

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

VIETNAM

UNIT ROT
PLEASE

Pieces of History



AIR FORCE
and SPACE DIGEST
The Magazine of Aerospace Power | Published by the Air Force Association



The Pittsburgh Press
FINAL EDITION
S. Pulls Out Of Viet
Cong Agree On Plan To End War

GIAY THONG-HANH





After helping

develop naval aviation,
revolutionize



commercial aircraft,
and invent Stealth

technology, our name is
worth repeating.

The Aircraft Division of LTV Aerospace
and Defense is now Vought Aircraft
Company. Again. Vought is our original name.

One we've used for most of our 75-year history of
pioneering achievements. Including working as a major support
partner on some of the industry's most important programs. And as
we have throughout our history, we remain committed to maintaining our
aerospace and defense leadership
in an uncertain world.



AIR FORCE

MAGAZINE

October 1992, Vol. 75, No. 10

PUBLISHED BY THE AIR FORCE ASSOCIATION

- 4 Letters
- 8 Chart Page
- 14 Aerospace World
- 20 Senior Staff Changes
- 23 Index to Advertisers
- 78 Valor
- 80 AFA/AEF Report
- 83 Unit Reunions
- 84 Bulletin Board
- 88 There I Was . . .

- 2 **Strategy for the Nearsighted**
Editorial by John T. Correll
War has a way of surprising the optimists.
- 10 **Washington Watch: The Coming Flap on Roles and Missions**
By James W. Canan
Questions settled in 1948 by the Key West Agreement are being reopened.
- 24 **Gunfighter Country**
By James W. Canan
The Air Force's first air intervention wing is taking shape at Mountain Home AFB, Idaho.



24

- 32 **Scud War, Round Three**
By Stewart M. Powell
The argument continues over the effectiveness of the US campaign against Saddam's terror weapon.
- 36 **Pieces of History**
Photographs by Paul Kennedy
From cans of pemmican to computer keyboards, USAF's history can be read in the details.
- 42 **A Russian View of Russian Interests**
By Mary C. FitzGerald
The head of the General Staff Academy takes a hard—and familiar-sounding—line on defense policy.

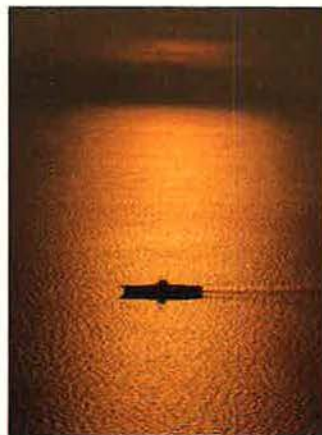
- 70 **The Risen Sun?**
By David J. Lynch
Japan is slowly but unmistakably mapping an independent and assertive international course.



About the cover: The minutiae of daily life recall history most vividly for those who lived it. This montage contains artifacts associated with the Vietnam War. For more "Pieces of History," see p. 36. Photo by Paul Kennedy.

- 46 **A New Tack for Naval Air**
By Frank Oliveri
By 2010 or so, the fleet's punch will be consolidated into two multimission fighters.
- 52 **Jargon of the Air**
By Bruce D. Callander
Aviation was new, and it took a new vocabulary to talk about it.
- 57 **Gallery of Middle East Airpower**
By John W. R. Taylor and Kenneth Munson
Detailed descriptions of and statistics on the aircraft of Mideast air forces.

- 76 **A Checklist of Air Force Armament and Ordnance**
Edited by Tamar A. Mehuron
Work in progress at USAF's major program offices, Aeronautical Systems Center's armament offices, and Wright Laboratory's Armament Directorate.



46

AIR FORCE Magazine (ISSN 0730-6784) October 1992 (Vol. 75, No. 10) 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 changes of address to Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air Force Association. Copyright 1992 by Air Force Association. All rights reserved. Pan-American Copyright Convention.

By John T. Correll, Editor in Chief

Strategy for the Nearsighted

When the Senate Armed Services Committee had Gen. Colin Powell, Chairman of the Joint Chiefs of Staff, on the hot seat in March, Sen. Edward M. Kennedy (D-Mass.) bore down on the subject of the B-2 bomber.

SENATOR KENNEDY: Well, who is it going to bomb?

GENERAL POWELL: I can tell you who it would have bombed if I had had it about eighteen months ago.

The Senator did not expect a real answer. His question was rhetorical and loaded. As he knows perfectly well, General Powell cannot predict what wars, if any, the US armed forces of the future will have to fight. Nobody can.

The implication is that unless the Pentagon can specify a clear and present danger—and prove it—we need not spend tax money to prepare for it. That idea, gussied up in different language, has appeal for the public, which is disposed to believe that all threats ended with the cold war.

Rep. Les Aspin (D-Wis.), chairman of the House Armed Services Committee, warns that "our citizens may understandably be reluctant to pay for defense unless there is a clear linkage between the forces and the threats those forces are designed to deal with." Mr. Aspin's solution is "threat-based" force planning. He makes some allowance for the unexpected but pegs his calculations basally to requirements that can be anticipated and specified.

In April, a House Armed Services Committee panel chaired by Rep. Dave McCurdy (D-Okla.) concluded that "the United States cannot continue spending billions on weapon systems that may never be used." Let us hope that sentence was crafted in haste and does not reflect what the panel actually believes.

Some of these viewpoints make more sense than others, but taken as a whole, they add up to a strategy for the nearsighted. They depend far too much on the premise that we need to prepare only for the threats we can currently see.

In *The Experts Speak*, Christopher Cerf and Victor Navasky remind us that the prime minister of Great Britain declared in 1936 that Germany had no desire to attack any country in Europe. In 1938, *Time Magazine*,

History is littered with assumptions that turned out to be colossally wrong. War has a way of surprising the optimists.

complaining about the expense of \$492 million a year, asked: "Where, how, and for what does the US Army expect to fight?" In 1945, US Under Secretary of State Dean Acheson saw no point at which the basic interests of the United States and Russia might ever conflict, "now or in the future." In 1961, President John F. Kennedy labeled "crazier than hell" a suggestion that 300,000 US troops might be deployed to Vietnam.

In 1989, before Saddam Hussein became a household name, a headline in the New York *Daily News* hooted that the "Pentagon Needs a Few Good Enemies." In February 1992, the New York *Times* accused the Pentagon of inventing war scenarios to justify its budget. In August, that same newspaper was calling for air strikes against Serbia and denouncing US and European reluctance to use military force in the Balkans.

Former Secretary of Defense James R. Schlesinger observes that "Americans tend to be rather romantic. The

world seems a benign place, with a natural harmony among peoples only intermittently disrupted by evil men or hostile ideologies. Once those are removed, the natural harmony will be restored."

Secretary of the Air Force Donald B. Rice says that at the peak of Operation Desert Storm, thirty-five other conflicts were raging around the world and that a year later, the total had risen to forty. The Oxford Research Group in Britain identifies sixty "current and emerging conflicts" in Europe, noting that "this list does not include the conflicts in the non-European parts of the former Soviet Union."

