Desert Storm

By all accounts, senior military officers were at the very least sobered, and some perhaps were even



Weapons, vehicles, and other materiel are being put to use by members of factions, would-be revolutionaries, and former military members interested in self-defense. "In the past," goes a recent joke, "retired officers retained a right to wear their uniforms. Now they may demand a right to retain their weapons."

© Hoda Bakhtandagi/Black Star, 1991



humiliated, by the demonstration of US firepower and advanced military technology in Operation Desert Storm.

The timing of Desert Storm could not have been more excruciating for the senior military leadership. The inventory of main battle tanks had only recently swelled to 54,000, and it was at precisely that moment that the US showed that massive, mechanized ground forces, so basic to tactical planning, were of little use in the absence of control of the air and the ability to exploit space.

Even more painful was the fact that the US, in thoroughly trouncing Iraqi air and ground forces, had defeated the cream of national arms production—the Air Forces' MiG-29s, the Army's front-line battle tanks, the latest radars and air defense systems. One after another, their grave weaknesses came to light when put to the test against Western equipment.

In its drive for massive quantitative superiority, the military-industrial complex had fallen short in the production of high-tech weaponry. Many military and industrial leaders recognized the need for developing such advanced technological equipment, but the production system, already stretched to the breaking point producing conventional and nuclear weapons, simply ran out of steam.

Gen. Maj. V. Samoilov of the Russian Federation State Committee of Defense, at a Washington conference in October, said that the Ministry of Defense had no control over types, numbers, or kinds of weapons produced. The military-industrial complex itself made these decisions. The armed forces were out of the picture.

Trends in the industrial base probably had already moved qualitative superiority or even parity in high-tech weaponry well beyond its reach. Operation Desert Storm provided the final proof that the military was yoked to an obsolete material base.

Failure of senior military and industrial leaders to provide the required types of advanced arms, and their apparent inability or unwillingness to make up for the oversight, became another factor in the decline of military officers' faith in their superiors. Younger, more ag-

gressive officers, such as Marshal Yevgeny Shaposhnikov (the last Defense Minister of the old USSR), were not prepared to accept a return to the *status quo* of the Brezhnev period.

### The Empire Breaks Up

Perhaps the strangest feature of the old military structure in its last months was its evident lack of a country, or even a credible central authority, to which it could declare allegiance.

Estonia, Latvia, and Lithuania were the first of the fifteen republics of the old empire to gain independence from the Kremlin "center." The remaining twelve republics moved at various speeds to divorce themselves from the control of Moscow. The once all-powerful heart of political, economic, and military authority had become weak and ineffectual. Finally, it simply ceased to exist.

Even within the Russian Republic, all sixteen former "autonomous republics" declared themselves new, sovereign republics and elected their own presidents. Leaders in the Far East and Siberia talked of independence. Even oblasts, such as Irkutsk, called themselves republics and, in some cases, formed small armed detachments.

Retired Gen. Maj. of Aviation Dzhakhar Dudayev was elected president of the Chechen Republic and head of the Republic's armed forces. The Great Council of Atamans of the Cossacks, meeting in Novocheerkassk, decided to form a Union of Cossack Republics of the South of Russia.

Some republics saw the sudden collapse of the center as a chance to "nationalize" troops and military equipment on their territory.

Eighty percent of the officers and ninety percent of the generals in the old armed forces came from Russia. Very few were non-Slavic. The question was whether they would serve wherever their units might remain, whether they would all seek service in the new Russian Armed Forces, or whether they would retire.

The Republic of Belarus (formerly Byelorussia) set up a Ministry of Defense Affairs, though it had no plans to build up a military force.

Ukraine's new parliament had

planned for armed forces numbering more than 450,000 men. A reporter from *Komsomolskaya Pravda* looked at costs, however, and reported what, for Ukraine, had to be depressing facts. A force of that size would need more than 5,000 tanks and 7,000 personnel carriers. Each tank would cost 1.5 million rubles. Added to this would be the cost of training. A single division exercise cost six million rubles. In the Kiev Military District, training facilities cost 110 million rubles, and 4.5 million rubles annually was needed for upkeep.

France, with an armed force of about 461,000, has an annual military budget of \$48 billion, a sum Ukraine would be not only unlikely to spend on defense but also unlikely to be able to raise.

### The Military-Industrial Leviathan

The residual military establishment on former USSR territory knew it had to mount significant internal reforms in order to right itself, assuming that the job could be done at all. The task required dealing with major problems.

One was to get a grip on the military-industrial leviathan that had grown up over the past five decades. "Conversion" became a buzzword among defense intellectuals in the late 1980s. They said that, in a short time, the military-industrial complex would be converted to civilian goods. Few knew anything about defense plants. Victor Krasavtsev, head of a defense industry enterprise, estimated late last year that conversion would cost forty billion rubles, a huge sum.

In a speech last November, Mikhail Gorbachev blasted the defense industry: "For fear of the military threat, we used to take the shirt off our own back to strengthen the country's defense might. The more we strengthened it, the more we invested. The more we invested, the firmer became the stranglehold on our economy exerted by the military octopus's deadly tentacles, sucking the blood of large families and invalids, of the health service, and construction of the economies of cities and villages. And the more human sweat it drank down, the more aggressive it became."

Some saw this as Gorbachev's



admission that, in his nearly seven years in power, he had not made the slightest dent in the complex's power.

Just how many resources did the military-industrial complex consume? Georgi Arbatov, a former arms advisor, estimated that it employed thirteen million people, some two million in Moscow alone. *Izvestia* correspondent A. Kiva claimed that eighty percent of the country's industrial capacity directly or indirectly supported the military.

The armed forces also faced the problem of controlling 30,000 nuclear weapons. In an effort to maintain centralized control, the military formed a new uniformed service, the Strategic Deterrence Forces, created from the old Strategic Rocket Forces, attack warning systems, space control systems, missile defense systems, and other components.

The Strategic Deterrence Forces had operational control over strategic nuclear forces. The obvious question was, Who controlled the Strategic Deterrence Forces?

At an end-of-year meeting, Commonwealth leaders agreed to a joint command of nuclear weapons. Marshal Shaposhnikov was appointed as interim Commander in Chief of the joint armed forces, until March at least.

### The Republics Disagree

The unofficial journal *Postfactum* reported that the nuclear release codes and authorities were contained in three nuclear "briefcases." When Gorbachev resigned on December 25, he formally relinquished his briefcase to Yeltsin. It was not clear who, if anyone, had other briefcases.

It appeared that Russia would inherit substantially all of the old superpower's nuclear arsenal. Andrei Kozyrev, the Foreign Minister of the Russian Republic, declared that "Russia will be the continuation of the Soviet Union in the field of nuclear weapons. Two of the other "nuclear" republics, Ukraine and Belarus, have accepted that they will move quickly to cede to Russia the nuclear arms on their territory. By year's end, Kazakhstan, the only other republic with nuclear arms, had not declared itself on the



One leading "conservative" has called for a purely Russian military force, "including a missile force." Ethnic Russians in all the republics are clamoring for a central role for Russia in the Commonwealth of Independent States. Above, anti-Communist demonstrators in Moscow carry the old Imperial Russian flag.

matter. In December, Kazakh President Nursultan Nazarbayev said his republic would retain some nuclear weapons so long as Russia did. That claim was subject to change.

One strong theme to emerge from the turmoil was the likelihood that a major portion of the armed forces would at some point retrench, retool, and reemerge as the military of the newly independent Russian Republic.

More than eighty percent of the strategic nuclear weapons of the old empire were located within the borders of the Russian Republic. The two largest naval armadas—the Northern Fleet, headquartered at Murmansk, and the Pacific Fleet, headquartered at Vladivostok, were based on and supplied exclusively from Russian territory. The majority of officers were ethnic Russian. Half of the former military districts were in Russia, as was the strategic arms command system.

Russian military figures stepped forward. The Vice President of Russia, Alexander Rutskoy, was a general major of aviation in the old USSR. The State Advisor of the Russian Republic for Defense is

Konstantin Kobets, a general colonel of the Army.

During the coup attempt, Russian President Yeltsin took temporary command of the armed forces stationed in the Russian Republic. He then designated General Colonel Kobets as his minister of defense. General Rutskoy directed the raising of the barricades around the Russian White House during the coup attempt.

I. Shafarevich, a leading "conservative," called for a purely Russian military force, "including a missile force." He said that ethnic Russians were "being oppressed in [Moldavia] and the Baltics." He called for a revival of the great "Rus" spirit of the past.

Lt. Col. Sergei Stepashin, a Russian People's Deputy and chairman of the Russian Republic's Supreme Soviet Committee on Defense and Security, supported the concept of a Russian force. However, he claimed, "I do not think it is worth creating our own army; it exists." By "it," the colonel meant the former Soviet military force.

"There is no need," he explained, "to create what we already have." ■

---

*Harriet Fast Scott, a Washington consultant on Soviet military affairs, 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. Sokolovskii'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.*



**The Iraqis were good, but not good enough to beat the electronic sweep of the shadowy RC-135s.**

# Ears of the Storm

**By Robert S. Hopkins III**

**A**S THE big RC-135 jet moved from its parking place, Capt. David Lawlor saw the crew chief standing at attention, rendering a solemn salute. Captain Lawlor returned the salute; the crew chief gave a thumbs-up and hurried to his remaining duties. "It was then that it struck me we were really going to war," said Captain Lawlor, an RC-135 Rivet Joint commander with the 38th Strategic Reconnaissance Squadron (SRS).

The men and women who flew and maintained the highly classified RC-135 Rivet Joint (RJ) reconnaissance platform in the Persian Gulf War understand that the story of their contributions might never fully be told. Nonetheless, the RC-135 mission was central to the prosecution of coalition combat operations. Whereas the much-publicized E-3 AWACS was popularly considered the "Eyes of the Storm," the shadowy Rivet Joint aircraft might best be called the "Ears of the Storm."

Rivet Joint was a crucial part of the coalition's intelligence collection capability. It provided real-time intelligence data to theater and tactical commanders, in coordination

with such assets as AWACS, E-8 Joint STARS aircraft, the EF-111A, and the Navy's EA-6B Prowler.

Even in peacetime, the mission of the RC-135 is shrouded in secrecy. Assigned to Strategic Air Command's 55th Strategic Reconnaissance Wing (SRW) at Offutt AFB, Neb., RC-135s have routinely flown worldwide peacetime strategic aerial reconnaissance missions directed by the Joint Chiefs of Staff on behalf of national intelligence organizations as part of the Burning Wind program. Pilots and navigators on board the "Wind" were part of the 38th SRS. Electronic warfare officers, known as "ravens," were assigned to the 343d SRS, and in-flight maintenance technicians came from the 55th SRW. Mission personnel were se-

**USAF's RC-135 Rivet Joint reconnaissance planes were central to the prosecution of allied combat operations in the Persian Gulf War. Rivet Joint aircraft provided crucial electronic intelligence data to theater and tactical commanders in real time throughout the war.**







lected from Electronic Security Command units worldwide.

The RC-135 is a specially configured variant of the Boeing KC-135 Stratotanker. There are currently five different variants of the RC-135 in use, two of which—the RC-135V and the RC-135W—are in the Rivet Joint configuration and participate in the Burning Wind program. The other three support special technical reconnaissance programs.

### “Hog Nose” and “Cheeks”

Rivet Joint RC-135s are capable of air refueling, enabling them to remain aloft for extended missions over intercontinental distances. They have four TF33 turbofan engines and are covered with a variety of fairings and antennas. The most obvious external characteristics are the airplane’s elongated nose (called a “hog nose” by RJ crew members) and its “cheeks,” large aerodynamic fairings along each side of the forward fuselage.

Wind crews often see adversaries “up close and personal.” Not all of these confrontations have ended peacefully. In July 1960, for example, a 55th SRW RB-47H, a predecessor of the RC-135, was shot down by a Soviet MiG over the Barents Sea. The two surviving crewmen were captured and eventually repatriated. In April 1965, a pair of North Korean MiG-17s attacked and badly damaged another

55th SRW RB-47H, but it managed to escape with no casualties and landed safely in Japan.

RC-135s participated in Operation Urgent Fury in Grenada in 1983, Operation Eldorado Canyon against Libya in 1986, and Operation Just Cause in Panama in 1989–90, all significant combat operations. According to one raven with over a hundred peacetime RC-135 missions, these encounters definitely improved the RC-135 crews’ operational discipline. The chance to display this discipline in the Gulf War came early in August 1990.

The first Rivet Joint aircraft came to Riyadh Military AB, Saudi Arabia, on August 11, 1990. En route to Saudi Arabia, the airplane conducted an operational reconnaissance mission, establishing the uninterrupted intelligence link that the RJs would provide to theater commanders through the end of the war and long after. Additional RC-135s and crews flew nonstop from Offutt to Riyadh. These RC-135s were part of the 1700th Strategic Reconnaissance Squadron. Mission support personnel came from RC-135 detachments at Kadena AB, Japan; Eielson AFB, Alaska; and RAF Mildenhall, England.

Crews initially stayed in Riyadh hotels but soon moved to a large compound thirty minutes from the air base. Accommodations were Spartan. Given the crews’ twenty-

hour duty periods on alternating days, there was little time to do anything other than eat and sleep between fifteen-hour missions.

### Aloft Twenty Hours

During Desert Shield, RJs flew continuous, twenty-four-hour coverage in a single orbit along the Saudi-Iraqi border. An airplane and crew were on station for twelve hours (or until relieved), with an additional three hours total transit time to reach and return from the orbit area. Any malfunction of a replacement jet meant that the on-duty plane would have to fly an extended orbit, as Maj. Jerry Orcutt’s crew discovered one night in January 1991, when it set an unofficial Desert Storm RC-135 record by staying airborne for more than twenty hours.

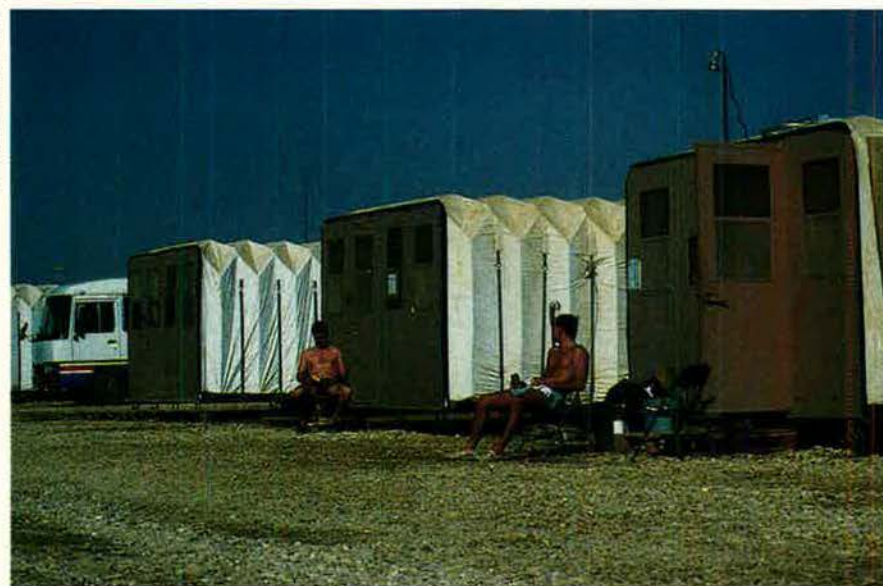
Crews flew fifteen-hour missions every other day. Staff personnel filled gaps in manning that occasionally arose, particularly due to illness. The most common ailment among the RJ flyers was an insidious sinus infection caused by extremely low humidity, high dust content, and time spent breathing recycled air while flying. Flight surgeons were able to treat all but the most serious illnesses without grounding the flyers.

This demanding pace was not entirely new to the 55th SRW’s maintenance personnel. In addition to RC-135s, the wing operated SAC’s EC-135C Looking Glass airborne command post, which until July 1990 had an airplane continuously airborne. Applying lessons learned from the Looking Glass operation significantly reduced major maintenance problems.

Foremost among these problems was the effect of windblown sand on the airplanes. Sand and grit permeated any opening or panel not tightly sealed. Despite the strict use of engine intake and exhaust covers, engine compressors and fan blades were gouged and scarred from the sand and debris ingested during engine start and takeoff or landing and taxi back. Even at high altitude, the planes encountered so much dust that paint on wing leading edges was stripped off in a single flight.

The incessant flying schedule was generally beneficial to airplane maintenance. Crew chiefs are quick

© Robert S. Hopkins III, 1991



*Rivet Joint crew members Capt. Kevin Horton and Mark Morris take a break outside their quarters. RC-135 crews flew fifteen-hour missions every other day during Operation Desert Storm. Missions usually featured long stretches of tedium interspersed with moments of confusion, excitement, and concern.*



to say that a jet that flies a lot breaks very little, while a plane that sits a lot breaks a lot. Nonetheless, there were recurring maintenance requirements such as phase inspections after, say, 250 flying hours. Approximately every three weeks, an RJ reached this limit of safe flying without a major inspection and overhaul and was rotated back to the US.

The long Rivet Joint missions in the Gulf were a mix of boring flying and moments of confusion, excitement, and concern. For the pilots, the only break from the tedium generally came during the two air refuelings necessary to stay on station for twelve hours. At the outset of Desert Shield, these refuelings were major events. Problems with new autopilot software in the KC-135 precluded autopilot-on refueling, and tanker crews lacked experience in long autopilot-off contacts with fuel offloads in excess of 100,000 pounds. The fatigue felt by most RJ pilots made these refuelings even more challenging. By the beginning of the war, however, experience levels had improved dramatically and air refueling had become routine.

The navigators on board the RJs worked continuously to maintain precise positioning throughout the mission. Using systems as advanced as stellar-inertial and global positioning system (GPS) satellites and as basic as dead reckoning, the



© Robert S. Hopkins III, 1991

*The author flew RC-135V 63-9792 (shown here on the ramp at Riyadh AB) on the first day of the Gulf War, evading an Iraqi MiG-23 in the process. He credits "effective crew coordination" and "quick response by F-15 Eagles" of the 33d Tactical Fighter Wing with having kept the MiG from shooting down his plane.*

two RJ navigators kept the airplane in the optimum orbit for data collection and coordinated with the mission crew members for special orbit requirements.

#### The Work of the "Backenders"

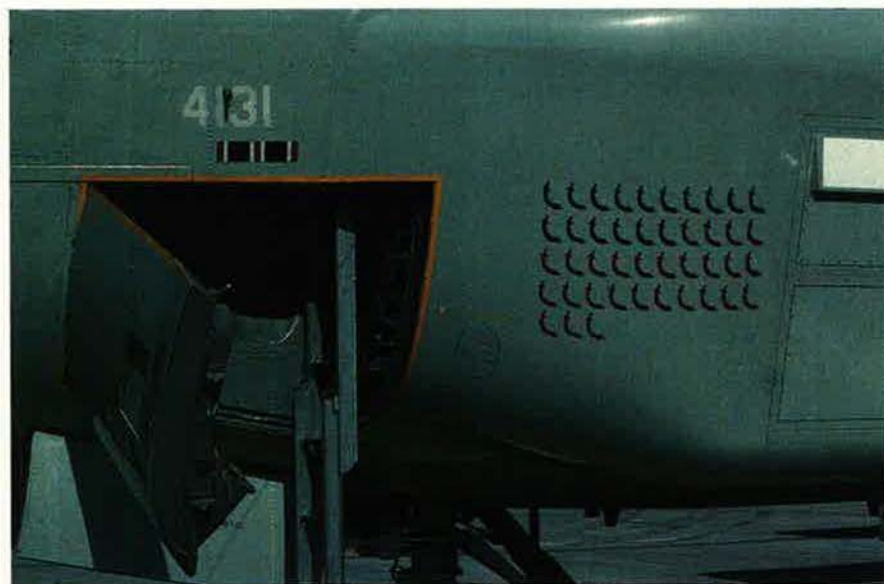
The Rivet Joint reconnaissance mission was conducted by the ravens and other US personnel. Using the RC-135's sophisticated and powerful sensors, these "backenders" located, identified, and cataloged electronic threats that could

have affected the coalition's combat forces. At first the Iraqis were relatively careless with their electronic emitters, but eventually they "ran silent," turning them on only for brief periods in the early morning and late evening.

"The Iraqis were good," said one RJ mission specialist, "but they weren't good enough." By that he meant that the RJ already had picked up the most vital data.

In the Iran-Iraq War, Iranian F-14 Tomcats with their powerful radars were used like miniature AWACS planes, reporting Iraqi fighter operations to Iranian air defense commanders. To counter this capability, Iraqi Mirage F1-EQ fighters flew high-speed, low-altitude missions well beneath the Tomcat's radar limits. Based on timing, the Mirage F1-EQ would pop up directly beneath the Tomcat's orbit, briefly illuminate the F-14 with its radar, and fire one or two air-to-air missiles at it. Iran lost several Tomcats this way—a fact not lost on RJ crew members.

During the months of Desert Shield, Iraqi fighters flew teardrop-shaped tracks that worked well with this tactic. When the planes were launched from forward Iraqi bases, these fighter tracks ended directly beneath Rivet Joint and AWACS orbits. There was little doubt in the mind of RJ crew members that the Iraqis planned to try to destroy these important aerial assets, so



© Robert S. Hopkins III, 1991

*Mission markings adorn the nose of RC-135W 62-4131 during the Gulf War. Black scimitars represent prewar Desert Shield missions; red scimitars, Desert Storm combat missions. All such markings were later removed at the order of higher authorities. RC-135s also conducted search-and-rescue missions.*





**A Rivet Joint aircraft hooks up with a KC-135 for aerial refueling. Such refuelings were enlivened by tanker crew inexperience (which soon wore off), severe weather, and heavy offloads in short durations. Aerial refueling enables RC-135s to remain aloft for extended missions.**

Desert Shield flights were as tense as those during Desert Storm.

On one occasion just before the start of the war, an RJ reported unidentified radar contacts during the rendezvous with a tanker. The local AWACS was unaware of any coalition aircraft in the vicinity, although some high-speed, high-altitude Iraqi planes (probably MiG-25 "Foxbats") had been reported minutes earlier. US F-15s were quick to scour the area with their powerful radar but found nothing. The Foxbats had disappeared. The radar returns persisted.

At the same time, a US ground unit near the Iraqi border reported it was being surrounded by unidentified ground forces and requested immediate assistance. With tanker in tow, the RJ headed for the beleaguered ground unit. The mysterious radar blips also accelerated and began a course that would intersect that of the Rivet Joint plane.

To everyone's relief, it turned out that the ground unit had mistakenly identified a returning patrol as hostile troops. The mysterious radar returns turned out to be rare, spurious radar returns of the RC-135 and its tanker. As the RJ accelerated to rush to the aid of the ground unit, so too did its enigmatic pursuers. Only the discipline brought about by training and operations under pressure prevented shooting at ghosts.

### The War Begins

On the eve of the war, the replacement RJ under the command of Capt. Paul Hutchinson taxied out and launched amid the usual radio chatter and air traffic control calls. If the Iraqis were monitoring the radio traffic, they would hear nothing unusual about that night's launch.

Shortly thereafter, in absolute radio silence, a second RJ, commanded by Major Orcutt, launched and hurriedly established itself in a new, second orbit. Iraqi radar remained silent and thus ignorant of this second, ominous development. Until the war's end, there would be two RJs airborne at all times, taxing the system and its crews to their limits.

To alleviate this strain, additional crews and every available RJ in SAC were relocated to the Middle East for Desert Storm or for missions along the Turkish-Iraqi border in Operation Proven Force. In Saudi Arabia, primary crews moved from the compound into field conditions at Riyadh AB, sleeping in tents. On the first night of the war, air raid sirens awoke crew members trying to sleep prior to their next-day combat sortie. There were worries that Iraqi Su-24 "Fencers" carrying chemical weapons might hit Saudi air bases. The attacks never came.

Crews often wore flak vests during takeoff and landing to ward off possible small-arms fire. To reduce

the vulnerability of the RC-135, the 55th SRW Combat Tactics Division developed unique takeoff and approach procedures. Combined with the extremely bad weather, these radical tactics were very unsettling compared to traditional peacetime departure and recovery profiles, but they seemed effective.

Iraq's Scud missile proved to be a major annoyance. "I don't know how many times the airfield at Riyadh came under Scud attack," said Captain Lawlor, "but it seemed as if it was always when my crew and I were out trying to launch."

Capt. Mike Canina, an RJ intelligence officer, was nearly hit by Scud debris. "It happened so quickly," he said. "I saw the Patriot launch, dove for cover, and seconds later a big chunk of Scud missile landed right where I had been standing."

The US Patriot intercepted one Scud missile directly in the flight path of a landing RC-135, which narrowly avoided debris and downwash.

The RC-135 is not well suited for direct combat operations. It has no defensive armament and must rely on its "eyes" and "ears" for protection. During operations in the Gulf, however, the RJs were never alone. F-15s routinely orbited nearby and were quick to react to potential threats. Prior to the war, Iraqi fighters would often fly right up to the border. The RJ would withdraw to a safe distance while the Eagles clustered along the border waiting for a chance to shoot, a chance that never came. Other fighter coverage came from Navy F-14s, British Tornado F. Mk. 3s, French Mirage 2000s, and Saudi F-15s and Tornado ADVs.

### The Iraqi Fighter Threat

On the first night of the war, an AWACS plane detected a fast mover—probably a MiG-23 "Flogger"—heading south across the Saudi-Iraqi border directly toward an orbiting RJ. As the RC-135 began evasive action, F-15s from the 33d Tactical Fighter Wing, Eglin AFB, Fla., responded to the RJ's calls for assistance. The MiG-23, its radar warning gear no doubt illuminated like a Christmas tree and alerted to the F-15s, fled back across the border. A similar event took place on the same night in the other RJ orbit.



This time, however, the F-15s shot down the threatening Iraqi Mirage F1-EQ.

On the night of January 23, an RC-135 was shot at by an unidentified type of surface-to-air missile. "I was standing behind the pilot and looking out the window when I saw the launch," recalled Capt. Tim Spaeth, an RC-135 instructor navigator. "As the missile guided closer, the pilot prepared to take evasive action. Suddenly, just a few thousand feet below us, the SAM detonated prematurely."

Among the RJ's least-known accomplishments is its role in search-and-rescue (SAR) operations. The airplane's sophisticated sensor suite allows it to pinpoint a downed aviator's emergency rescue beacon. Under hostile conditions, the flyer might transmit on his beacon only for extremely brief periods, and local terrain can dramatically reduce the beacon's range. The RJ's sensors can find the beacon, track its azimuth over time, and thus give an accurate position of the flyer.

Working with SAR forces, the RJ can direct rescue helicopters to the flyer's position with less wasted time and effort and help the SAR forces avoid enemy troop positions or antiaircraft threats. RJ crews participated in several such rescues during Desert Storm. On one occasion, the RJ required air refueling during a critical phase of an SAR mission. The available KC-10 tanker flew right up to the border, joined up with the RJ, offloaded its fuel, and allowed the SAR operation to go on uninterrupted.

### **Eyewitnesses to War**

Rivet Joint orbits often placed an RJ and its crew in unique positions to witness the campaign firsthand. On the first night of the war, a huge package of five KC-135s refueling twenty F-15Es en route to targets in Iraq flew through the RJ orbit. Later, RC-135 crew members would count the number of southbound contrails passing over the Saudi-Iraqi border. Even numbers usually



**RC-135s shared crowded ramp space at Riyadh AB with a rich assortment of planes, including USAF and Saudi AWACS, KC-135s, C-130s, C-5s, C-141s, commercial transports in military service, and US Army aircraft. Iraqi Scud missile attacks on the airfield were frequent. One Scud crossed the path of an RC-135.**

meant that all of the strike package was returning; odd numbers often meant that a jet had been downed in Kuwait or Iraq and that the hunt was on to rescue the missing aviator. Each night that B-52s struck targets in Kuwait and Iraq, RJ crews saw the small flashes of antiaircraft artillery at low altitude followed by the exploding bombs dropped from the B-52s and, on occasion, the secondary explosions that followed.

On one night, as an RJ banked in its orbit, the aircraft commander witnessed the launch of four Scud missiles. As he turned toward Kuwait, he saw four parallel streaks of fire rising from northwest Kuwait. At first he thought they were SAMs launched at the RJ, but they continued upward out of sight. "I then realized they were Scuds," said the commander, "and I looked at our navigation systems to determine a bearing from us to their launch site and quickly worked up an approximate launch position with the nav. We then called AWACS with the data." Soon coalition "ScudBusters" were dropping iron on the transporter-erector-launchers.

The hunt for Scud missiles almost brought in another of SAC's RC-135s. Assigned to the 6th SRW at Eielson AFB, Alaska, the RC-135S Cobra Ball was configured to gather data on ballistic missiles. US planners briefly considered using the Cobra Ball's sensors to help locate the Scud launch sites, and 6th SRW crews were briefed, equipped, and made ready to deploy to Riyadh. Coalition forces, however, had by this time eliminated most of the safe havens from which the Iraqis launched Scuds (and Scud attacks had decreased to almost nil), so the Cobra Ball was not needed.

Throughout the buildup for the war, the days of combat, and the aftermath, Rivet Joint RC-135s flew missions vital to the development and execution of the coalition's combat operations. The RJs flew over hostile territory and came under fire from ground and aerial threats. Still, not one RC-135 was lost, and there were no combat casualties among its crews, maintenance, or support personnel.

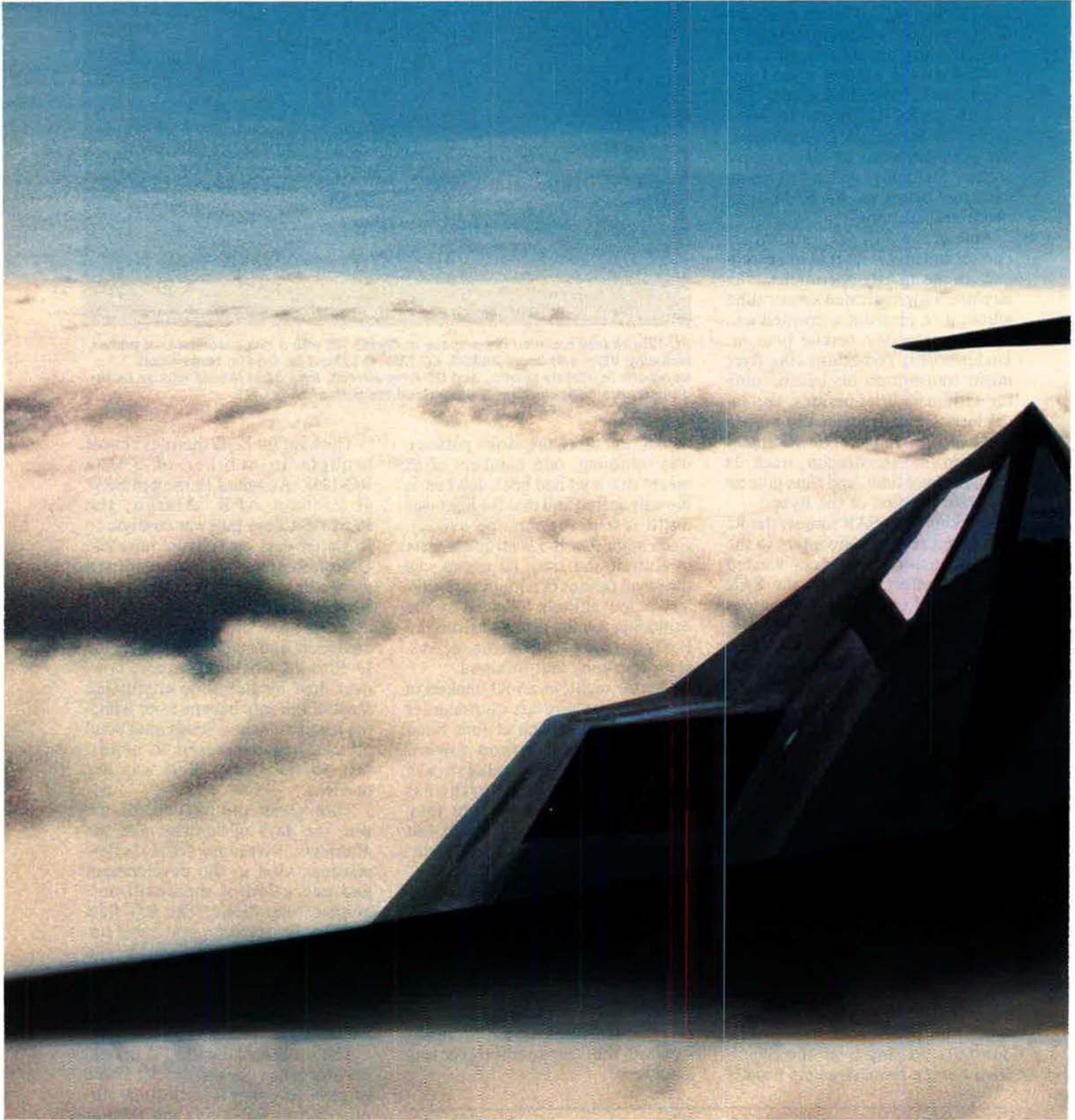
The success of the RC-135 in Desert Storm has caused the Air Force to plan to convert additional airplanes into RC-135s, and theater commanders are now committed to making the Rivet Joint RC-135 an integral part of their arsenals. The RC-135's peacetime mission, however, remains the same. ■

---

*Robert S. Hopkins III, a former Air Force officer, was an aircraft commander qualified in seventeen different types of EC-, KC-, RC-, and TC-135 planes. Before flying Rivet Joint combat missions during Operation Desert Storm, he flew special-mission RC-135s in support of the verification of strategic arms agreements. He now teaches history at Creighton University in Omaha.*



**It was impossible. Until they called Lockheed.**



**Lockheed leads.**

When America needs to break technological barriers, it comes to Lockheed.

Whether it is the first sub-launched ballistic missile, the first Mach 3 jet, the first stealth fighter or the first jam-resistant satellite,



*The F-117, the world's first stealth fighter.*



Lockheed gets the call. It's our legacy.

Technological leadership is what sets America apart from the rest of the world. Lockheed is committed to maintaining that leadership, for the benefit of our customers, our shareholders, and our country.





**MAC provides a lift to wounded veterans who fought the Soviet invasion.**

USAF photo by MSgt. Bill Thompson

# Afghan Airlift

By Richard Mackenzie

**S**EVEN miles up, high above the Arabian desert, the C-141B roared through the night, making its way from Rawalpindi, Pakistan, to Andrews AFB, Md. Capt. Ted Buck, one of the crew for MAC 101, was fixing the ship's position when a passenger began climbing a ladder up to the flight deck.

Captain Buck noticed that the visitor, hardly more than a boy, was having difficulty with the climb. On closer examination, the reason was only too obvious: The lad had one arm. He waved off offers of help. "It's these," he said, pointing to his legs. "It will be easier if I take them off." With that, Abdul Rahman Sahak, using his one arm, removed not one but two artificial legs.

The astonished crew members and the twenty-two-year-old Afghan soon settled down into an animated conversation. The youth talked about the Afghan freedom fighters, of which he was one; about the war against the Soviet military occupiers; and how he and fellow guerrillas, trying one day to take an enemy outpost, got hit by a score of shells, one of which destroyed three of his limbs.



Photo by Richard Mackenzie

*Above, an elderly Afghan plods through the rubble of a Panjshir Valley village, destroyed in a Soviet air attack. Capt. Ted Buck (opposite) was part of the C-141 crew for MAC's 100th "McCullum Flight." The McCullum Flight missions played a key humanitarian, diplomatic, and propaganda role in the Afghan war.*









**In the aftermath of a 1989 firefight in Takhar Province, three mujahedeen look over their prize, a captured vehicle left by retreating Soviet troops. The Afghan irregulars, who usually got around on foot or on horseback, stymied modern Soviet forces in one of the most gruesome and vicious wars of the century.**

Now, Abdul Rahman knew, he shortly would be in the West, preparing to receive medical attention and therapy of a kind unavailable in his homeland.

On paper, MAC 101 might seem another workaday USAF mission, but in the minds of the crew, part of Military Airlift Command's 6th Military Airlift Squadron, this late-November flight lingers vividly. The same can be said of the many other mercy flights that MAC has flown in support of the Afghans for more than five years.

These missions, never officially "Classified" but closely held until now, were known as "McCullum Flights," after one of their prime political sponsors, Rep. Bill McCollum (R-Fla.). The MAC missions played a key humanitarian, diplomatic, and propaganda part in the course of the Soviet-Afghan conflict, and how they came to be is a story in itself.

Between 1979, when the Red Army invaded Afghanistan, and 1989, when its last remnant left, the Soviets and their Afghan puppets killed some one million Afghans and maimed countless more. Five million became refugees, fleeing mostly to Pakistan. From the beginning, the US Central Intelligence Agency worked with Pakistan's intelligence establishment to back the Afghan resistance with supplies of arms and other materiel. None of

this, however, was of much use in treating the war's victims.

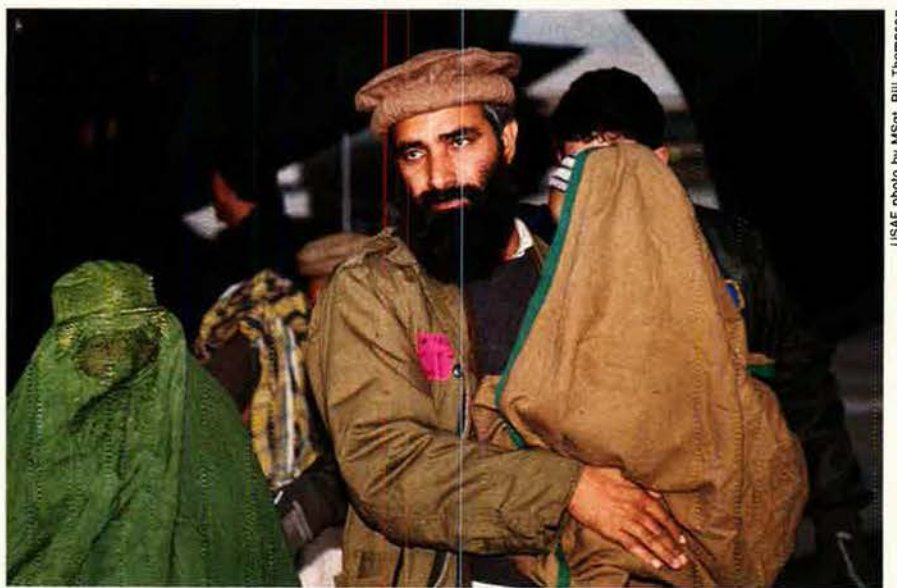
#### **Weinberger Gives Approval**

In 1984, Mary Spencer-Morin of the conservative Committee for a Free Afghanistan began a campaign to help Afghan wounded get medical care in the US. That same year, Defense Secretary Caspar Weinberger approved, on a one-time basis, a request to bring back eight *mujahedeen* for treatment at Walter Reed Army Medical Center.

As Soviet operations in Afghanistan intensified and the number of Afghan casualties soared, Ms. Spencer-Morin managed to get approval for dozens more wounded Afghans to come to the US for private treatment. The catch was that all had to travel on commercial flights, paid for by Ms. Spencer-Morin with whatever money she could raise.

Meanwhile, Vaughn Forrest, Congressman McCollum's chief of staff, had visited Pakistan and had seen the suffering of Afghan refugees and fighters firsthand. When the Florida lawmaker heard the stories, he came up with the idea of mounting humanitarian missions into neighboring Pakistan. More than a year earlier, a Pentagon Task Force study had recommended centralizing and expanding the military's international humanitarian role, but the idea went nowhere. The Agency for International Development (AID) was already working with refugees in Pakistan, but Representative McCollum claimed that the most immediate need was to provide warm clothes and medicine to the Afghans who remained in their homeland.

In its final version of the 1986 Pentagon budget, Congress approved the Florida Republican's idea. The budget authorized the Pentagon to transport to Pakistan excess non-lethal items, such as sleeping bags, boots, and blankets, to provide to



**Outward bound from Pakistan, MAC planes have carried about 1,000 severely wounded Afghans to the US, Europe, Egypt, and Japan, where they could receive advanced medical treatment or therapy. Above, an Afghan mother and father prepare to take their wounded child aboard the November C-141 flight.**



Afghans "displaced" by the war. Representative McCollum and Rep. Charles Wilson (D-Tex.) convinced Congress to appropriate \$10 million to pay for the shipment, which would take place on Military Airlift Command planes.

Though principally humanitarian, the legislation helped the Afghans to hang on and fight the invasion, Mr. Forrest observes. After a rocky start, the program began to function well. Field workers on the Pakistani-Afghan border soon saw that the operation had greater potential. The Air Force planes, they told Congressmen McCollum and Wilson, had been returning to the US empty; on the return runs they could easily ferry war victims needing surgery or treatment to the United States.

The two lawmakers joined forces with another staunch backer of the Afghan resistance, Sen. Gordon Humphrey (R-N. H.), to push for the idea, and they succeeded. The first patients to come to the US under the military program arrived on March 6, 1986. In a convoluted funding procedure, Pentagon money was passed to AID, which hired the Geneva-based International Organization for Migration (IOM) as a subcontractor. IOM then set up its own Afghan program office in Washington, starting with \$250,000 a year.

IOM's role grew. It is now supposed to help screen the patients, find doctors and hospitals to provide free treatment in the US and western Europe, manage the patients while they are in the United States, and feed and house them while they are not in hospital. IOM's actual policy is to attempt to enlist the aid of volunteers to do these jobs as often as possible. So far, Americans in 100 cities across thirty-eight states have accepted responsibility for the Afghans, often taking them into their homes during their recuperation.

### The First Six Years

In the program's nearly six years, IOM has brought about 530 Afghans to the United States. Another 500 or so have been treated in western Europe, Canada, Egypt, and Japan.

On these flights, MAC pilots and crews of the twentieth century come face to face with warriors who

sometimes seem as though they would be more at home in the thirteenth century. They are the Afghan freedom fighters who fought against modern Soviet forces in one of the most gruesome and vicious wars of this century. On flights into Pakistan, the transports have brought military equipment, goods, and other necessities to the Afghan people. On flights home, they carried the wounded and maimed to Western hospitals.

children who came aboard MAC 101. One had been blinded, another had lost an arm, another had severe brain damage. "As long as I live," said Airman Bailey, "I will never forget that experience."

In February 1989, the Soviet Red Army finally withdrew the last of its occupation force from Afghanistan, but the bloodshed did not end. The Kremlin continued to pour \$3 billion a year into Kabul to prop up its puppet regime.

*Two mujahedeen assist an injured fellow resistance fighter, wounded in the 1987 Battle of Keran in the Panjshir Valley. Though the Afghan guerrillas won that battle, it cost this man his left eye and left arm. Between 1979 and 1989, the Soviet Red Army and its Afghan puppets killed about one million Afghans and maimed countless more. Five million became refugees.*



Photo by Richard Mackenzie

The McCollum Flight that MAC undertook last November was special—number 100 in the series—and a cause for celebration. On this particular flight, MAC brought to Pakistan huge crates of sleeping bags, which were scheduled to be distributed to Afghans. Outward bound from Rawalpindi, the MAC C-141 carried thirty war victims. One was Abdul Rahman, whose good cheer in the face of adversity deeply impressed the MAC aircrew.

"This guy's got no legs," remarked one, "he's got one arm, and he's happy. These people are amazing. How the hell can he laugh? How do you understand that courage?"

One loadmaster, A1C Richard G. Bailey, said he would long remember the terribly wounded Afghan

The McCollum Flights are expected to continue at least through Fiscal 1992; says Robert K. Wolthus, the deputy assistant secretary of defense for Global Affairs who is in charge of the Pentagon's part of the operation. The Pentagon official has personally taken part in more than thirty of these missions. "One thing I have found very moving over the years," he says, "is that, for a lot of these Afghans, it's the first time on an airplane. You're taking them on a strange airplane. You're doing it in the middle of the night. They're going to a country they've never been to. They're surrounded by a different language and different customs."

Moscow and Washington agreed to halt supplies to the combatants as





**En route to Pakistan, the 100th McCollum Flight stopped at Rhein-Main AB, Germany, where it picked up a twelve-member team from USAF's 2d Aeromedical Evacuation Squadron. The elite team (above, helping a wounded Afghan) operated as a medevac mission once the patients came aboard.**

of January 1, 1992, but, with both sides sitting on huge stocks of weapons, few believe the conflict will end anytime soon. In addition, senior MAC officials say that the Air Force will put far greater emphasis on using the nation's airlifter fleet for humanitarian and relief operations in years to come.

### Pakistani Sensitivities

The 100th mission, which began at Andrews, saw the MAC airlifter fly first to Rhein-Main AB, Germany, where it picked up a twelve-member team from the Air Force's 2d Aeromedical Evacuation Squadron, an elite group of medics and nurses who ran the plane as a medevac mission once the patients came aboard. Next, the plane stopped in Dhahran, Saudi Arabia.

From there, it was on to Pakistan, where the crew members were instructed not to wear their uniforms, a step evidently taken in deference to Pakistani sensitivity to the presence of US military forces. To assuage these sensitivities, the McCollum Flight airlifters rarely stay at their initial destination, a Pakistani military airport in Rawalpindi, for more than a few hours. On the 100th mission, however, the crew stayed for twenty-eight hours, attending a ceremony at which certain Pakistani intelligence officers were awarded Pentagon plaques in recognition of the aid they rendered

to the anti-Soviet effort over the years.

Then it was time to load the patients. Air Force Col. John B. Piazza, the director of international security operations in the State Department's Bureau of Politico-Military Affairs, stood on the tarmac as the patients were taken on

board the aircraft. In threadbare traditional clothes, clutching their few possessions, the patients walked up the ramp into the back of the C-141, evidently awed by the size and sophistication of the gigantic machine.

In the back of the plane, Abdul Sabar Sobat, an engineer from the Panjshir Valley located deep in the Hindu Kush mountain range, hugged his six-year-old son, Mohammad Zamil, to his side. The boy lost his right arm in a 1987 Soviet bombing raid. He is still recovering. He will end up in England, where he hopes to be fitted with an artificial arm.

Then came Abdul Rahman Sahak, swinging his artificial legs and balancing himself with a crutch as he moved across the asphalt. It was his second McCollum Flight. On the first, shortly after he sustained his horrendous wounds, he was in far worse shape. Since his first treatment, Abdul Rahman has set up and now runs the Free Welfare Society for Disabled Afghans. This time, the young man didn't hesitate as he hobbled up the ramp. "Moshkel?" he said, using the Farsi word for "difficult." "Nothing is moshkel." ■



**Somewhere in the Hindu Kush Mountains in 1987, freedom fighter Rahman Beg (left), author Mackenzie (center), and an unidentified guerrilla pause in their journey out of the Panjshir Valley to Pakistan. Beg, a horseman, lost numerous members of his family in a 1985 Soviet attack on his village.**

Richard Mackenzie, a free-lance writer in Washington, D. C., was a war correspondent in Afghanistan during the 1980s. His most recent article for AIR FORCE Magazine, "Apache Attack," appeared in the October 1991 issue.



# INVESTMENT PERFORMANCE IS DETERMINED BY PROFITS... NOT PROPHETS.



We don't try to time the market. Our approach is different — one based on hard work, knowledge and pride. With over 20 years of experience, USAA Investment Management Company stands by its principles with the serious intent required to handle over \$15 billion, including over \$8 billion in mutual fund assets.

**MEET STUART WESTER...**

**Manages the Aggressive Growth Fund for USAA Mutual Fund, Inc.**

**Chartered Financial Analyst**

**Assistant Vice President, Equity Investments & Research**

**3 years experience with USAA Investment Management Company**

**16 years experience in investment management**

**Manages \$210 million for USAA and its subsidiaries**

**THE AGGRESSIVE GROWTH FUND...**

**\$271 million strong**

**10 years in existence**

**Performance\***

**1 year 71.69%**

**5 year 14.83%**

**10 year 12.60%**

**USAA Investment Management Company . . .  
because investing requires hard work.  
Not guess work.**

**1-800-235-0484**

\*Average annual total returns for the period ended December 31, 1991; assume reinvestment of dividends and capital gains at net asset value. Past performance is no guarantee of future results. Your return and share price will fluctuate with market conditions and you may have a gain or loss when you sell your shares. ■ For more complete information about the Aggressive Growth Fund, including charges and expenses, call for a USAA Mutual Fund, Inc. prospectus. Read it carefully before you invest or send money.





**It's difficult to believe now, but in the 1960s there was real resistance to putting ECM on the wing.**

# *Birth of the Pods*

By August R. Seefluth

**A**IR FORCE Lt. Gen. Charles A. Horner, Jr., the Desert Storm air boss who flew many Wild Weasel missions in the Vietnam War, once described electronic combat of that time as "kind of a string-along, learn-as-you-go affair." He explained that "the [electronic countermeasures, or ECM] pods we had on the airplanes were pretty primitive. Many were R&D kinds of stuff. We never really had a chance to integrate a whole EC package."

General Horner was referring to the QRC 160 series of ECM jammer pods. They were indeed R&D devices, and they were primitive. Largely unwanted by Tactical Air Command and inadequate in its overall performance, but pushing the state of the art nevertheless, the QRC 160 saved many fighter crews during the southeast Asia conflict. More important, this pioneering pod broke the ice for wider use of ECM systems, paving the way for the more sophisticated types used by General Horner's forces twenty years later in the Persian Gulf War.

When the 1960s opened, USAF fighters carried no electronic defenses at all—not even radar warn-

ing receivers. The deficiency left these planes ill-prepared for modern combat, a condition prevalent in TAC, US Air Forces in Europe, and Pacific Air Forces. Some experts in the tactical air forces recognized that a fighter without effective electronic countermeasures, or ECM, would likely become a dead duck pretty quickly if it had to attack a radar-defended target. However, the only warning receiver to be had was the AN/APS-54, a wide-open crystal. The only ECM system was the AN/ALE-2 chaff-dispenser pod, which was very large. Because of their size, neither was suitable for use on fighters. The technology was not available to produce jamming equipment that would fit inside tightly packed airframes.

Larger Strategic Air Command bombers and support aircraft were being updated with state-of-the-art ECM systems as rapidly as electronic threats could be identified by the Quick Reaction Capability (QRC) program. Under this program, research and development engineers could conduct their projects with personal phone calls, face-to-face meetings, and telegrams.

*The QRC 160 electronic countermeasures jammer pods were primitive R&D devices, but they saved many fighter crews in Vietnam and paved the way for the sophisticated ECM systems that helped win the Persian Gulf War. Opposite, a QRC 160-1 pod with two S-band and two L-band transmitters, mounted on a test aircraft.*

Direct access to Air Force headquarters, including those on the Air Staff, and to using commands was encouraged. As a result, the R&D community could respond quickly to changes in requirements.

One-on-one discussions, whether within the Air Force or between the Air Force and a contractor, often resulted in quick contract modifications, made directly by the assigned





buyer. When the Air Force first turned to producing tactical ECM pods, it was able to complete the entire effort, from initial R&D through production, in under three years' time.

### Work Begins at ASD

In early 1961, Air Force Systems Command's Aeronautical Systems Division (ASD), Wright-Patterson AFB, Ohio, contracted with General Electric for development of a jammer pod for fighters.

This program, designated QRC 160, was conducted by a small group of technicians headed by Laco Knight, who worked in the Defensive Branch of ASD's Avionics Division.

Mr. Knight, something of an expert at circumventing red tape, had some experience with a program that developed an earlier pod called Long Sam. Herb Smalls, an electronics engineer, had a talent for gaining access to people whose approval was needed for action. Capt. Juan Butto, a power-tube engineer, made sure the transmitters worked. I was an Air Force captain, newly arrived at ASD from an electronic

warfare job in USAFE, and the only member of the group with actual operational experience. I was named project engineer.

The plan was to produce a family of self-contained pods for universal use on the fighter fleet. The design constraints were well understood. The systems were to be delivered in ready-to-go condition, with support equipment able to operate in the field. Aircraft modifications were kept to a minimum. We all understood that fighter pilots would be averse to losing a stores pylon or a fuel station in order to make room for an ECM pod. The drag caused by the nonjettisonable pod had to be minimal. In general, we believed that the pods should never handicap the pilot, so they had to be qualified for supersonic flight and high G-loads.

The only readily available drag data had been gathered on the Sidewinder missile, which was approximately the same size and configuration as the proposed jammer pod. These Sidewinder data were used for aircraft performance estimates. The estimates could not be confirmed empirically, however, be-

cause no high-velocity wind tunnel was yet available and the day-to-day variations in F-100 fighter performance exceeded the drag effect of the pod itself.

The team established that the pod could have a maximum diameter of ten inches, a size that would fit snugly against an armament pylon, and a maximum length of 100 inches, which would give sufficient clearance for the flaps and slats. The target weight was 100 pounds, light enough that two men could load the pod without ground support equipment.

### State-of-the-Art Electronics

The electronic heart of the pod comprised discrete components, miniature vacuum tubes, and a few transistors and magnetrons—state-of-the-art technology. To eliminate moisture, the systems were sealed; the pod was cooled by conducting heat through its skin. The pod used a 3.5 kilovolt-ampere alternator driven by a ram air turbine because none of the candidate aircraft had any excess electrical power. Provisions were made for connection to aircraft power, if available, in lieu of



using the ram air turbine. Wiring was kept simple, and, in most cases, existing spare wires were identified for control circuits.

When the two-blade ram air turbine was in operation, the turbine blades changed pitch automatically to maintain AC power of 400 cycles per second during varying flight conditions, including travel through the supersonic shock wave. The connector for aircraft power was located in a round hole in the top of the pod, just under the leading edge of the pylon.

The first development effort led to the production of four pods: two S-band types in the 2,400 to 3,500 megahertz range and two X-band types in the 9,000 to 10,500 megahertz range.

Each of the S-band pods (designated QRC 160-1) consisted of two cast-magnesium canisters, a spun-aluminum tail cone, and a nose-mounted ram air turbine, fastened together by steel clamps. Each canister had two voltage-tuned magnetrons, each feeding seventy-five watts of noise-modulated, continuous-wave energy to a stub antenna.

Later, an L-band version was developed and was often paired with the S-band units. Early in the program, technicians mounted a pod containing two S-band and two L-band transmitters on a test aircraft. Lower-frequency units were installed in the center stations to mini-

mize radio frequency interference. The only major problem was that the round pod and the lower wing surface formed a poor ground plane, disrupting the desired omnidirectional radiation pattern.

Each of the two X-band pods (designated QRC 160-2) comprised two canisters with a special tail cone. This was an automatic jammer with search and set-on receivers, intended to counter all common airborne fire-control radars with 150 watts of noise-modulated continuous-wave energy. It also warned the pilot when a radar had locked on to his aircraft.

Initially, the QRC 160-2 provided only aft quadrant coverage, but later models added a forward-facing transmitter antenna. The receivers used a stub antenna under the canister and a second antenna in the tail cone, while the jammer fed energy to a directional antenna mounted under the aft end of the pod. Isolating the receivers from the jammer was a major problem. GE solved it with shorting stubs located on the skin.

Other, low-frequency pods, with modified loop antennas mounted in radomes, were also developed and flown but never went into production. Though our test pilot encountered no trouble with these, there was concern that the antennas might cause a biplane effect on a fighter.

Test equipment was developed for QRC 160-1 and QRC 160-2. The electronic test sets were installed in weatherproof cases for flight line and shop use. Because tactical aircraft had to be ready to operate from austere bases without electrical power, a special venturi tube was provided to operate the ram air turbine. It could be mounted on a standard engine dolly. Two standard engine starter carts turned the ram air turbine fast enough to operate the pod electronics.

### One Pod per Plane

The F/RF-4C fighter, then just entering production, was selected as the carrying aircraft. A special pylon (designated QRC 160-7) was designed by McDonnell Douglas for installation just inside the fold joint. Only one pod was allowed per plane, because the magnetrons would interfere with the remote compass transmitter. The remote compass location turned out to be on the left wing of one F-4 model and the right wing on another. The aircraft designers made available only three wires to hook to the pod. They allocated one 2.25-inch panel in the cockpit for control purposes. Cockpit space limitations forced the design of a subminiaturized control panel.

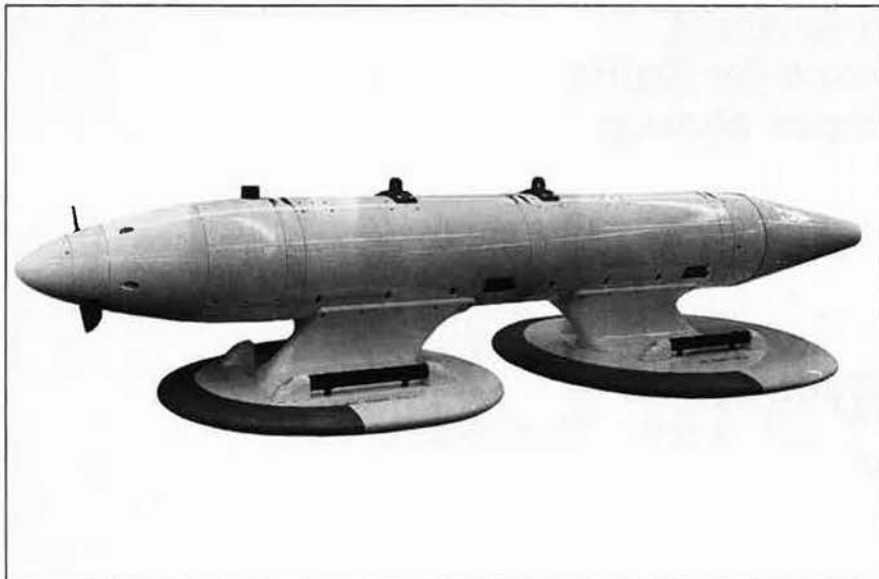
The ASD test-bed for the new ECM pod was an F-100 fighter. It was flown by Capt. Ed White, who later performed the first US space walk and died in the Apollo 1 capsule fire. After one of the pods was damaged in a surface shipment, Captain White flew the F-100 to Griffiss AFB, N. Y., picked up the remaining prototype pods, and delivered them directly to ASD in Ohio.

The development team flew as many engineering tests as possible out of Wright-Patterson AFB. Later tests at Eglin AFB, Fla., would concentrate on jamming effectiveness. At Wright-Patterson, the performance of all systems (other than the jammer) was confirmed. The flight envelope and effects on the F-100 aircraft were investigated. Pod drag effects were so small as to be undetectable. Since no supersonic test facility was available, Captain White collected the needed data by taking the F-100 up to altitude, then diving through Mach 1 in formation



*The X-band QRC 160-2 was an automatic jammer designed to counter all common airborne fire-control radars. It also warned the pilot when a radar locked on to his aircraft. After successful engineering tests, it saw service in Vietnam as the AN/ALQ-72 and was used briefly in electronic warfare training.*





*Among the ECM pods developed and tested at Air Force Systems Command's Aeronautical Systems Division were low-frequency pods with modified loop antennas mounted in radomes. Though ASD's test pilot encountered no trouble with these pods, some worried that the antennas might cause a biplane effect.*

with another F-100 carrying a photographer. The photography was rock-solid, showing the shock wave moving across the ram air turbine without interfering with its operation, as confirmed by pod instrumentation.

Captain White also flew the ASD F-100 test plane during the engineering functional tests, which pitted the pod against the electronic range at Eglin AFB. The test programs were carefully designed to check radiation patterns, effectiveness of jamming, X-band receiver effectiveness, and the pod's maintenance requirements, which were not excessive for engineering test models.

The QRC 160-1 was tested in July 1962 at Eglin. Runs at various aspect angles against Eglin Sites 4 and 20 showed that it could disrupt anti-aircraft artillery fire control and protect the aircraft against SAM-2. The system, flying over the Eglin range, also showed good results against search and height-finder radars located at Crystal Springs, Miss. In the engineering tests, QRC 160-2 performed well against airborne fire-control radar.

### **Institutional Reluctance**

In 1963, GE produced a small quantity of QRC 160-1 and -2 pods so that tactical users could begin building operational capability. Institutionally, however, the tactical air forces were slow to accept the pods.

TAC refused to train maintenance personnel on QRC devices, which were by nature limited-production R&D equipment. Engineering tests were not designed to develop detailed combat tactics, but TAC, showing no apparent interest in the pods, declined to provide a plane and crew for operational tests and tactics development. ASD could develop no tactics other than those built into the engineering test program, largely because no potential user was willing to provide the necessary operational support, especially radar-equipped interceptors. Air Defense Command expressed some interest, but nothing concrete came of it.

The pods were not carried on aircraft until the Air Staff intervened. Some aircraft were wired incorrectly; as soon as TAC began flying them, the crews inadvertently jet-

tisoned four QRC 160-1 pods, one in Louisiana and three in Virginia.

No fighter pilot likes excess weight and drag; in the absence of firm operational requirements to carry and exercise the jammer pods, they were rarely used. As a result, when the pods finally were deployed in southeast Asia, they were not properly supported and no tactics had been developed for their effective use.

When the engineering tests were completed, work statements were prepared for production of two hundred units. QRC 160-1 came to be known as the AN/ALQ-71, and QRC 160-2 became the AN/ALQ-72. Hughes won the production contract but, for about a year, could not deliver a system that met requirements.

In spite of the lack of training and preparation, QRC 160 and ALQ-71/72 pods were used effectively by combat crews in the Vietnam War. They were forced to improvise tactics and procedures in the heat of battle, but, fortunately, pilots and crews learned fast. Such operations provided the experience necessary for wider acceptance of ECM gear in USAF tactical operations.

Meanwhile, ASD technicians were developing other pod concepts under the 669A program, and no further work was undertaken with respect to the QRC 160 or the ALQ-71/72 systems. Later, the ALQ-72 was briefly used in Air Defense Command for electronic warfare training.

Emphasis soon turned to development of larger pods, a move that culminated in the ALQ-119 and -131. Very little QRC 160 experience fed into these systems. The 669A effort was a formal program whose goals were to achieve higher power and greater sophistication.

The greatest benefit that the Air Force derived from its experience with the QRC 160 was awareness of the advantages of ECM in tactical air operations. Successful employment in the Gulf War of ECM, along with all the other elements of modern electronic combat, showed the real payoff of the first program. The equipment takes up valuable space on already crowded aircraft, but, when combined with the training that TAC now provides, it saves lives. ■

---

*August R. Seefluth was the project engineer and program manager of the QRC 160 pod effort during its development, test, and initial production phases. His military service included fourteen years as an electronic warfare officer. He is now a free-lance writer living in Ohio. This is his first article for AIR FORCE Magazine.*



**With the volcano about to erupt,  
14,000 Americans headed for Subic  
Bay in a bumper-to-bumper convoy.**

USAF photo by TSgt. Val Gemphs

# Last Days at Clark

By Peter Grier

**T**HE beginning of the end of the Air Force's presence at Clark AB in the Philippines came on Saturday, June 15, 1991, at precisely 5:55 a.m. local time. In the months since, a skeleton crew left there as caretakers has begun calling that day "Black Saturday." Those who were there say that what they saw will stay with them all their lives.

At that early hour came the enormous, long-threatened explosion of Mount Pinatubo, which took place at the same moment that a violent tropical storm, Typhoon Yunya, was sweeping in from the sea and bearing down on the islands. Witnesses say they saw a wall of ash and soot some five miles wide rising directly into Yunya's swirling winds and rain. Rather than continuing to climb, as did the smaller plumes of previous days, the debris from this eruption began spreading horizontally. Clark AB lay directly in the path of the mess.

At the scene, US Geological Survey (USGS) volcano experts warned commanders that the air base could be threatened by pyroclastic flows—streams of molten ash and rock superheated to

900° Celsius and moving at speeds of up to 100 miles per hour. Most of the 1,500-strong, mission-essential Air Force team was evacuated to safer ground at an agricultural college on the Philippine-controlled portion of the base. Only a few team members were left at Clark in the early afternoon, when the sky turned black and it began raining stones.

"They were just like hailstones. It was incredible," said SMSgt. Arthur Futch, a member of the Air Force's mission-essential team who stayed at Clark throughout the initial evacuation and its months-long aftermath. Falling rocks and ash muffled all sound. Sergeant Futch said it "was like a reverse snowstorm," a winter scene with everything turning black instead of white.

By 2:30 p.m., the situation for those still at Clark proper was clearly untenable. All remaining personnel were taken to the agricultural college. A natural disaster had just forced the US to take the unprecedented step of mounting a complete, immediate evacuation of a major military installation, leaving behind hundreds of millions of dollars'

worth of equipment and personal possessions.

When the worst part of the ash fall was over, 100 buildings at Clark had been destroyed and the base had sustained more than \$300 million in damage.

Ongoing negotiations with Manila over US military basing rights had been rendered moot, at least so far as Clark AB was concerned. After inspecting the damage from the air, US negotiator Richard Armitage said it was obvious that the base was fatally threatened by continuing explosions and mudslides. As he said at the time, "We're out of Clark forever."

## The Last "Retreat"

His prediction came true on November 26, 1991, when "Retreat" sounded for the last time and the US Air Force formally turned over to the Philippines what had once been its largest overseas military installa-







tion. A long and colorful base history that began in 1903 when Clark was founded as Fort Stotsenburg, a US cavalry installation, was over.

"The long-standing US presence here is ending," said Maj. Gen. William A. Studer, commander of 13th Air Force, at the closing ceremony. General Studer and his command have since moved to Andersen AFB, Guam.

The natural events that helped to force Clark's closing began building up hundreds of years ago. Scientists say that Mount Pinatubo's last major eruption could have occurred no later than 1499, only seven years after Christopher Columbus sailed to the New World. The volcano had lain fairly dormant ever since.

Pinatubo was considered one of the least active volcanos in what volcanologists call the Pacific "Ring of Fire," a belt of seismic activity stretching from Japan southward. Though it was one of the least active, Pinatubo was by no means considered less dangerous. According to data from the Smithsonian Institution's Global Volcanism Network, eleven of the fourteen largest eruptions of the last two hundred years involved long-dormant volcanos. This includes the deadliest eruption of modern times, the 1883 explosion of Krakatoa, which killed 36,000 people on Java and Sumatra in what is now Indonesia.

Geologically, the Philippines is one of the most active areas of the world. The Philippine archipelago rests on a continental slab riven by eight major earthquake-generating faults and is squashed between huge tectonic plates to the east and west. In July 1990, an earthquake killed 1,621 people on the island of Luzon, and scientists from the Philippine Institute of Volcanology and Seismology think this tremor may have acted as the trigger that helped Pinatubo go critical.

During the quake, a landslide occurred on Pinatubo's northwestern slope, perhaps a sign that a fault underneath the mountain was shifting.

The first hints that something was amiss with the mountain came in the early spring of 1991. On April 2, an explosion from Pinatubo's southern region spread ash across the countryside up to ten kilometers away from the center of the blast. Philippine scientists quickly installed monitors and detected a pattern of tremors, called a "seismic swarm," that indicated molten lava was rising to the surface nearby.

#### One Year at Most

Concerned Air Force officials requested expert help from the US Geological Survey, and a USGS team arrived on April 23. Further examination of seismic data and air

samples convinced the US volcanologists within weeks that a major eruption was imminent. They couldn't predict with assurance the exact date. Their best guess was that the mountain would blow sometime within a year.

Throughout May, seismic tremors in the Pinatubo region continued, growing stronger and appearing to emanate from points closer to the surface. By early June, experts began to warn that a major explosion could occur at any time. Clark officials began planning for evacuation. By June 8, each American household had received a detailed evacuation pamphlet, giving instructions on what to do, what to bring, and what to leave behind.

The first items to go were the Air Force's aircraft. All remaining F-4s from the two squadrons based at Clark had already flown out of the country as part of a previously scheduled drawdown. On Sunday, June 9, just about everything still on the flight line—MC-130 Combat Talons, MH-53 Pave Low helicopters, C-12 Huron transports—moved to Cubi Point NAS, near the huge Subic Bay naval facility. Three UH-1N Iroquois helicopters were left behind.

In the early morning darkness of June 9, the USGS experts said a major eruption could be expected within twenty-four hours. A few hours later on that Sunday morning, two Pinatubo craters spat ash and rocks skyward. The debris drifted toward the northwest, away from Clark. But the base lies only about ten miles east of the volcano, and General Studer decided the time had come for evacuation.

The evacuation announcement went out at 5:00 a.m. over the Clark Far East Network radio. By 6:00 a.m., the first of three organized sectors of Clark residents had formed up to drive the length of the fifty-mile, two-lane road to Subic Bay. By noon, some 14,000 personnel were on their way, beginning the withdrawal code-named "Fiery Vigil." The mission-essential group left behind numbered about 1,500, slightly more than half of them security policemen.

As cars crawled along the road in the midday heat of a Philippine June, the evacuation convoy formed a bumper-to-bumper snake two

USAF photo by TSgt. Val Gemphie



At 5:55 a.m. on June 15, 1991, Mount Pinatubo erupted. At the same time, Typhoon Yunya was moving in on the Philippine islands. A wall of ash and soot five miles wide rose directly into the violent tropical storm and began to spread toward Clark AB. By the end of the day, even the mission-essential force had left.



miles long. Violently anti-American Communist guerrillas have roamed freely through some of the territory alongside the road, so Marine forces and patrolling helicopters were on hand to provide security.

With cars crammed with pets, kids, and household goods, some evacuees felt caught in a Philippine version of the Long Island Expressway at rush hour. By nightfall, however, all 14,000 evacuees had made it to the Navy base at Subic without major incident.

The problem then was to find housing for all of these unexpected guests. The roughly 1,100 Navy families took in a large number of the stranded. The rest made do in gyms, dorms, and chapels.

### A Gigantic Mushroom Cloud

Meanwhile, the pressure inside Pinatubo kept building. On Wednesday, June 12, it blew a column of ash into a mushroom cloud 60,000 feet high, and most of the mission-essential crew were transferred to the safe haven at Pampanga Agricultural College on the slope of Mount Arayat. Luckily, the ash drifted westward, away from Clark. Over the next few days, however, the scope and magnitude of threatening seismic activity caused base personnel to sound eight "bug-out" sirens, only to reverse the order within a short time.

Then, on June 15, came Black Saturday and the freak combination of massive volcanic eruption and typhoon. The strange darkness at noon also enveloped Subic Bay, causing some evacuees to wonder if they hadn't stopped their trek away from the volcano too soon.

Pinatubo's ash, when mixed with the storm's seven-inch downpour, turned into falling concrete, violently pummeling the now-deserted air base. From 1:30 p.m. Saturday onward, fifteen hours of violent explosions ripped the volcano. Its summit collapsed into the rising, fiery magma and was blown back into the air. Later, when the mountain had calmed down somewhat, Philippine scientists judged that they had just witnessed the most powerful volcanic explosion of this century. Pinatubo threw at least twice as much debris into the atmosphere as did Mount Saint Helens when it erupted in 1980.



USAF photo by ATC Steve McNally

Early in the morning of June 9, US Geological Survey experts predicted a major eruption within twenty-four hours. At 5:00 a.m., "Fiery Vigil" was set in motion, and 14,000 Clark residents began to form up (above) to drive to the Subic Bay naval facility. The convoy formed a bumper-to-bumper snake two miles long.

US personnel weren't gone for long. A vanguard security force was back on the base by Sunday morning, barely twelve hours after the last man had left. They returned to something far different from what they had left.

A lush tropical landscape had been turned into a moonscape. Everything was buried under four to eight inches of rapidly hardening ash. Trees resembled big pencils sticking upright, lacking branches or leaves. The smashing power of the falling ash and the undermining force of the earth tremors had destroyed 111 buildings, including a gym, a skating center, seven warehouses, part of the powerplant, and all the shelters that had previously housed F-4s.

The bookstore, the NCO club, and much of the stock in the new car sales lot had been flattened by rapid mud flows called lahars. These mud waves also knocked out several bridges on MacArthur Highway. A superhot pyroclastic flow from the volcano had come frighteningly close to the base, traveling down a riverbed to within a few hundred yards of base housing.

### Deaths at Subic

Subic Bay had suffered from the day's natural events, too. Typhoon winds dumped six inches of ash on base buildings. Two young girls, one American, one Philippine, were

killed when a roof at Subic's Dewey High School collapsed. With ash having shorted out power pylons, with water running short, with all airports closed, and facing the threat of continued volcanic eruptions, US Pacific Command on June 16 ordered the Fiery Vigil evacuation of all military dependents, plus most Air Force military personnel, from the Philippines.

The next day, Navy ships started carrying the estimated 22,000 evacuees to the island of Cebu. By June 19, the armada had grown to twenty-one ships, including the *Nimitz*-class carrier *Abraham Lincoln*. From Cebu, the road home for evacuees entailed flying to Andersen AFB, from there to Hickam AFB, Hawaii, and on to West Coast installations.

By the end of June, just about every evacuee had made it to California.

Back at Clark, life was not returning to normal. As damage-control teams set to work, they discovered a shortage of a key item—shovels for clearing ash from roofs, sidewalks, and roads. They ordered 200 snow shovels from Elmendorf AFB, Alaska. Clark turned one of its damaged workshops into a shovel factory, churning out 800 in a few weeks.

Ash falls and seismic events continued to hit the area. The continued instability convinced many in the





**A vanguard security force returned to find Clark buried under four to eight inches of ash. Falling ash, earth tremors, and mud flows had destroyed 111 buildings and several bridges. Molten ash and rock had flowed within a few hundred yards of base housing. Ash falls and tremors continued for weeks.**

mission-essential crew to spend the nights in their cars instead of in buildings, which were in constant danger of collapse. Tremors sometimes rocked them to sleep. "I spent just about every night in my car," recalled Sergeant Futch.

Three hundred Philippine contract workers were hired to help clean up, but much of their time was spent packing the household belongings of evacuees. In early July, earth-moving machines were hard at work—not clearing runways, but scraping off the golf course putting greens to give the Clark skeleton crew some recreation.

Base security continued to be a concern. "Looting was a problem," said Sergeant Futch, "though it was not being done on the scale people have been led to believe." After the evacuation began, say Air Force officials, the base experienced ninety-six break-ins in government buildings and another 200 in base housing. Of these crimes, two involved ransacked homes. The looters apparently breached some sensitive areas. A Philippine television network showed pictures that it said were of buildings at the Crow Valley range on Clark grounds, with open doors and ransacked interiors.

### **The Nuclear Question**

One British newspaper, the *Guardian*, charged in late June that Clark AB had been used temporarily

as a storage site for US nuclear warheads and that these were hastily removed when Pinatubo began rumbling. US and Philippine officials denied the charge, but the Philippine Senate called for an investigation.

According to Robert Norris, a nuclear weapons expert with the Natural Resources Defense Council, Clark AB could not have been used as a nuclear weapons storage center. It didn't have the special facilities or trained personnel required to guard the weapons, he said.

Some of Clark's conventional munitions were destroyed on site by demolition teams. The rest—weighing 3,250 tons—eventually was trucked to Subic Bay.

If the Pinatubo disaster had happened elsewhere, the Air Force perhaps would have begun shaping its long-range recovery plans immediately, but Clark's future had been in doubt for years by the time the volcano blew. Coming in the middle of basing rights negotiations, the explosion only hastened what may have been inevitable.

On July 17, 1991, the US decision to pack up became official. US and Philippine government negotiators signed a new base rights pact that

called for the US to abandon Clark in stages. The US Navy would retain rights to the Subic Bay naval facility for ten years at a total cost of about \$2 billion in direct aid.

At that point, the cleanup crew at Clark began moving out more than household goods. Before the eruption, there had been no massive movement of mission equipment—"only onesies and twosies" of valuable items, according to Sergeant Futch. For example, the threat-emitting radars on the Crow Valley range had been taken out before the ash could damage them.

No munitions igloos collapsed. Though some warehouses sustained extensive damage, about ninety percent of the equipment in storage was recovered, said Sergeant Futch. By the time taps for Clark sounded in late November, more than 1,500 fully loaded, forty-foot trailers of equipment had been shipped from the base. In addition, the mission-essential crew moved more than 2,000 private vehicles and the possessions of 3,000 homes.

Patrol dogs were carried away, too. Of the base's 100 or so working canines, half were evacuated and half stayed in kennels throughout the worst of the eruption. All survived and will be assigned to duty at other Pacific Air Forces bases. The horses of Clark's official horseback patrol, last of its kind in the Air Force, didn't all get reassigned. Some were sold at auction.

In September 1991, the Philippine Senate rejected the laboriously negotiated basing rights pact, raising anew the question of Subic Bay's fate. In any case, Clark is gone. Philippine officials utter much brave talk about reconstituting the base as an international airport or perhaps a manufacturing center. Those plans, however, are on hold as the Philippines searches for money to support volcano-recovery efforts.

Sergeant Futch, one of the last Americans to leave, said he will miss the base and its lush tropical foliage. Its strategic value may have declined, but its setting still had a lot to recommend it. "It's not necessarily a happy ending," he said. ■

---

*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 Flags Come Home," appeared in the October 1991 issue.*



By John L. Frisbee, Contributing Editor

## A Tale of Two Crosses

Leland Kennedy salvaged two combat rescue attempts that seemed doomed to failure.

**N**O ONE who was in southeast Asia during the long course of the war will be surprised that, in relation to their number, Air Rescue and Recovery Service (ARRS) crewmen earned more combat decorations than any other group. One of their number, then-Capt. Leland Kennedy, was the first airman to be awarded the Air Force Cross twice. His two awards of the nation's second highest decoration for valor were for extraordinary heroism in combat missions only fifteen days apart.

Captain Kennedy had been at Udorn RTAFB, Thailand, with Detachment 5 of the 38th ARRS Squadron only a short time when, on October 5, 1966, he lifted his HH-3E Jolly Green Giant helicopter off the ground to search for an F-4C crew downed along the Black River west of Hanoi. It was a deep penetration—some 300 miles into enemy territory. He was flying backup to Capt. Oliver O'Mara, pilot of the low rescue bird.

The F-4 crew was located in a box canyon. Two A-1H "Sandys" made a low pass over the area, drawing no fire. Captain O'Mara dropped into the canyon and lowered his hoist. His helicopter was immediately hit by fire from a ridge 200 yards above the F-4 pilot. Captain O'Mara had to pull out, but he made two more attempts in the badly damaged HH-3E before his hoist was knocked out and he had to head for Udorn. (Captain O'Mara was awarded the Air Force Cross for his part in the mission.)

The usual practice was for the secondary helicopter to escort the lead ship home if it was heavily damaged, but Captain Kennedy was asked to return and attempt a pickup. It was his eighth mission and his first actual rescue attempt. On the first pass, his Jolly Green was hit and one of the crew wounded. In spite of the odds against them, Kennedy's three crewmen joined him in wanting to try



again. Four times the HH-3E was driven off by enemy fire, taking more hits on each pass. On the fifth try, with Captain Kennedy holding the aircraft in a hover just off the canyon floor, the crew dropped their hoist to the pilot and reeled him in. Kennedy climbed out of the canyon and flew his tattered chopper back to Udorn. His determination, skill, and sustained heroism were to make him a member of an elite group—only twenty-five at that time—to earn the Air Force Cross.

The mission for which Captain Kennedy was awarded an oak leaf cluster to the Air Force Cross came fifteen days later, on October 20. Again he was flying the secondary helicopter in an attempt to rescue an F-4 crew, both of whom had parachuted into trees. The lead helicopter, flown by Maj. A. D. Youngblood, dropped its hoist

to the pilot, who had strapped himself to a tree. While the downed pilot was hanging half in the hoist, Major Youngblood's Jolly Green was hit so hard he had to make an emergency landing.

Captain Kennedy, descending and dumping fuel to compensate for the added weight of Major Youngblood's crew and the F-4 pilot, directed Youngblood to a field nearly a mile away. Kennedy had to continue dumping fuel while on the ground—engines running and rotor turning—knowing that vaporizing fuel might blow up the aircraft at any moment. Luck was with them. Major Youngblood's crew and the rescued pilot climbed aboard, one of them wounded by small arms fire, and Kennedy lifted off with nine men in the helicopter.

At that point, an O-1E pilot spotted the second F-4 crewman, still in a tree. As Kennedy hovered to pick him up, enemy soldiers came from the tree line, firing at the HH-3. The F-4 crewman was wounded as he came up the hoist, and Kennedy started for Nakhon Phanom. Then one of the Sandys that had participated in the rescue reported that it was losing power. Kennedy escorted the damaged Sandy all the way to a safe landing. It was a great day for an elated Jolly Green crew who saved six fellow Americans from death or the horrors of Hanoi's prisons.

Leland Kennedy, now a retired colonel, flew ninety-nine missions in southeast Asia for a total of 354 combat hours. Colonel Kennedy spent much of his subsequent career in Alaska before retiring from an assignment as director of Operations Plans at Tactical Air Command headquarters. Like so many other ARRS crewmen, the satisfaction of saving others whose lives were in peril made his combat tour in southeast Asia the high point of an Air Force career. Leland Kennedy was a major player in southeast Asia rescue operations, called by former Secretary of the Air Force Harold Brown "one of the most outstanding human dramas in the history of the Air Force." ■





# The Force In Art



**S**INCE its beginnings in 1950, the Air Force Art Program has sponsored professional artists' efforts to capture the essence of various Air Force missions. Today, the program's collection contains more than 7,000 works. Here are some of the latest additions to that body of work.

*Above, "Moon Shadows," by Craig Kodera; opposite, "The Mother of All Parades," by John Thompson.*









*Above, "An Eye on the World" by Nilo Santiago; left, "Super Jolly: Final Checks," by Keith W. Criss; below, RF-4s from the 67th TRW, Bergstrom AFB, Tex., by William Lacy.*







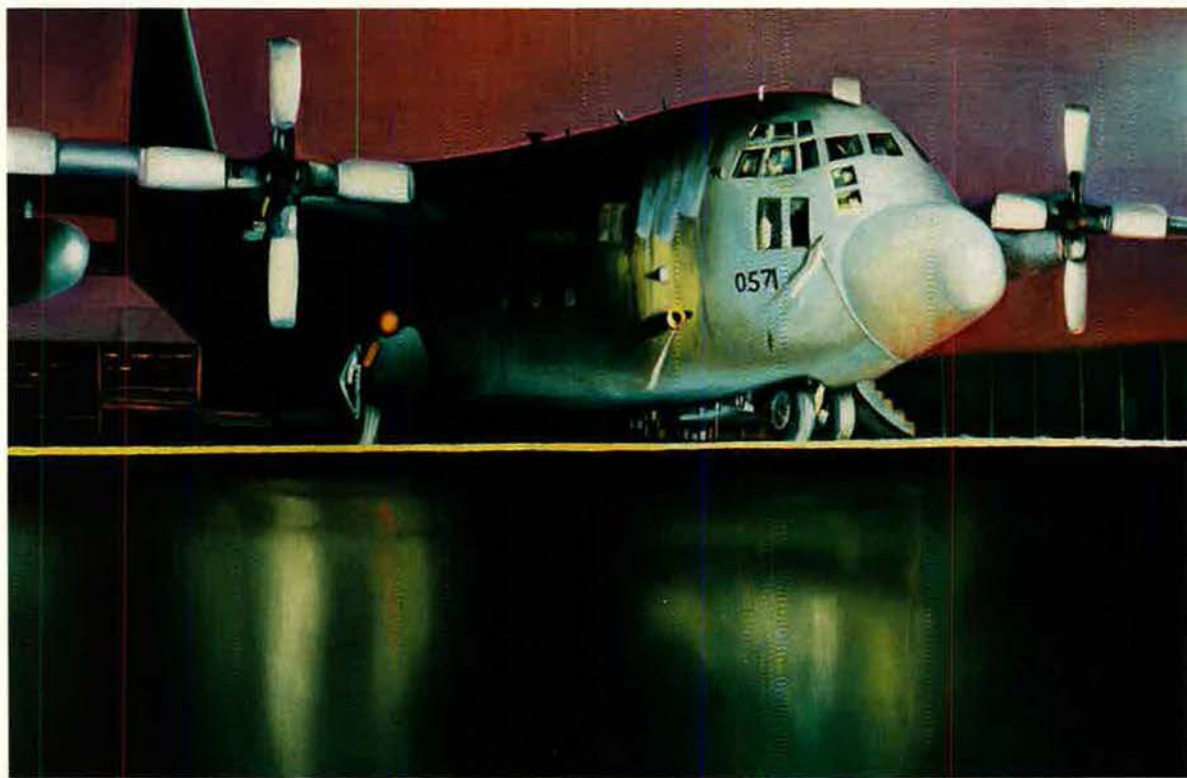
**Above, "Launch Team,"**  
**by James Few; right,**  
**"Navigator KC-135:**  
**Lunch is Over,"** by Paul  
**Kreutziger; below,**  
**"The Mechanics,"** by  
**Ronald Weiss.**



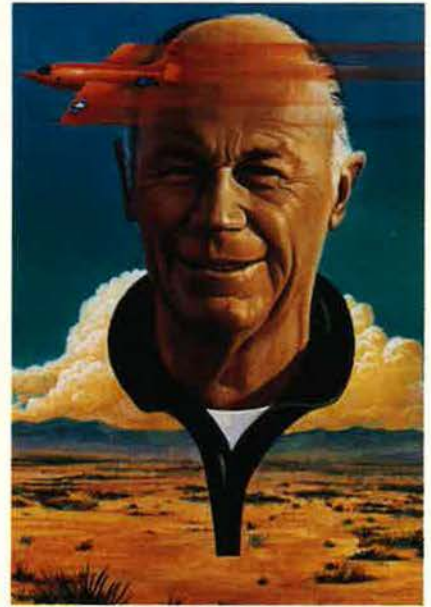
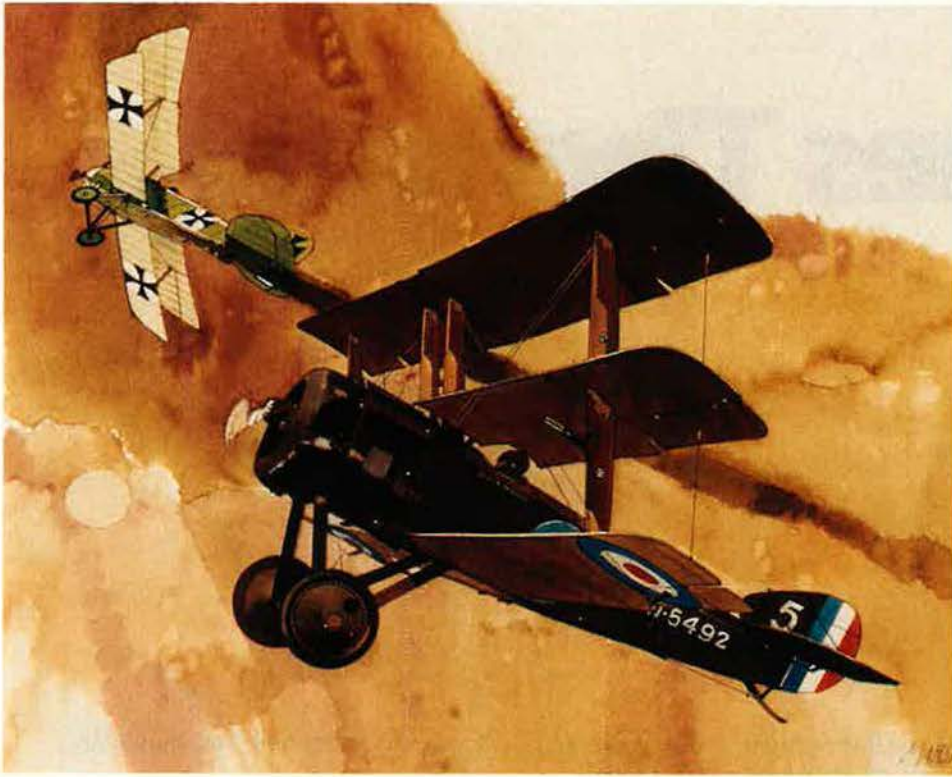




*Right, "Stealth Over the Sierras," by Ren Wicks; below, "Midnight Mission," by Karen Chandler.*







*Top right, a portrait of Chuck Yeager by Bruce Bowles; above, "Black Maria," by William Marsalko; right, "Operation Desert Storm," by A. Merrill.*





**SSgt. James J. Philhower, the Crew Chief of the Year, views his airplanes as an extension of himself.**

# He Makes Them Fly

By Amy D. Marchand, Editorial Assistant

**S**SGT. James J. Philhower's hard work and near-flawless performance as a C-130-dedicated crew chief with the 435th Aircraft Generation Squadron, 435th Tactical Airlift Wing, Rhein-Main AB, Germany, have made him Crew Chief of the Year for 1991. He is the first Military Airlift Command crew chief to be so honored since AFA began presenting this award in 1988.

From August 1990 to February 1991, the 435th AGS was deployed to the Middle East for Operations Desert Shield and Desert Storm, ferrying cargo and supplies in-theater and eventually transporting the XVIII Airborne Corps. During this time, Sergeant Philhower's aircraft flew 849.2 hours with a 100 percent on-time departure rate. What typifies his performance, however, according to Maj. J. D. Pauly, maintenance supervisor for the 435th AGS, is Sergeant Philhower's selfless volunteer spirit.

For example, when the thirty-person advance party first deployed, "all of us had been up for probably twenty-four hours at one point. . . . [Sergeant Philhower] was out there throughout, making

sure all the preparations were taken care of, that we had parking spots [for the aircraft] lined up, that each of the planes . . . coming through was being serviced, and he was there to greet each one. He took this on himself, and he actually worked another shift when he didn't have to. He volunteered for it."

Sergeant Philhower's performance in Desert Shield and Desert Storm earned him AGS NCO of the Month honors for August 1990 and February 1991.

## "Mechanically Perfect"

His performance at home base was equally stunning. His C-130 flew more missions in 1990 than any other at Rhein-Main (485 out of 4,461 C-130 missions for the entire base), with a mission capable rate of ninety-eight percent. Comparison with wing averages makes his aircraft shine all the more. In a twelve-month period, his aircraft averaged seventeen no-defect flights per month, as opposed to only three per month for most aircraft. His aircraft averaged 4.3 delayed discrepancies, against a wing average of 22.9. Major Pauly summed it up: "His air-

craft was essentially mechanically perfect."

That perfection was no accident, but rather the result of many hours of hard work. Comments on his long hours run throughout his nomination, with one aircraft commander noting, "He was always staying at the aircraft long after the crew had gone to bed." Major Pauly also commented on his dedication: "He views his aircraft and its performance and its appearance as an extension of himself."

With its reputation for dependability, his aircraft became the one called on for short-notice or high-profile missions. "Whenever we had a high-profile sort of mission, of which we get many here at Rhein-Main, his aircraft was so good that we instantly thought to schedule it for that mission, because we knew we could count on it to meet all the requirements," said Major Pauly.

"When you've been in maintenance as long as I have, you've seen a lot of things go wrong, so when you have a sure thing, you go for it. Sergeant Philhower always made sure that his aircraft was as close to a sure thing as I've ever seen."



The special missions in which Sergeant Philhower participated during 1990 included two training weeks without normal support, one each in France and Italy; two static displays, one at the RAF International Tattoo in England, the other at the Tempelhof Berlin Open House/Air Show; and three Intermediate-Range Nuclear Forces Treaty missions transporting US inspectors and other officials to Moscow, to Rome, and to Leipzig, East Germany. On all of these missions Sergeant Philhower and his aircraft performed "flawlessly."

Even with the best preventive maintenance, things still can go wrong, "but if you've got a guy like him who's out there and proficient, he can take care of them without getting help from somebody else," said Major Pauly. Several incidents during 1990 gave Sergeant Philhower the opportunity to demonstrate that proficiency.

### Tough TDYs

Because of his aircraft's exceptional condition, it was readied for an immediate medevac flight to England in just forty-five minutes, even though the C-130 was scheduled for a maintenance down day. The C-130 departed Rhein-Main within two hours of notification. However, when the aircraft arrived at RAF Mildenhall, England, its number three propeller would not feather. Sergeant Philhower diag-

nosed the problem as a faulty valve housing and, the nomination says, "effectively coordinated all actions to obtain the necessary parts." A garlock seal leak developed at the fuel control during the engine run to check the valve housing, but Sergeant Philhower replaced the seal, and the mission continued with no further problems.

During a temporary duty (TDY) trip to Morocco for exercise African Eagle, an engine malfunctioned in flight. His nomination describes what happened: "Upon landing, he overcame the lack of facilities, the language barrier, and the lack of support personnel" and diagnosed the problem as a faulty valve housing. Through close coordination with the Moroccan Air Force, he acquired a replacement part and "returned the aircraft to mission capable status in minimum time."

On another TDY mission, this time to Senegal for exercise Broken Arrow, his aircraft's number two hydraulic pump failed during the take-off roll. "Without any support," Sergeant Philhower traced the problem to a bad pump, which he ordered and replaced, enabling the aircraft to complete its mission. Before that mission ended, however, the aircraft's air turbine motor failed en route to Lajes Field, Azores. Sergeant Philhower found the problem, a bad diverter. He received the part the next day and replaced it, and the aircraft returned to home station.

Sergeant Philhower's influence is not limited to his personal maintenance expertise. He developed a training program that matches the practical training on the aircraft to the corresponding applicable areas in the career development book. All four of his Skill Level Three trainees upgraded to Level Five under



his leadership, and his aircraft continued to be "the best prepared, best maintained aircraft in the fleet, even in his absence from home station."

His influence at Rhein-Main even extended to baseball. A three-year varsity letter-winner at his high school in Towanda, Pa., Sergeant Philhower played shortstop and third base for the 435th AGS baseball team, which won the 1990 base championship. In one tournament his teammates voted him most valuable player.

Sergeant Philhower was cited as a Quality Assurance Superior Performer for June, August, and September 1990 and was AGS Maintenance Man of the Month for December 1990. He is working toward a B.S. in professional aeronautics from Embry-Riddle Aeronautical University, where he is a dean's list student with a 3.9 grade point average.

In December 1991, Sergeant Philhower transferred to the 655th Special Operations Maintenance Squadron at Eglin AFB, Fla., where he will work on HC-130s. Says his former supervisor, "I wish I had him back." ■



**SSgt. James J. Philhower uses a flashlight to peer into the fuel tank in the wing of his C-130. His many extra hours of hard work paid off in reliability. His supervisor noted that "his aircraft was as close to a sure thing as I've ever seen."**



**A day in the flying life of the B-24  
Home for Christmas, as experienced by  
the bombardier.**

# The Mission

By Bruce D. Callander

**B-24 Liberators from Fifteenth Air Force plow through flak "so thick you could walk on it" over their target (the oil refineries of Ploesti, Romania). Fifteenth Air Force crews had to survive fifty such missions before rotating out of the theater.**

**W**AKE up, lieutenant. You're flying. Don't go back to sleep." The CQ then goes to wake another crew. We dress silently and stumble out toward the mess tent. It is 4:00 a.m., July 19, 1944, in southern Italy. It will be a long day.

Breakfast is largely fabricated. The juice tastes of the can it came from. Eggs and milk are reconstituted from powders. The toast is covered with unmeltable butter, and the coffee is part chicory. The pancakes look genuine, but I pass them up. At altitude, they would set like cement.

It's still dark as we move on to the briefing tent and take seats on empty ammo boxes. Somebody yells "Ten-hut!"

Col. A. L. Schroeder enters and says, "Be seated, gentlemen." He became commanding officer of the 464th Bomb Group three weeks ago, after Col. Marshall Bonner went down over Vienna.

The curtains part to reveal the big wall map, and everybody groans. The colored string indicating the bombing route stretches from the heel of the Italian boot to a red arrow in southern Germany. It's no

## Anatomy of a Mission

**Date:** July 19, 1944.

**Target:** Aircraft engine factory, Munich Allach, Germany.

**Aircraft:** B-24H, No. 42-52437, named *Home for Christmas*, built by Ford Motor Co. at Willow Run, Mich., under contract to Consolidated Aircraft.

**Crew:** Pilot, Roy G. Anderson; copilot, Ernest G. Astroff; navigator, David A. Kellogg; bombardier, Bruce D. Callander; engineer/top turret gunner, Alvin G. Ness; radio operator/nose gunner, James H. Hearon, Jr.; assistant engineer/rear turret gunner, J. D. Nowell; waist gunners, John H. Damron and Lawrence F. Gardner; ball turret gunner, Listel Kimble.

**Units:** 778th Bomb Squadron, 464th Bomb Group, 55th Bomb Wing, Fifteenth Air Force, Mediterranean Allied Air Forces.

**Base:** Pantanella, near Bari on southeast coast of Italy.

**Group History:** Formed July 1, 1943. Trained in Idaho in late 1943. Flew southern route to North Africa, arriving in Tunis in March 1944. Transferred to Italy March 1944. First mission flown: April 30, 1944, against marshaling yards at Castel Maggiore.







milk run, but there is one consolation. Because Fifteenth Air Force requires fifty missions before a crew is rotated out, and Eighth Air Force only twenty-five, we sometimes get double credit for the tough ones. This looks like a double.

Colonel Schroeder says the target, an aircraft engine factory near Munich, is vital to the German war effort. That's always a comfort. Other briefers take over. Flak will be light to moderate. Fighters are likely, but we'll have cover. Over the target, the weather is clear. If hit, we can go to Switzerland, but we should remember that means internment for the duration.

We synchronize our hack watches, the chaplain asks God to guard and guide us, and we break up. Pilots collect their "flimsies"—detailed orders printed on onion-skin paper that can be eaten, if necessary. Navigators receive their charts. I join the other bombardiers to get my target photos and to be reminded that wing headquarters wants a tight bombing pattern.

As we leave, we draw our escape kits. They contain silk maps, paper money, and compasses small enough to swallow, should we be captured. We toss our flight bags into a GI truck and pile in.

### **Home for Christmas**

In the Italian valley below, ground crews are loading bombs and rev-

ving up engines. The truck rumbles down the gravel road and rattles across the steel landing mats to our plane. We stow our gear, check our stations, and make sure the ground crews have delivered our chest-pack parachutes, K rations, and first-aid kits. They used to leave medical kits on board between missions, but someone was stealing the morphine out of them, so the crews began locking them up.

The pilots do their walkaround and then join us for a smoke at the edge of the hardstand. The pilot, Roy Anderson, has been aircraft commander since the crew was formed, but our original copilot has



*The crew poses with Home for Christmas (above). Standing (left to right) are navigator David A. Kellogg, pilot Roy G. Anderson, and bombardier Bruce D. Callander. In front are gunners Listel Kimble, Alvin G. Ness, John H. Damron, J. D. Nowell, Lawrence F. Gardner, and James H. Hearon, Jr. Not pictured is copilot Ernest G. Astroff. Top, another Fifteenth Air Force B-24 shows the "unexpected grace" that the Liberator, ungainly on the ground, achieves while airborne.*

been given his own crew. Ernest Astroff will fly in that position today.

Our B-24H, No. 42-52437, stands nearby. We have named her *Home for Christmas*, after the sentimental song recently popularized by Frank Sinatra. For good luck, we hung a tree ornament over the flight deck, but somebody swiped it. We didn't dare tell the gunners it was gone until we had flown a mission safely without it.

It's time to start engines. Al Ness, our flight engineer, switches on the little putt-putt motor that supplies ground power. One by one, the props turn, the engines spew blue smoke, and the plane roars to life. The bomb bay doors grind shut, and we pull out. Two dozen bombers fall into single file like elephants heading for the water hole.

During the roll, the pilots run their checks. We pull onto the runway, Anderson shoves the throttles full forward, and we gather speed. Ahead, one plane is clearing the ground. Behind, another is moving into takeoff position.

Once it becomes airborne, the B-24 takes on an unexpected grace. Its fat body seems longer. The narrow wings reach out like fingers. Built for long range and heavy hauling, it is now in its element.

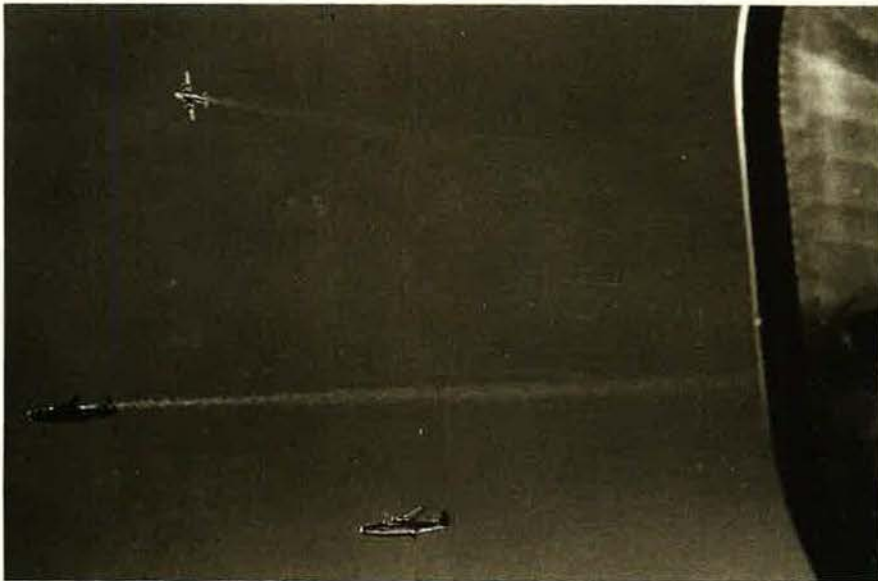
We climb and begin the slow process of forming up, first by elements, then by flights, squadrons, groups, and wings. The morning sky fills with white contrails. Nine months earlier, the new Fifteenth Air Force mounted its first mission with only 112 planes. Now we launch as many as 1,000 at a time.

### **Boredom and Terror**

The long flight is under way. In the movies, it would be an action-filled adventure. In reality, it will be what has been described as an eight-hour exercise in physical endurance and utter boredom broken by a few moments of sheer terror.

Over the Adriatic, the gunners test-fire their weapons and the plane quivers. At 10,000 feet, we buckle sticky rubber oxygen masks to our fleecelined helmets. I call each crew member on the intercom to make sure his system is working. I will check again each half-hour. This became one of the bombardier's regular duties after a turret gunner on one crew passed out and





*It wasn't always so easy as the movies made it seem. Here, two Fifteenth Air Force B-24s have been hit by heavy flak over their target. One has peeled out of formation prior to crashing, while another struggles to maintain its position in the flight despite a smoking engine. Below, author Callander makes it look easy.*

died because his oxygen hose became disconnected.

The temperature drops as we climb. It will fall to  $-50^{\circ}$  Fahrenheit over the mountains. The B-24 has little insulation and numerous gaps and unpatched flak holes. A tiny heater on the flight deck keeps the pilots' feet from freezing, but it does little more than that.

Our main protection from the cold comes from layers of clothing. We start with long johns, thick socks, and heavy sweaters. Over that come fleece-lined flying suits with bulky jackets, thick boots, and pants that zip together like a toddler's snowsuit. A parachute harness and a Mae West vest increase the bulk to the point where we are barely able to move. Later we will add flak vests and steel helmets.

The waist gunners, standing beside open windows, suffer most from the cold. They were issued blue flannel "bunny suits" with heating wires embedded in them. One of the waist gunners, Larry Gardner, says his suit provides some relief from the cold. The other, John Damron, quit wearing his after one of the wires shorted out and burned his leg.

We skirt Venice and climb as we approach the Alps. At 25,000 feet, the sky is ice blue. Below, in the snow-capped mountains, tiny villages perch atop the lower peaks like figures on a wedding cake. They

look like pictures from my sixth grade geography book.

There's little time to admire the view. Dark specks appear at the fringes of the formation, and we speculate whether they are our fighters or theirs. The formation tightens up. Nuzzling up to another four-engine bomber is nerve-wracking work, but we have rehearsed it often. On practice runs, we have flown so close that the waist gunners on one plane could touch the wing lights of another.

The fighters keep their distance. If they are from the Luftwaffe, they'll probably wait until we come off the target and then look for cripples. Our gunners save their ammunition.

Suddenly, gunner Listel Kimble thinks he sees something and fires a burst from his ball turret. It's a false alarm.

### Into the Nose Compartment

Once we are over and past the mountains, the formation wheels east. I leave the flight deck and crawl through the tunnel around the nose wheel into the nose compartment. Dave Kellogg has stowed his navigator's table and sits by the nose wheel door. He has his flak suit under him, his steel helmet in his lap, and one hand on the door's release lever. When he is at work, Kellogg is the coolest man I know. During the bomb run, however, his work

is over, he has nothing to do, and that makes him nervous.

I put on my own flak suit, kneel behind the bombsight, and flick switches. Lights on a panel to my left show the bomb bay is open and identify which racks hold bombs. Gyros whine inside the bombsight. The Army, having trained me on the Norden bombsight, naturally gave me a Sperry sight for combat. Actually, I like it better. I reach behind the sight, turn a knob, and watch a bubble level until it centers.

As I take my hand away, there is a sharp rap and bits of Plexiglas spray my face. I reach back for the leveling knob and it's gone. The flak has started.

Over the intercom, waist gunner Larry Gardner asks, "How's it look, Jim?"

Our radio operator, Jim Hearon, rides the nose turret and has the best view of the target. "Wow!" he says, "It's so thick you could walk on it."

It's his standing joke, but this time he's right. All around us, puffs of smoke are appearing and dis-



sipating. New ones are forming like bursting popcorn, only black. We wade through it. Evasive action wouldn't help.

I ask, "Why are they shooting at us, Jim? Is it something we've done?"

Hearon giggles. Anderson tells us to knock it off.

"You've got it," he tells me. He means that he has put the plane on autopilot, and the bombsight—



operated by the bombardier—now controls it.

The formation has loosened up to give the individual ships room to maneuver. The lead bombardier already has made most of the needed course corrections. The rest of us concentrate mainly on “killing the rate,” synchronizing the movement of a telescope inside the bombsight with the plane’s ground speed to establish the release point for the bombs.

I turn some knobs to bring the cross hairs onto our piece of the target. They drift off. I slow the movement, return the hairs to the target, and watch. They hold until flak rocks the plane and they move again. I make finer adjustments, wishing I had more time.

Then, inside the sight, there is a faint click. The plane lurches gently. The lights are out on my panel, but I ask Ness to check if all bombs are gone. On one mission, we discovered after I closed the bomb bay that four were left. One dropped through a door, and I had to pry the others loose with a screwdriver.

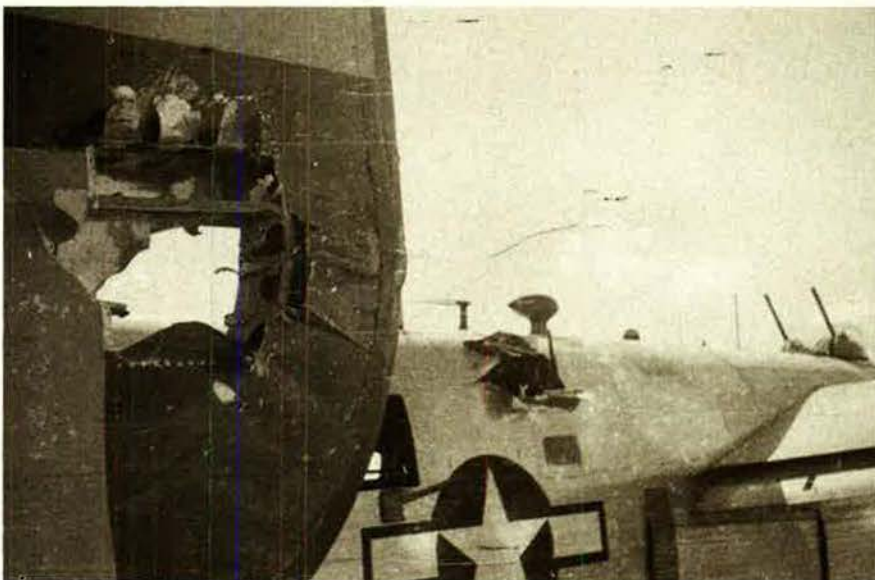
This time, Ness says, the racks are empty. I close the doors and say, “Bombs away!” It’s hardly necessary, but that’s what they say in the movies.

### Ready to Jump

As I crawl back to the flight deck, flak spatters the plane like pebbles hitting a tin roof. Close by, another bomber takes a direct hit, hangs there for a moment, and then falls. We watch for parachutes. Farther on, another plane flies apart. Everything seems to happen in slow motion. Some protective mechanism inside us says, “Never mind. It isn’t real.”

We are almost clear of the flak when, suddenly, our plane jerks around as though some giant has grabbed a wing. It rights itself but shivers violently. The pilots fight the controls. The waist gunners can’t stand up. From the rear, tail turret gunner J. D. Nowell says he’s being shaken to pieces. Anderson tells him to come out of the turret and be ready to jump. Damron cranks up the ball turret and helps Kimble climb out.

From the top turret, Ness can see jagged metal sticking up between the left engines. It appears that an



*This B-24 made it back to base after the group’s first encounter with rocket-armed fighters. One rocket left this gaping hole; another killed both waist gunners. The surviving crew members were sent home after only one mission. The lack of paint on this “silver-sided” plane types it as a replacement aircraft.*

88-mm shell has passed through the left wing. It was not armed to explode on impact, but it left a hole big enough to disrupt the airflow over the wing. The left tail fin is caught in a miniature cyclone and flutters like an aspen leaf.

The pilots try to raise and then lower the nose. The vibration continues. They bank to the left. Nothing. A slight bank to the right seems to help. When the plane is put in a twenty-degree bank, the shaking is reduced to a quiver. We breathe again.

We’re not out of the woods yet, however. It’s still almost four hours to base. The shell may have broken a wing spar. Even if the wing stays on, it will be tough to hold formation. The Luftwaffe pilots can hardly fail to notice a plane flying in a twenty-degree bank.

Anderson lays out our options. We can bail out, head for Switzerland, or try to reach the base. Nobody wants to jump, and we’re so close to finishing our missions that we don’t want to risk internment. We vote to go home.

German fighters come in for a closer look, but a few bursts from our guns convince them we’re still in business. With pure muscle power, the pilots hold the bank and stay in formation over the mountains and through the slow descent.

Back over the Adriatic, we are low enough to come off the oxygen.

That impediment removed, we break open our K rations, individual containers the size of Cracker Jack boxes. Each holds two small cans, one containing congealed meat spread and the other filled with rubbery cheese shaped like an orange hockey puck. There are some impregnable crackers. The box also yields three cigarettes with such names as “Wings” and “Fleetwoods” and two sheets of waxy toilet paper, of little use on a plane that has no toilet.

### Back to Pantanella

Under the circumstances, however, the rations seem almost appetizing. We relax and chatter over the intercom. Ness notices that there are specks of dried blood on my face, evidently from cuts I got when the Plexiglas exploded over the target. He says that if I can get them bleeding again, they’ll probably give me a Purple Heart. Ness draws his trench knife and offers to open them up a little. There is little reverence for rank on a bomber crew.

The formation descends. Various groups peel off for their respective bases. We head toward Pantanella, breaking up into progressively smaller elements as we go along.

Near base, Anderson asks again if anybody wants to jump. Even if the wheel comes down, he says, there may not be any tire on it.



Again we elect to stay on board. It seems preferable to breaking a leg on some farmer's stone wall, as some members of other crews have done recently.

Crash trucks stand by as we make our approach. The gear drops, and the wheel seems intact. Anderson holds his bank until just before touchdown, levels off, and brings her in smoothly.

Back at the hardstand, we pile out to inspect the hole. About eight inches across, it has just nicked the spar and missed the landing gear, fuel lines, and control cables. When I see that, my stomach goes queasy.

The trucks take us back up the hill. We collect our Red Cross



doughnuts and postmission shots—two fingers of bourbon in our canteen cups. Usually, I trade my liquor ration with somebody for a Coke. This time I take it.

We return to the group tent for debriefing. Much flak? Many fighters? Kills? Target damage? Any of ours lost? Any chutes?

Dead tired, still numb from the cold, and starting to feel the bourbon, we're already beginning to confuse this mission with the last and the one before. Anyway, the strike photos will tell them all they really want to know.



*After a mission, the crews inspect the aircraft and count flak holes. The ground chief (center, with his hand on his face) wonders how to patch it up for the next mission. This B-24 is not Home for Christmas, but another from the same squadron. Below, pilot Anderson "rests his eyes" beside the Adriatic.*

The debriefing over, most crew members head for their tents. Kellogg and I linger to ask the intelligence officer how to put the pilots in for medals. He says we should write up what happened in triplicate and have the rest of the crew sign the papers, which we do.

A week later, he tells us that Group doesn't think that the pilots did anything that exceptional and won't send in the paperwork for action.

### **Bona Fide Heroes**

We fly twelve more bombing missions, including three against the oil field targets at Ploesti in Nazi-occupied Romania. By mid-August, in just over three months of combat time, we have fifty missions to our credit and are eligible for rotation.

There is one hitch. Higher authority has decided it wants all officers promoted before they leave the theater. Anderson has made first lieutenant, but Kellogg and I haven't. We go to 55th Bomb Wing headquarters in Bari, Italy, to ask when our orders will come through. We're told to wait.

Meanwhile, some staff officer at Wing tells the 464th that it lags all groups in the awards department. Except for air medals issued routinely after every ten missions, none of us has been decorated. Group pulls out all the recommendations it has disapproved, including the one for our pilots, and bucks the package to Wing. A few days later, the wing commanding officer shows up and awards the Distinguished Flying Cross not just to the pilot, Anderson, and copilot Astroff, but to the whole crew. Kellogg and I are also promoted.

Now that we are bona fide heroes, somebody thinks we and our plane are good candidates for a Stateside tour to sell war bonds. We like the idea, mainly because it means flying back in our own aircraft rather than spending two weeks on a troopship. While the Army Air Forces brass is weighing the bond tour idea, however, Emmett Drake's crew loses its plane and asks to borrow ours. We agree. The next day, we're all down on the flight line when the group's aircraft return from a mission. *Home for Christmas* doesn't show.

A few days later, Drake returns. He and his crew were shot up and had to land in Yugoslavia. The partisans helped the crew get out but kept our plane. Without it, we go to Naples to board the troopship for home. ■

---

*Bruce D. Callander is a regular contributor to AIR FORCE Magazine. Between tours of active duty during World War II and the Korean War, he earned a B.A. in journalism at the University of Michigan. In 1952, he joined Air Force Times, becoming editor in 1972. His most recent article for AIR FORCE Magazine, "Drawdown and Pain," appeared in the January 1992 issue.*



If you liked "The Bat Bombers" in the October 1990 issue, this one's for you.

# The Pigeon Project

By C. V. Gillies

EVERYONE knows that Japan had kamikaze pilots in World War II. The US had some of these flyers, too, but they were not human beings. They were pigeons.

The concept was simple: Put a pigeon in the nose of a missile, and then let the bird guide the projectile to its target. The idea became reality as a program code-named "Project Pigeon." It was another of those bizarre classified weapons projects hatched in the early, try-anything days of the war. Even though a pigeon never actually steered a missile into an enemy target, Project Pigeon and successor experiments did make useful contributions to US defense.

Dr. Burrhus F. Skinner, the noted University of Minnesota behaviorist and psychology professor, came up with the idea well before the December 7, 1941, Japanese attack on Pearl Harbor. Dr. Skinner, after carrying out extensive experiments with animals during the 1930s, concluded that the learning process is a matter of applying a stimulus and rewarding, or "reinforcing," a desired response.

Anyone who has studied psychology readily recalls the "Skinner box," a title coined by critics. The box was a device in which animal learning could be strictly controlled and measured. Dr. Skinner's success with this device led to the "baby box," or Air-Crib, a large, sound-proof, germ-free container used to study early childhood development. One of Skinner's daughters spent part of her childhood in such a chamber.

Later, the box was used by pharmaceutical researchers to observe how drugs modify animal behavior. Skinner's work led to the development of teaching machines and programmed instruction.

In addition, Dr. Skinner became renowned for his success in the use of behavior reinforcement to teach pigeons how to recognize shapes and patterns. He and his colleagues were able to train pigeons to peck out a tune on a small piano, and even to play Ping Pong. In his autobiography, *The Shaping of a Behaviorist*, Dr. Skinner explained how he got the idea to use his scientific techniques to train pigeons to guide missiles.

"In April 1940, the Nazis had invaded Norway and Denmark," he wrote. "[O]n a train to Chicago . . . I recalled the bombing of Warsaw and the way in which the airplane had been converted into a weapon. What was to prevent the destruction of any city at the whim of a ruthless leader? Was there a counterweapon? Could a shell or missile be designed to home in on a bombing plane?"

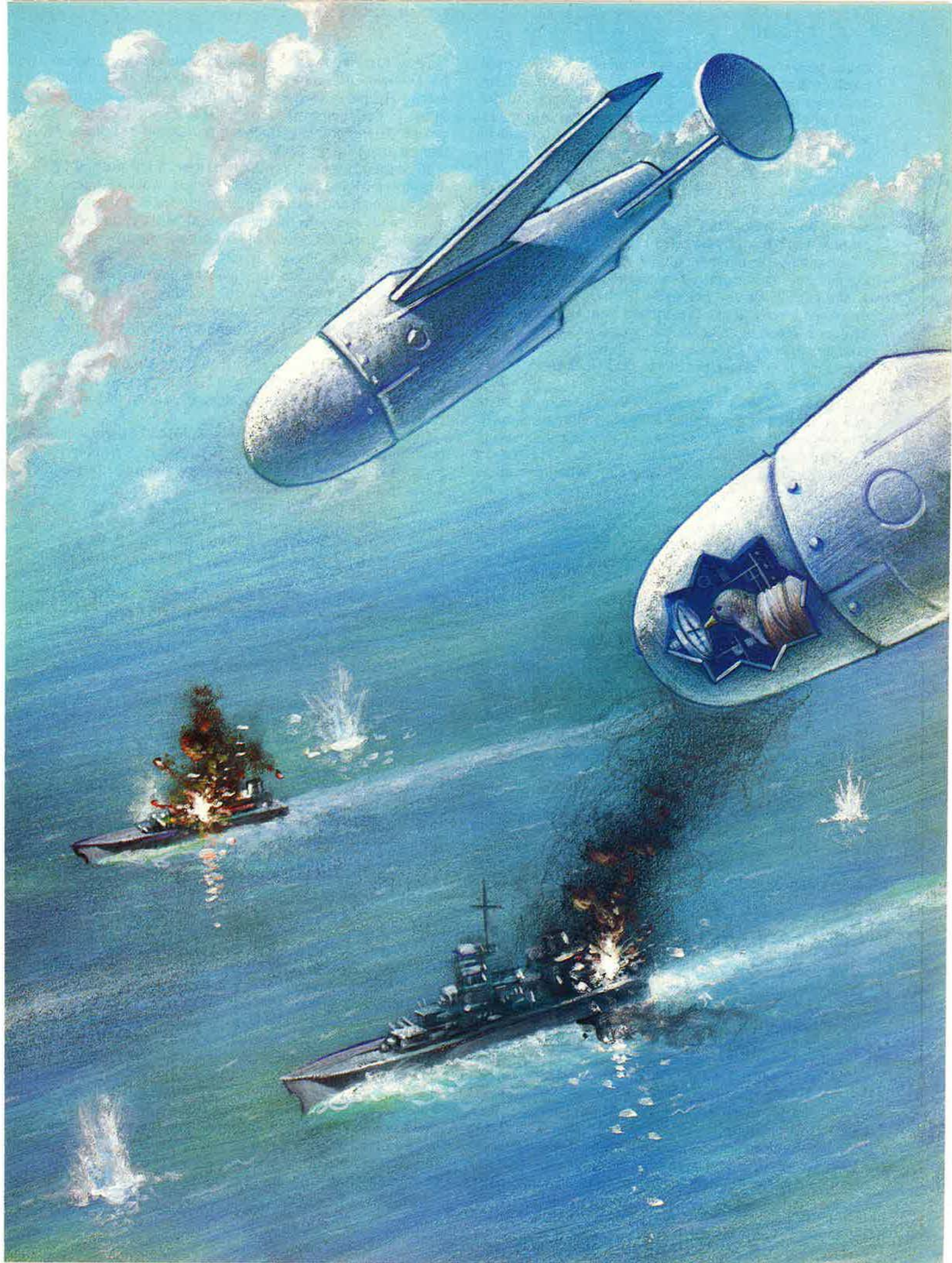
"I was looking out the window . . . and saw a flock of birds lifting and wheeling in formation as they flew alongside the train. Suddenly I saw them as 'devices' with excellent vision and extraordinary maneuverability. Could they not guide a missile? Was the answer to the problem waiting for me in my own backyard?"

## Emotionally Stable

Dr. Skinner concentrated on pigeons because they have sharp vision, can distinguish colors, are fast and agile, don't get airsick, and, compared to other high-strung birds, are stable emotionally. He bought four pigeons at a poultry store and began to experiment.

"Feet and wings would be hard to harness," he wrote, "but the head and neck might be used. The pigeon's eyes







could pick out a target, movement of its neck could produce signals to steer the missile, and its head and neck together could pick up grain as a reinforcer. I found that I could conveniently package a pigeon in a man's sock with its head and neck protruding through a hole in the toe and its wings and legs drawn together at the back and lightly tied with a shoestring.

"The jacketed bird could be strapped to a block of wood and put into an apparatus. A simulator was designed, and a variety of visual patterns, including photographs, were used as targets.

"I built a system in which the pigeon steered by moving pairs of lightweight rods alongside its neck—a horizontal pair above and below the neck that moved up or down and a vertical pair that moved from side to side. By lifting or lowering its head, the pigeon closed electrical contacts operating a hoist, and by moving its head from side to side it drove the hoist back and forth on an overhead track."

The researchers tacked a bull's-eye on the wall. In its center, they placed a small cup filled with grains of corn. The harnessed pigeon was pushed toward it; by moving its head from side to side or up and down, the pigeon could reach the wall and get the grain. When the image moved off center, the pigeon would peck frantically toward the target to bring it back.

"My pigeons became quite adept at this," said Dr. Skinner, "and I pushed them faster and faster across the room until they were operating the moving hoist as fast as the motors permitted."

By late 1940, encouraged by the results of these initial experiments, Skinner laid out his concept to the National Inventors Council, whose members were startled at his proposal to guide missiles with pigeons. Moreover, they were not persuaded of its utility. The inventors rejected the idea, claiming that it was "unrelated to national defense."

Undaunted, Dr. Skinner next delivered his proposal to a member of the National Defense Research Committee (NDRC), which also rejected government sponsorship of missile-guiding pigeons.

Just after the attack on Pearl Harbor, and thoroughly convinced his idea had merit, Skinner tried again and finally obtained funding for his project. It came from the University of Minnesota, which provided financing to improve the apparatus. Two graduate students offered to help train the pigeon pilots.

### Going on Offense

Because the United States had no guided missile, Skinner explained later, he and his team abandoned work on ground-to-air systems and turned to the problem of inventing a steerable bomb that could be used for offensive purposes. "We found that pigeons would work when held in a harness pointing down," he said, "and if the bomb rotated slowly, it would be enough if they simply steered back and forth."

Word about Dr. Skinner's pigeon experiments reached A. D. Hyde, vice president for research at General Mills, the corporate giant based in Minneapolis. Earlier, Hyde had been contacted by another inventor seeking funds to demonstrate the use of dogs to steer torpedoes. This idea was inspired by information that the USSR had trained dogs to detonate explosives under enemy tanks.

Hyde turned down the suicide torpedo-dog suggestion but thought Dr. Skinner's kamikaze pigeon concept had merit. He persuaded General Mills Board Chairman James F. Bell to appropriate \$5,000 to develop Skinner's device "to the point at which support could be obtained from a government agency."

In September 1942, on the top floor of a flour mill in downtown Minneapolis, Skinner began working in earnest to design and perfect a pigeon-guided bomb mechanism. With the help of the General Mills engineering staff, the original harness apparatus was improved and other refinements made. Several tame crows were enlisted briefly. Although they learned more rapidly and could operate sophisticated controls, they were dropped as pilots because they "were not very cooperative."

After Dr. Skinner went to Washington to show various officials a film of his experiments, General Mills got a \$25,000 contract in June 1943 from the Office of Scientific Research and Development. The money was to be used "to develop a homing device" under the name Project Pigeon.

Sixty-four pigeons were obtained. Forty of them were homing pigeons and the rest "just ordinary pigeons." Pigeons trapped on the rooftops of city buildings proved equal in every way to the more celebrated "homers."

The missile selected for use in Project Pigeon was the Pelican, a glide bomb then being developed for the Navy. A report from the General Mills files notes that the company's engineers developed a special bomb servo-control mechanism and thus stepped up the pigeon's pecking motion "by running the bomb's gyro and controls in a vacuum and by placing four valves behind the top, bottom, and sides of a flexible screen. When a pigeon tapped over one of these valves, the valve opened, permitting air pressure to build up in the system and operate the fins on the bomb. Whenever the pigeons pecked at dead center (when the target image was in dead center), all the valves opened an equal amount and the setting was unchanged."

### "Amazing Results"

The General Mills report indicates that the pigeon-training routine was fairly simple and states that it "produced amazing results." The birds were left without food for thirty-six hours. Then a grain-filled board was placed in the pigeons' cage for about thirty minutes each day. Thus stimulated, the birds were ready for their target training exercises.

The Pelican missile was to be test-fired against a white, pyramid-shaped target on a green field in Florida. In advance of the test, Skinner simulated the Florida target on a screen with white triangles cut into green paper. When a bird learned that pecking the white pyramids would produce a few kernels of grain, it was hooked. As soon as the bird learned to peck through light paper, heavier sheets were substituted. In a short time, the pigeon was pecking to stay on course, with the force of a miniature air hammer.

Once a bird had proven itself in "primary" training, it was graduated to an advanced trainer. This was a light-proof box over a projection screen like the ground glass of a camera. A moving picture of the target appeared on this screen. When the pigeon pecked the image of the ship under attack on the screen, it closed an electrical



circuit, causing a small drawer containing kernels of grain to pop out. A wire grid would register where the screen got pecked. Servomotors would steer the missile accordingly as the trainer moved toward the target.

This training proved satisfactory for a short time, but the pigeons were smart. They soon learned they could get the grain no matter where they pecked the screen and began to disregard the target. Skinner countered by crossing two beams of light at right angles in front of the image. From then on, a pigeon had to peck the target image at dead center in order to break both beams and activate a photoelectric relay to release the feed. Dr. Skinner later added an adjustment so that he could feed the birds at regular intervals or after a certain number of pecks. After a while, the pigeons learned to rap out as many as four pecks a second continuously for more than two minutes, just to prevent the target image from moving off dead center. This was fast enough to guide a missile traveling at 600 miles per hour.

For final tests, each bird was placed into a hand-operated trainer. A man sat behind each pigeon and moved a color photo projected onto the screen, at the same time operating the food magazine. The pigeon had to straighten up and peck correctly, or it got no food at all. The General Mills report stated, "There wasn't a single washout in the entire class of sixty-four [birds]."

At about the halfway point in training, the proposed target was switched from Florida to New Jersey. It took the birds only a few days to adjust to the target image change.

### Unshakable Concentration

Dr. Skinner conducted other tests to determine the birds' psychological fitness for combat. He fired a .22 caliber pistol seven inches from each bird's head. The pigeons didn't miss a peck. Loud radio noises were piped into the pigeon chambers—sounds so loud that they hurt the ears of the humans in the room. The pigeons merely looked bored. The human experimenters placed the pigeons in a pressure chamber set at 10,000 feet, whirled them in a centrifuge, gave them pure oxygen, dimmed the target light to one-twenty-fifth of normal intensity, and splashed the screen with simulated shell bursts—all without effect.

To increase the guidance system's reliability, Skinner's experimenters placed several pigeons in tandem in a missile cone so that if one or more became lazy, obstinate, or forgetful, the majority would override any incorrect signals and keep the missile on course. Teams comprising up to seven birds were tried, but three-bird teams seemed to work best.

One final question remained: Would sex interests prevent the birds from performing their duties? The General Mills report states that, in a series of tests, the pigeons once more "demonstrated their single-track concentration on getting those kernels of grain. They pecked at the target and showed no interest in each other."

Trouble was brewing, however. As the US began to achieve breakthroughs in development of other types of guided missiles, official interest in the kamikaze pigeon idea began to evaporate. Dr. Skinner was unable to convince government officials that further work on the project would be fruitful. Finally, in mid-1944, Project Pigeon died. Skinner later said that, in hindsight, the

atomic bombs dropped on Japan just a year and a half later "made it look for a while like the need for accurate bombing had been eliminated for all time."

That was not the end of the story. The knowledge gained under Project Pigeon remained classified at the "Secret" level in Defense Department files. In 1948, the Navy dug out NDRC files on Dr. Skinner's project and formed a new task force of scientists in the Naval Research Laboratory for Project Orcon (for "organic control"). Taking up where Dr. Skinner and his colleagues had left off, the Navy pursued its interest in attacking ships with guided bombs that could not be fooled by radar or electronic countermeasures. Skinner's work with pigeons seemed pertinent.

In Navy tests over many months, eight pigeons graduated to the stage at which they could hold a missile on course in a simulated approach to a target. A creditable fifty-five percent of their ninety-six target runs on a screen image were judged successful. The top four pupils showed an average success rate of seventy-nine percent.

Midway through the project, a preliminary report stated, researchers concluded that "organic control might be feasible in a military situation" and recommended "the creation of a rather large-scale organic control program by the Department of Defense. Much would remain to be done, not only on the development of operational organic control systems but also in the way of research on the capacities and limitations of the pigeon and possibly other animals. Such a program would probably best be conducted as a joint effort of all three branches of the Armed Services."

A later report stated that "tests proved that, under ideal conditions . . . pigeons could peck fast enough and with sufficient accuracy to guide a speeding missile."

Project Orcon lasted until 1953, when the Navy "regretfully" canceled it. The project was done in by the emergence of other guidance systems, with increasingly sophisticated, foolproof electronics.

In hindsight, it might seem that Dr. Skinner's idea was worthless and tied up many scientists without benefit. There was, however, a valuable spinoff. The wire-gridded conducting glass used as the screen for the target image later became a key feature in Air Defense Command combat information centers. It is found in radar displays on which plotters use electric probes to trace the course of attacking aircraft.

Dr. Skinner had no regrets about his kamikaze pigeon experiments. In 1959, when Projects Pigeon and Orcon were finally declassified, he told the press, "there ought to be more crackpot ideas among psychologists." The average Ph.D., said Skinner, "is a model of compulsive cautiousness. But these psychologists are just the ones who need a touch of wildness in their thinking. The remarkable fertility of our discussions during the pigeon project was largely due to the fact that we all knew that, in the eyes of the man in the street, we were all crazy." ■

---

*C. V. Glines, a retired Air Force colonel, has contributed many articles to AIR FORCE Magazine. With Gen. James Doolittle, USAF (Ret.), he is co-author of I Could Never Be So Lucky Again, the General's memoirs. Mr. Glines's most recent article in this magazine was "Missile Mail" in the April 1991 issue.*



# AFA/AEF Report

Edited by Daniel M. Sheehan, Assistant Managing Editor

## Twentieth Annual L. A. Ball

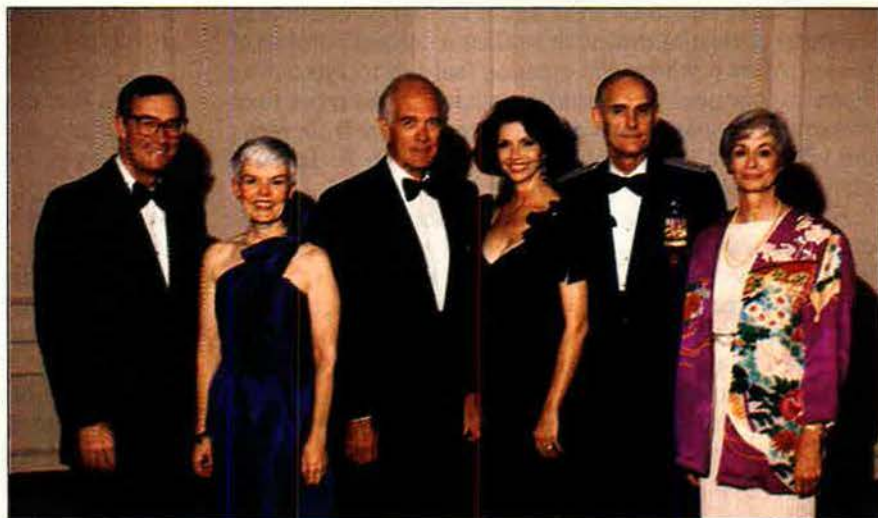
With a nod to the past and a commitment to the future, AFA's 1991 Los Angeles Air Force Ball, the twentieth, presented five \$5,000 scholarships to children of military personnel last October. Honorary Chairman Gov. Pete Wilson and General Ball Chairman former Secretary of the Air Force Verne Orr were among those attending this year's black-tie fund-raiser.

Begun in 1972 in appreciation for US servicemen engaged in an unpopular war, the ball raises funds for Scholarships for Children of American Military Personnel (SCAMP) and for the Aerospace Education Foundation (AEF). Over the years, eligibility for SCAMP awards has been broadened to include children of men and women who have been captured or killed implementing national security objectives since May 7, 1975; children of men and women killed in the space program; and children of participants in Operations Desert Shield and Desert Storm.

Actor Efrem Zimbalist, Jr., master of ceremonies for the event, recalled the ball's inception during the Vietnam War and told the 1,100 attendees of the event's sustained successes. Mr. Orr took note of the dizzying pace of change in international affairs since the first L. A. Ball and stressed the need for future support of a modern military and of the children of those summoned in the past and in the future to defend against any threat the US faces.

Lt. Gen. Edward P. Barry, Jr., commander of Space Systems Division at Los Angeles AFB, Calif., and Lt. Gen. Robert D. Beckel, commander of SAC's 15th Air Force at March AFB, Calif., served as cohosts to an array of honored guests, including Air Force Secretary Donald B. Rice, Air Force Chief of Staff Gen. Merrill A. McPeak, CMSAF Gary R. Pfingston, and surprise guest Lt. Gen. Kenneth W. Schultz, USAF (Ret.), former commander of the Space and Missile Systems Organization, who was the ball's first military host.

The ball has raised more than \$1 million each for AEF and SCAMP.



From left, Air Force Secretary Donald Rice, his wife Susan, AFA President O. R. Crawford, his wife Nancy, Air Force Chief of Staff Gen. Merrill A. McPeak, and his wife Ellie take time out during the festivities at the L. A. Ball. The ball raises thousands of dollars annually for worthy charities.

SCAMP awards have gone to 106 recipients, who have received a total of 318 grants. This year's \$5,000 awards will be followed by renewals of \$3,500 per year to students maintaining the required academic standard. Twenty-one students are receiving ongoing awards.

SCAMP President and AEF Trustee Edward A. Stearn and Hollywood song-and-dance man Donald O'Connor, who served in the Army Air Forces during World War II, presented this year's scholarships to the following five students:

**Ennice D. Gordon**, daughter of Air Force Lt. Col. John M. Gordon, who was killed in August 1990 when his aircraft crashed during a mission to support Desert Shield. A magna cum laude graduate of Klein High School in Spring, Tex., she intends to major in business education at Southern Methodist University.

**Laura A. Lamp**, daughter of Air Force Capt. Arnold W. Lamp, Jr., who was killed in action in southeast Asia in April 1969. She attends Gallaudet University in Washington, D. C., as a communications major specializing in sign language for the hearing-impaired.

**Catherine E. Luna**, daughter of Air Force Lt. Col. Donald A. Luna, who was declared killed in action in southeast Asia in 1976. She graduated magna cum laude from Dartmouth College and is currently a doctoral candidate at the University of Pennsylvania Graduate School of Education, studying oral and written language as an integrated communications capability.

**Anneliese M. May**, daughter of Air Force 1st Lt. Arthur Hans Hardy, who was declared killed in action in southeast Asia in November 1976. She attends the Massachusetts Institute of Technology, studying toxicology and physical chemistry.

**Allyson H. Rudloff**, daughter of Cmdr. Stephen A. Rudloff, USN (Ret.), who was taken prisoner in southeast Asia in May 1972 and released March 28, 1973. She attends Herkimer County College in New York, majoring in early education. She will graduate in June and enter the State University of New York at Oneonta, intending to earn a degree in elementary education.

This year's ball will be held on October 30, 1992.

—James A. McDonnell, Jr.





The Colorado Springs/Lance Sijan Chapter's Air Force Ball had the elements of a time warp as USSPACECOM Commander in Chief Gen. Donald J. Kutyna and his wife Lucy stepped out of a vintage staff car and into 1947. They were joined at the ball by Lt. Gen. Thomas S. Moorman, commander of AFSPACECOM, Lt. Gen. Bradley C. Hosmer, USAF Academy superintendent, and Don Dandurand, chapter president.

#### AFA's National Committees

The makeup of AFA's National Committees for 1991-92 has been determined. The following members have been named to serve on the committees.

● **Executive Committee:** O. R. Crawford (Chairman), George M. Douglas, Martin H. Harris, William V. McBride, James M. McCoy, Thomas J. McKee, Jack C. Price, Mary Ann Seibel, William N. Webb, Gerald V. Hasler, *ex officio* (nonvoting), James M. Keck, *ex officio* (nonvoting), Monroe W. Hatch, Jr., *ex officio* (nonvoting).

● **Resolutions Committee:** Mary Ann Seibel (Chairman), O. R. Crawford, George M. Douglas, Martin H. Harris, William V. McBride, James M. McCoy, Thomas J. McKee, Jack C. Price, William N. Webb, Gerald V. Hasler, *ex officio* (nonvoting), James M. Keck, *ex officio* (nonvoting), Monroe W. Hatch, Jr., *ex officio* (nonvoting).

● **Finance Committee:** William N. Webb (Chairman), Charles H. Church, Jr. (Vice Chairman), John R. Alison, R. L. Devoucoux, William J. Gibson, William L. Ryon, Jr., Dr. George Silver, O. R. Crawford, *ex officio* (voting).

● **Constitution Committee:** Martin H. Harris (Chairman), William V. McBride, Mary Ann Seibel, O. R. Crawford, *ex officio* (voting).

● **Membership Committee:** James M. McCoy (Chairman), R. Donald Anderson, A. C. Burleson, H. R. Case, Robert W. Gregory, Cecil H. Hopper,

Doyle Larson, Alwyn T. Lloyd, Robert N. McChesney, Robert A. Munn, Nuel Sanders, Stan Hood, O. R. Crawford, *ex officio* (voting).

● **Long-Range Planning Committee:** Walter E. Scott (Chairman), Philip Lacombe (Vice Chairman), Donald D. Adams, Richard S. Cain, CMSgt. Deborah Canjar, William Croom, John E. Kittelson, Stephen Mallon, M. Elisabeth Root, William Spruance, O. R. Crawford, *ex officio* (voting).



President Crawford accepts a model F-111 from 27th TFW Commander Col. Arnold L. Franklin to commemorate his flight on the aircraft during a visit to Cannon AFB, N. M., and the Llano Estacado Chapter, named Outstanding Large Chapter for 1991.

● **Audit Committee:** Jack G. Powell (Chairman), George D. Hardy, Craig R. McKinley, Bryan L. Murphy, Jr., Benjamin S. Roth, Claudius E. Watts III, Jack C. Price, *ex officio* (nonvoting).

● **Science and Technology Advisory Group:** Robert T. Marsh (Chairman), Thomas E. Cooper, Charles G. Durazo, Charles A. Gabriel, H. B. Henderson, Thomas McMullen, Wayne A. Schroeder, Henry C. Smyth, Jr., Charles F. Stebbins, James Tegnalia, Richard E. Thomas, George R. Weinbrenner, O. R. Crawford, *ex officio* (voting).

● **Advisors:** Ken Daly (Junior ROTC), Jerry Dalton (Communications), Col. Michael N. Farage (Senior ROTC), Pat L. Schittulli (Civilian Personnel), Patricia Turner (Medical), Capt. Paul A. Willard II (Civil Air Patrol).

#### Chapter News

The Lt. Gen. Frank Maxwell Andrews (Tenn.) Chapter welcomed a special guest to a dinner meeting last fall. W. D. "Bill" Manning, Tennessee state commissioner of Veterans Affairs, enthralled a large audience with his firsthand descriptions of combat in Vietnam. His vivid account of the firefight that cost him his right arm and left hand brought the crowd to its feet for a standing ovation. He credits his wartime experience with helping him to serve veterans better in his post as commissioner. He was introduced by longtime National Director Maj. Gen. Daniel F. Callahan, USAF (Ret.), and after the speech, Lt. Col. Daniel F. Callahan III, a Desert Storm



veteran, presented Commissioner Manning with a first-day cover of the Gen. H. H. Arnold commemorative stamp. Leo Bolster, former state president of Tennessee; Nancy I. Blanchard, chapter president and former under-forty national director; and Lt. Col. Art Laird, head of Tennessee State University ROTC, attended the event, as did several ROTC cadets and Angel Flight members.

The **Eagle (Pa.) Chapter** has been busy lately on a number of fronts. The chapter showed its understanding of the importance of recruiting even in these days of reduced forces by honoring Lt. Col. Charles R. Cohoon, commander of the 3518th Recruiting Squadron. Chapter President Edmund Gagliardi welcomed Colonel Cohoon, USAF Recruiting Group Commander Col. Robert Mead, and ANG Maj. Gen. Robert Harris, Pennsylvania ANG, to the dining-out and awards banquet and presented Colonel Cohoon with an inscribed and mounted photograph of the American flag.

The Eagle Chapter could not have asked for a more authoritative voice on the subject of commissaries than its other recent honoree. The Army's Maj. Gen. John P. Dreska, director of the Defense Commissary Agency, gave the chapter the word from the top on this important issue. Chapter Secretary Raymond Marsico presented General Dreska a Scott Associate Award in appreciation for his talk. The



**Missouri State President Otis M. Lytle, Jr. (left) traveled to Kansas City to present the Harry S. Truman Chapter its award for Membership Achievement. Pat Ryan, former chapter president, accepted the award, which is given to chapters that increase their membership by up to five percent.**

chapter also welcomed the Carlisle War College and New Cumberland Commissary as Community Partners.

Finally, the chapter did its part for international goodwill by hosting two delegations from the People's Republic of China's embassy. Besides meeting chapter members for dinner and discussions (despite the language barrier), the groups were treated to a tour of nearby Hershey Chocolate World.



**Dr. Felix R. Kay, Oklahoma state executive committee member and past president of the Central Oklahoma (Gerrity) Chapter, straps in for an orientation ride on the IA 63 Pampa, one of the contenders for the Joint Primary Aircraft Training System program to replace USAF's T-37 and the Navy's T-34.**

### Coming Events

February 14-15, **Oklahoma State Convention**, Tinker AFB, Okla.; March 20-21, **Texas State Executive Committee and Southwest Region Workshop**, Dallas, Tex.; March 20-21, **Great Lakes Region Workshop**, Fort Wayne, Ind.; April 3-4, **Northeast Region Workshop**, Mechanicsburg, Pa.; May 1-2, **North Carolina State Convention**, Raleigh, N. C.; May 9, **Massachusetts State Convention**, Hanscom AFB, Mass.; May 9, **New England Region Workshop**, Hanscom AFB, Mass.; May 15-16, **Maryland State Convention**, Andrews AFB, Md.; May 15-17, **New Jersey State Convention**, Atlantic City, N. J.; May 16, **Alabama State Convention**, Birmingham, Ala.; May 22-24, **South Carolina State Convention**, Columbia, S. C.; June 26-27, **Mississippi State Convention**, Columbus, Miss.; June 26-27, **Missouri State Convention**, Whiteman AFB, Mo.; July 17-18, **Arkansas State Convention**, Little Rock, Ark.; July 17-19, **Michigan State Convention**, Marquette, Mich.; July 17-19, **Pennsylvania State Convention**, Harrisburg, Pa.; July 24-25, **Florida State Convention**, Panama City, Fla.; August 7-9, **California State Convention**, San Bernardino, Calif.; August 22-23, **Indiana State Convention**, Kokomo, Ind.; August 28-29, **New Mexico State Convention**, Alamogordo, N. M.; September 14-16, **AFA National Convention and Aerospace Development Briefings and Displays**, Washington, D. C.



The **Colorado Springs/Lance Sijan (Colo.) Chapter** demonstrated its continuing support for young people by awarding Eagle Scholarships in separate Community College of the Air Force graduation ceremonies at Peterson AFB and the US Air Force Academy. MSgt. Rodney E. Ellison was the Peterson AFB honoree, and TSgt. Mark W. Wood received his award at the Academy. Chapter Vice President for Aerospace Education Chuck Zimkas presented the \$250 awards to both scholars.

Training was the topic of a recent meeting of the **Del Rio (Tex.) Chapter**. Featured speaker Col. Don Cook, commander of the 47th Flying Training Wing, discussed the changes sweeping Air Training Command in the wake of revised Undergraduate Pilot Training. He also described the award-winning "Grow Your Own" project at Laughlin AFB, under which the base, in partnership with area high schools, seeks to enlarge the pool of qualified aircraft maintenance workers. The program was praised as "imaginative and innovative" by Secretary of Defense Dick Cheney. Chapter member Dan Rein, Laughlin AFB

director of maintenance, was instrumental in the program's success.

The chapter recently elected a slate of officers. President Dan Bus; Vice Presidents Larry Martwig, John Stein, and Ernest Worley; Secretary Alice Voss; and Treasurer Gary Stehle will lead the chapter.

The **Southern Indiana Chapter** also has a new leader. Gene Merrell was recently elected chapter president. His first task was to greet retired Army Maj. Wilfred B. Bahr, who entertained a chapter meeting with a slide show of the recent Oshkosh Fly-In.

The **General Doolittle/Los Angeles Area (Calif.) Chapter** held a fiftieth-anniversary celebration for the C-47 Skytrain and the A-20 Havoc at a dinner dance in Santa Monica, Calif. Doolittle Chapter board member Patrick Koughan chaired the event, at which McDonnell Douglas executives received a print of Craig Kodera's painting of C-47s dropping paratroopers over Normandy on D-Day. The chapter did not dwell exclusively on the past, however, as members and guests were shown a video about the C-17 airlifter now undergoing flight tests at Edwards AFB, Calif.

#### **D. N. Masone, 1914-1991**

The founder and driving force behind one of AFA members' favorite charities died this past November. D. N. Masone, a retired Air Force chief master sergeant and active member of the **Eglin (Fla.) Chapter**, saw a need and sought to fill it. The Air Force Enlisted Widows Home in Fort Walton Beach, Fla., stands as a monument to Mr. Masone's dedication and perseverance. He helped incorporate the Air Force Enlisted Widows Home Foundation, got it tax-exempt status, and served as first executive director, first president, and first chief executive officer. In less than fifteen years, the Bob Hope Village (Mr. Hope lent his name to the facility in 1979) has grown to a 121-acre, 256-unit complex, complete with swimming pool. AFA notes his passing with sadness but with the knowledge that Mr. Masone will live on through his lasting good works.

#### **Have AFA News?**

Contributions to "AFA/AEF Report" should be sent to Dave Noerr, AFA National Headquarters, 1501 Lee Highway, Arlington, VA 22209-1198. ■

## Bulletin Board

Seeking information, patches, decals, and insignia relating to **Northeast Air Command (NEAC)**, which was disbanded as a command in 1957. **Contact:** Andrew M. France, Jr., 651 Harding Ave., Williamsport, PA 17701.

Seeking contact with **SSgt. Bob Lentz**, USAF, who was at RAF Burtonwood, England, in 1954 and **MSgt. Jim H. Waste** (or Waiste), USAF, a flight engineer based at Clark AB, the Philippines, in 1966-67, who visited my family in Singapore. **Contact:** A. Brian J. Bamforth, 28 Pant Lodge, Llanfairpwll, Anglesey, Gwynedd LL61 5YW, United Kingdom.

For a book on GI ingenuity, I am seeking **anecdotes on improvisations** that members of the military made with equipment to perform various jobs. **Contact:** John Staggs, P. O. Box 651, Johnson City, TX 78638.

Seeking contact with 1945 graduates of the **Ellington AAF Navigation School**, Houston, Tex., especially members of Class 45-4N. **Contact:** Clem Heddleson, 9619 Carriage Rd., Kensington, MD 20895.

Seeking photos or patches from the **535th Tactical Airlift Squadron**, at Vung Tau, South Vietnam, in 1968. Also seeking patches from the 764th Bomb Squadron, 461st Bomb Wing, Amarillo AFB, Tex. **Contact:** Laila U. Malpass, 932 Buck Dr., Towne Point, Dover, DE 19901.

Seeking contact with former students of **Brunsum High School**, Belgium, who were

there between 1971 and 1974. **Contact:** Tracey Segraves Hughes, 1215 Roderweis, Cabot, AR 72033.

For a book, I am seeking contact with anyone who knew **Alanson Evans Russell**, who founded the first aviation company and the first pilot training school in Peru and South America in July 1920. **Contacts:** Robert and Carmela Russell Gill, Hacienda Pinos del Paraiso, P. O. Box 96, Sheridan, OR 97378.

Military historian seeks contact with former aircrew members of **9th Air Force** bombardment units who participated in the saturation bomb-

**If you need information on an individual, unit, or aircraft, or if you want to collect, donate, or trade USAF-related items, write to "Bulletin Board," Air Force Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Letters should be brief and typewritten; we reserve the right to condense them as necessary. We cannot acknowledge receipt of letters. Unsigned letters, items or services for sale or otherwise intended to bring in money, and photographs will not be used or returned.—THE EDITORS**

ing along the St. Lo-Perrier Rd. on July 25, 1944, during the breakout from Normandy. I would also like to interview any Air Liaison Officers who were with the infantry during the bombing. **Contact:** David B. McNair, 2878 Cribbens Ave., Boise, ID 83704.

For a documentary, I am seeking contact with former servicemen who flew out of **bases in Cambridgeshire**, England, during World War II who would be willing to be interviewed during my US visit in March. I am also interested in talking to English women who married American servicemen. **Contact:** Paul Seagrove, BBC Radio Cambridgeshire, 104 Hills Rd., Cambridge CM2 1LD, England.

For a biography of **Hunter S. Thompson**, I would like to hear from anyone who admits to knowing him, especially during his basic training at Lackland and Kelly AFBs, Tex., in 1956 or while he was assigned to Eglin AFB, Fla., in 1956-57 as sports editor of *The Command Courier*. **Contact:** E. Jean Carroll, 528 Grandview, Suffern, NY 10901.

Seeking information on **B-26 #44-35696**, which flew in combat in Korea and reverted to the Louisiana ANG in the mid-1950s. I am especially seeking information on and photos of the aircraft from 1955 until its civil registry in 1963. **Contact:** Bob Roskuski, T. I. Graphics and Communication, Inc., 4401 W. Jefferson Blvd., Fort Wayne, IN 46804.

For a research paper, I am seeking information on the **Me-262**, especially its associated engines



## Bulletin Board

(Jumo 004, Heinkel 011, and BMW 109-003). **Contact:** Carl H. Lund, 15 N. Windsor Dr., Arlington Heights, IL 60004.

Collector seeks **envelopes sent from Desert Storm APOs**, particularly those with cachets or UN emblems. **Contact:** CMSgt. David S. Lutz, USAF (Ret.), 2800 Northfields Rd., Charlottesville, VA 22901.

Seeking contact with anyone who knew **CWO4 Elmer R. Howe, Jr.**, who retired in 1969, then taught AFJROTC classes from 1972 to 1976. **Contact:** Capt. James C. Howe, 502 MMK Dr., Bellevue, NE 68005.

Seeking the whereabouts of **Dan Erickson**, a B-17 crew chief and flight engineer with the 348th Bomb Squadron, 99th Bomb Group, stationed in Foggia, Italy, in early 1944. **Contact:** Jules Horowitz, 3507 Oaks Way, Pompano Beach, FL 33069.

In conjunction with the fiftieth anniversary of the **341st Strategic Missile Wing**, we are seeking stories, anecdotes, memorabilia, and photos from anyone assigned to the 341st or its subordinate units since its creation as the 341st Bombardment Group on August 14, 1942. **Contact:** 50th Anniversary Celebration, 341st Missile Wing/History Office, Malmstrom AFB, MT 59402-5300.

Seeking information on the following officers whose names are printed on a 1920s-vintage cloth pilot's helmet that belonged to Lt. A. W. Robertson: **Lts. L. H. Bouhist, C. B. McDaniel, A. E. Waller, and A. L. Harvey.** **Contact:** Col. William L. Evans, USAF (Ret.), 4390 N. 125 W., Ogden, UT 84414.

Seeking contact with **Zade Rash**, from S. C., who was stationed with an Airborne Control and

Warning squadron in Germany in 1963-65. **Contact:** MSgt. William Chick, AFRES (Ret.), 125 Forestvue Dr. Earlysville, VA 22936.

I have four framed photos of 1940s vintage that belonged to the 23d AAF Glider Training Detachment available to donate to museums: **three aerial shots of Randolph Field and a portrait of Gen. H. H. Arnold.** **Contact:** Angus Reid, 13726 Starshine Sr., Victorville, CA 92392.

For a memorial display, I am seeking **POW/MIA bracelets** from all services, even those of POWs who have returned. Also seeking pilot training squadron patches and class patches from USAF units of the 1960s and 1970s. **Contact:** Leon D. Humiston, Jr., 1 Jordanne Ct., Chico, CA 95928.

Seeking information on the whereabouts of **Lt. Richard "Dick" Marshall**, who was in the 372d and 424th Bomb Squadrons, 307th Bomb Group, 13th Air Force, on Guadalcanal in 1943. **Contact:** Charles A. Bird, 626 E. 58th St., Minneapolis, MN 55417.

For a history of RAF Wethersfield, UK, I am seeking contact with former members of the **20th Fighter-Bomber Group**, later the 20th Tactical Fighter Wing, which operated from RAF Wethersfield from 1952 to 1969. **Contact:** Ian C. MacTaggart, Craig-y-llyn, Braintree Rd., Gosfie d, Halstead, Essex CO9 1PR, England.

Seeking any and all unit and squadron **patches**, official and unofficial. **Contact:** MSgt. Bobby J. Baldwin, Jr., USAF, 301 Wiley Ct., Marietta, GA 30060.

Seeking information on **Lt. Robert A. Billman**, who was bombardier on the B-24 *Best We Do*, with the 72d Bomb Squadron, 13th Bomb Group, in the Philippines. **Contact:** C. M. Murray, Jr., P. O. Box 507, St. John, USVI 00831.

At Topsail Island, N. C., last summer I found an **MIA bracelet** that read, "Col. Paul G. Underwood, USAF 3-16-66, NVN." I would like to return it to its owner. **Contact:** Randolph B. Ryman, Rte. 1, Box 158, Harrisonburg, VA 22801.

Seeking information on the whereabouts of **William "Woody" Wood**, a pilot with the 42d Tactical Reconnaissance Squadron stationed at Spangdahlem AB, West Germany, in 1956-57. **Contact:** Frank Perri, 30 Aylesbury Cir., Madison, CT 06443.

Seeking information on **SSgt. Donald J. Williams** from Middletown, Ohio, who was a B-29 flight crew member with the 878th Bomb Squadron, 499th Bomb Group, on Saipan in 1945. **Contact:** Hobart H. Ellifritt, 427 Stealey Ave., Clarksburg, WV 26301.

Seeking information on the whereabouts of **Sgt. Maureen Mulrooney Williford**, USAF, whose last known address, in 1987, was in the Las Vegas area. **Contact:** Bob Rasmussen, P. O. Box 96237, Las Vegas, NV 89193-6237.

Seeking contact with veterans of the **417th Night Fighter Squadron**, which was stationed in Algeria in 1943 flying Bristol Beaufighters. **Contact:** Robert Schaefer, 16058 Osborne St., Sepulveda, CA 91343.

Authors seek information, photos, stories, and samples of **blood chits** from all wars. **Contacts:** The Blood Chit History Project, P. O. Box 11131, Berkeley, CA 94701-2131. Thomas W. McGarry, 1173 Island Dr., Alameda, CA 94501.

Historian seeks serial number and current location of any surviving **two-seat F-100F and F-105F/G** Iron Hand/Wild Weasel aircraft. **Contact:** CMSgt. Keith A. Ebert, Hq. TAC/DRAS, Langley AFB, VA 23665-5575. ■

## Unit Reunions

### Air Forces Escape and Evasion Society

The Air Forces Escape and Evasion Society will hold a reunion April 9-13, 1992, in Savannah, Ga. **Contact:** Clayton C. David, 19 Oak Ridge Pond, Hannibal, MO 63401. Phone: (314) 221-0441.

### Burtonwood Ass'n

Military and civilian personnel who served at RAF Burtonwood, England, will hold a reunion May 12-19, 1992, in England. **Contact:** John T. Bado, 3432 N. W. 51st St., Oklahoma City, OK 73112. Phone: (405) 942-3127.

### P-38 National Ass'n

The P-38 National Association will hold its reunion August 27-30, 1992, at the US Air Force Academy, Colo. **Contact:** Seymour V. Prell, P. O. Box 1816, Burbank, CA 91507.

### RAF Manston Personnel

Former US Air Force units assigned to RAF Manston, UK, will hold a reunion June 5-7, 1992, at RAF Manston, UK. **Contact:** Maj. Milton J. Torres, USAF (Ret.), 11200 S. W. 99th Ct., Miami, FL 33176. Phone: (305) 238-3342.

### 1st Air Commando Ass'n

Members of the 1st Air Commando Association who served in the China-Burma-India theater will hold a reunion June 10-14, 1992, at the Park

Plaza Hotel in Boston, Mass. **Contact:** Arthur E. Burrell, 2 Thoreau Rd., Lexington, MA 02173. Phone: (617) 861-0271.

### 2d Air Division

Veterans of the 2d Air Division, 8th Air Force, will hold a reunion May 31-June 2, 1992. **Contact:** Russell A. Valleau, 1310 N. Neil, Champaign, IL 61820. Phone: (217) 359-5040.

**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.**

### 17th FS/ATS/MAS

Members of the 17th Ferrying Squadron/Air Transport Squadron/Military Airlift Squadron will hold a fiftieth-anniversary celebration March 13-14, 1992, in Charleston, S. C. **Contact:**

Maj. Michael R. Helms, USAF, P. O. Box 0487, Charleston AFB, SC 29404-0487. Phone: (803) 566-2926. DSN: 673-2926.

### 19th Tactical Recon

Members of the 19th Tactical Reconnaissance Squadron will hold a reunion April 24-26, 1992, at the Holiday Inn in Sumter, S. C. **Contact:** John F. Cusumano, 695 Pringle Dr., Sumter, SC 29150. Phone: (803) 775-2842.

### Class 43-D

Members of Class 43-D will hold a reunion April 22-25, 1992, at the Marriott Hotel in Charleston, S. C. **Contact:** Jack Carlson, 3045 Silverview Dr., Cuyahoga Falls, OH 44224. Phone: (216) 688-4848.

### 80th Fighter Group

Veterans of the 80th Fighter Group will hold a reunion April 29-May 3, 1992, at the Holiday Inn Palo Verde Hotel in Tucson, Ariz. **Contact:** George Haviland, 2928 Horizon Hills Rd., Prescott, AZ 86301.

### 95th Pursuit/Fighter/Interceptor Squadron

Veterans of the 95th Pursuit/Fighter Squadron (World War II/Grenier Field), Fighter-Interceptor Squadron (Andrews AFB, Md., and Dover AFB, Del.), and Tactical Interceptor Training/Tactical Fighter Training Squadron (Tyndall AFB, Fla.)



will hold a fiftieth-anniversary reunion May 1-3, 1992, in Panama City, Fla. **Contacts:** Lt. Col. Jim Miller, USAF, 95th FS/CC, Tyndall AFB, FL 32403. Phone: (904) 283-3113/2121 or (904) 871-3876 (Capt. Benjamin N. Cleveland, USAF).

#### 307th Bomb Wing

Veterans of the 307th Bomb Wing (B-47/KC-97) who served at Lincoln AFB, Neb., will hold a reunion May 7-10, 1992, at the Holiday Inn in Orlando, Fla. **Contact:** Hank Grogan, P. O. Box 2158, Largo, FL 34649. Phone: (813) 585-2726.

#### 325th Fighter Group

The 325th Fighter Group "Checkertail Clan" will hold a reunion April 30-May 3, 1992, in Panama City, Fla. **Contact:** Dan Penrod, 69 Keswick Ave., Pittsburgh, PA 15202. Phone: (412) 766-6190.

#### 369th Fighter Squadron

Veterans of the 369th Fighter Squadron, 359th Fighter Group (World War II), will hold a reunion August 27-30, 1992, in Rochester, N. Y. **Contact:** Anthony Chardella, 105 Mohawk Trail Dr., Pittsburgh, PA 15235. Phone: (412) 793-7619.

#### 406th Fighter Group

Veterans of the 406th Fighter Group (World War II), which included the 512th, 513th, and 514th Fighter Squadrons, will hold a reunion May 7-9, 1992, at the Holiday Inn Surfside Hotel in Clearwater, Fla. **Contact:** Carl Carlson, 495 Davenport Sq., Palm Harbor, FL 34683. Phone: (813) 786-6458.

#### 4th Photo Charting Squadron

Veterans of the 4th Photo Mapping/Charting Squadron are planning to hold a reunion this summer at Vandenberg AFB, Calif. **Contact:** Jerome Neuroth, 4024 Muirfield Pl., Lompoc, CA 93436.

#### 31st Bomb Squadron

Veterans of the 31st Bomb Squadron, 5th Bomb Group, 13th Air Force (World War II), are planning a return trip in 1992 to the southwest Pacific. The trip will include Auckland, Vanuatu, Solomon, Admiralty, and New Guinea. Veterans who served in any branch of the armed forces in any of these areas during World War II are also welcome. **Contact:** Owen C. Carr, 6-10-13 (1F) Motoyama-Kitamachi, Higashinada-ku, Kobe 658, Japan. Phone: (078) 411-3418.

#### Class 44-K

For the purpose of holding a reunion in 1993, I am seeking contact with former pilots who completed training or trained with Class 44-K. **Contacts:** Fredrick H. Medenwald, 5901 Elaine St., Speedway, IN 46224. Gordon Monnett, 2935 Horse Hill West Dr., Indianapolis, IN 46214. Phone: (317) 298-4364.

#### Class 45-C

I would like to hear from members of Class 45-C (pilots, instructors, and ground personnel) who served at Marfa AAB, Tex., who would be interested in holding a reunion in 1992. **Contact:** Lt. Col. Douglas C. Glover, USAF (Ret.), 7727 Romney Rd., Houston, TX 77036.

#### 71st Special Operations Squadron

Members of the 71st Special Operations Squadron, an AC-119 Shadow unit, are planning a reunion and would like to hear from former aircrew and support personnel. **Contact:** Earl W. Scott, 1939 S. 100 East, Greenfield, IN 46140.

#### 934th Signal Battalion

For the purpose of holding a reunion, I am seeking veterans of the 934th Signal Battalion, 5th Communications Group, which included the 1st Radio Squadron, 2d Communications Squadron, 2d Radio Relay Squadron, and the 7th Communications Squadron, who served in Korea between 1950 and 1954. **Contact:** Rick Feiler, P. O. Box 1664, Lone Grove, OK 73443. ■

# Useful ...and so good looking!



COFFEE MUGS



FLAG SET



PEN AND PENCIL SET



"SIGNATURE" TIES

These attractive, high quality AFA products provide you with a variety of choices for the "perfect" gift. Or select them for your own use! Either way they come with AFA's money back guarantee of full satisfaction.

Set of Matching AFA/AEF Coffee Mugs (M0045) \$22.50  
Desk Top Flag Set (M0064) \$15.00  
Quill Pen and Pencil Set (M0071) \$21.50

**For immediate delivery  
call AFA Member Supplies  
1-800-727-3337, ext.4830**

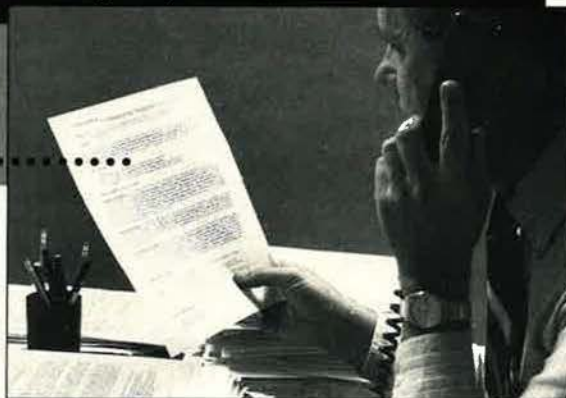
Handsome, custom made neckties by Givenchy are embroidered with AFA logo in a color that matches the tie's subtle stripe. 50% silk/50% polyester. Specify color (stripes silver except where noted): Navy, Green, Maroon, Brown, Gray/Navy, Gray/Black, Tan/Navy.  
Tie (M0113) \$21.50

## Will your résumé get you the interview?

*It can, with  
AFA's help!*

**AFA will prepare a résumé that...**

- makes your objective clear.
- uses terminology civilian employers will understand and appreciate — free of military-oriented "buzz words."
- avoids reading like a job description.
- conveys your accomplishments to a prospective employer and shows how you can contribute to the team.
- communicates the information in a format that is best suited for your experience and qualifications.



The content of a résumé is what will get you an interview. *It is the single most important paper in your life when you're looking for a job.*

The cost? \$150.00 for a complete résumé; \$40.00 for a critique of a résumé you've already written. And, as with all AFA services, your satisfaction is guaranteed!

For complete details, call AFA's Member Services office (1-800-727-3337, ext. 4891) or write:

 **Air Force Association**

Attn: Member Services  
1501 Lee Highway  
Arlington, VA 22209



# DON'T LET **MEDICAL EXPENSES** SOAR... GET PROTECTION WITH AFA's **CHAMPLUS**<sup>®</sup>

## A CHAMPUS Supplement Which Helps Limit Your Unreimbursed Medical Expenses.

CHAMPUS is a federally-funded health benefits program designed to help service families pay for medical care in civilian medical facilities, including doctors' charges. However, with CHAMPUS there is a gap between the percentage of medical expenses which are reimbursed and the amount you have to pay out-of-pocket. That's why you need **CHAMPLUS**<sup>®</sup>. As a member of the Air Force Association, you are eligible to purchase one of the best CHAMPUS Supplements available, with competitively low rates.

### FEATURES THE NEW EXPENSE PROTECTOR BENEFIT

This benefit limits out-of-pocket expenses (expenses beyond CHAMPUS-allowable charges) for covered services in any single calendar year to \$1,000 for any one insured person (or \$2,000 for all insured family members combined). Once those out-of-pocket expense maximums are reached, **CHAMPLUS**<sup>®</sup> will pay 100% of excess reasonable and customary charges for the remainder of that year.

### An example of how the Benefit works:

You are hospitalized for 35 days and the hospital charges you \$330 per day — \$95 per day more than allowed by CHAMPUS. Your out-of-pocket expense would be \$3,325. With the Expense Protector Benefit your cost would be limited to \$1,000. All reasonable and customary costs over this amount — for the entire calendar year — would be paid.

### 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.

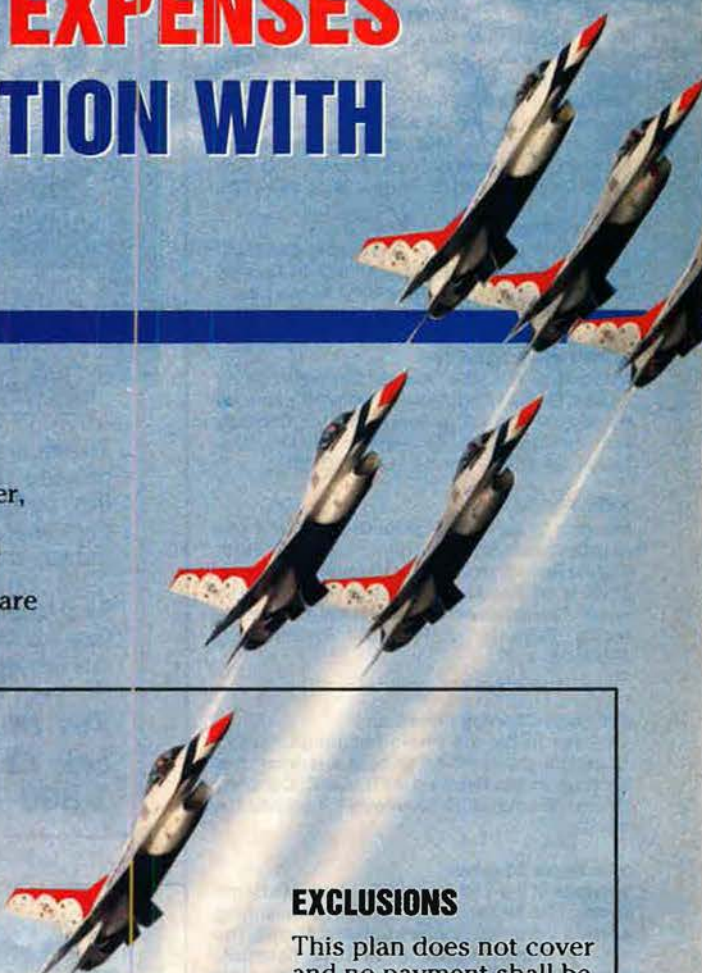
*There is no waiting period for active duty members who enroll within 30 days of retirement if their dependents have been insured for two years previously.*

### 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**<sup>®</sup> 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 required 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).





## LOOK AT WHAT AFA CHAMPLUS® PAYS

Care	Retired	Active Duty
<b>Inpatient civilian hospital care</b>	the 25% of allowable charges not paid by CHAMPUS, 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 greater of the total daily subsistence fees, or the \$25 hospital charge not paid by CHAMPUS
<b>Inpatient military hospital care</b>	the daily subsistence fee	the daily subsistence fee
<b>Outpatient care</b> (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

**CHAMPLUS®** offers many attractive benefits. For a complete description of the Plan, including exceptions and limitations, please refer to the Certificate of Insurance, or call our Insurance Division toll-free at

1-800-727-3337  
x4905

To enroll in the program complete the application. →

### 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*

Age	Member	Spouse	Each Child
Under 50	\$ 52.65	\$107.08	\$55.13
50-54	\$ 69.18	\$117.90	\$55.13
55-59	\$ 95.64	\$155.89	\$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*

All Ages	Member	Spouse	Each Child
	N/A	\$17.40	\$10.42
<i>In-Patient and Out-Patient Benefits Only</i>			
All Ages	N/A	\$69.55	\$52.12

### APPLICATION FOR AFA CHAMPLUS®

Group Policy 4609-G1  
Metropolitan Life Insurance Co.,  
Home Office: New York

Full name of Member \_\_\_\_\_  
Rank Last First Middle

Address \_\_\_\_\_  
Number and Street City State Zip Code

Date of Birth \_\_\_\_\_ Current Age \_\_\_\_\_ Height \_\_\_\_\_ Weight \_\_\_\_\_ S.S.N. \_\_\_\_\_  
Month/Day/Year

This insurance coverage may only be issued to AFA members. Please check the appropriate box below:  I am currently an AFA Member  I enclose \$21 for annual AFA membership dues. (includes subscription (\$18) to AIR FORCE Magazine)

#### PLAN & TYPE OF COVERAGE REQUESTED

Plan Requested (check one)  AFA CHAMPLUS® PLAN I (for military retirees & dependents)  AFA CHAMPLUS® 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)

<input type="checkbox"/> Member Only	<input type="checkbox"/> Member & Spouse
<input type="checkbox"/> Spouse Only	<input type="checkbox"/> Member & Children
<input type="checkbox"/> Children Only	<input type="checkbox"/> Spouse & Children
	<input type="checkbox"/> 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)

2/92

**Application must be accompanied by a check or money order. Send remittance to:**  
Air Force Association, Insurance Division, 1501 Lee Highway, Arlington, VA 22209-1198





Bob Stevens'

# "There I Was..."

READERS MAY REMEMBER THE STORY ABOUT THE REAR PITTER OF A BRONCO WHO EJECTED THRU THE CANOPY WHILE PARKED ON THE RAMP (MAR 1989 ISSUE). THERE'S MORE TO THIS STORY. A SHORT TIME BEFORE THIS INCIDENT IN OCT 1971 ANOTHER OV-10 HAD A GROUND EJECT HAPPENING AT PLEIKU. THE BIRD WAS RETURNING FROM A ROUGH COMBAT MISSION...

...LANDING ON A DARK & STORMY NIGHT, LOW ON FUEL, THE PILOT WAS SO CLANKED UP THAT HE FORGOT ONE LITTLE STEP ON THE CHECK LIST-



WHEN IN DOUBT, BAILOUT! SLIDING DOWN THE RUNWAY, GEAR UP, THE GIF (GUY IN FRONT) ELECTS TO EJECT. THIS THROWS THE GIB (GUY IN BACK) OUT FIRST-



THE AUTO-EJECT SYSTEM LAUNCHES THE GIB OUT 4 SEC LATER-



THE TOUGH PART OF ALL THIS WAS TRYING TO GET 3 EJECTION SEATS FROM THE DEPOT FOR TWO INTACT BIRDS!

Bob Stevens  
THANKS TO COL JAMES M. REED JUSMAG THAILAND



# Plug-in to the future with Pentastar



## Automatic Test Equipment

Pentastar, a new name for Chrysler Military-Public Electronic Systems, is a prime defense contractor with over 35 years of experience. Our Mil-Spec automatic test equipment supports all types of systems, from missiles to armored vehicles.

We design and build the Direct Support Electrical System Test Sets (DSESTS) for the M1 tank and the M2/3 Bradley infantry fighting vehicle. Pentastar also has experience in vehicle electronics, power bus management systems and electrical interface units.

Our test system knowledge gives Pentastar the capability to meet your most stringent ATE requirements, today and tomorrow.

## Test Program Sets

Our capabilities in digital and analog processing, RF, lasers and electro-optics technologies helps us design the vital link between standard Mil-Spec ATE systems and units under test. Pentastar's test program sets are known for their easy-to-use designs, rugged flexibility and low life cycle costs.

Our test equipment works because we understand modern weapon systems and their operational environment. All of which is why more and more customers are plugging into our capability.



Pentastar Electronics Inc.  
A Chrysler Company  
P.O. Box 1929  
Huntsville, AL 35807-0929  
Telephone: 205-895-2209  
FAX: 205-895-2039



**PENTASTAR**  
ELECTRONICS INC.  
A CHRYSLER COMPANY

Light years ahead in capability



**ITS POWERS  
STOP JUST SHORT OF  
SUPERNATURAL.**

THE F-15 E. It seems to come out of nowhere. Cruising at high speed and low altitude, day or night, good weather or bad. Surprising its enemy with an alarming load of weapons. Delivering them with laser-guided accuracy. And defending itself against airborne adversaries with ease and agility.

This is the most technologically advanced combat aircraft in service anywhere. It's here now. In production. And cost-effective.

Combat-proven under the harshest conditions, the newest Eagle is the envy of every nation on earth—and one spectre the forces of evil hope they never encounter again.

**MCDONNELL DOUGLAS**  
A I R S U P R E M A C Y

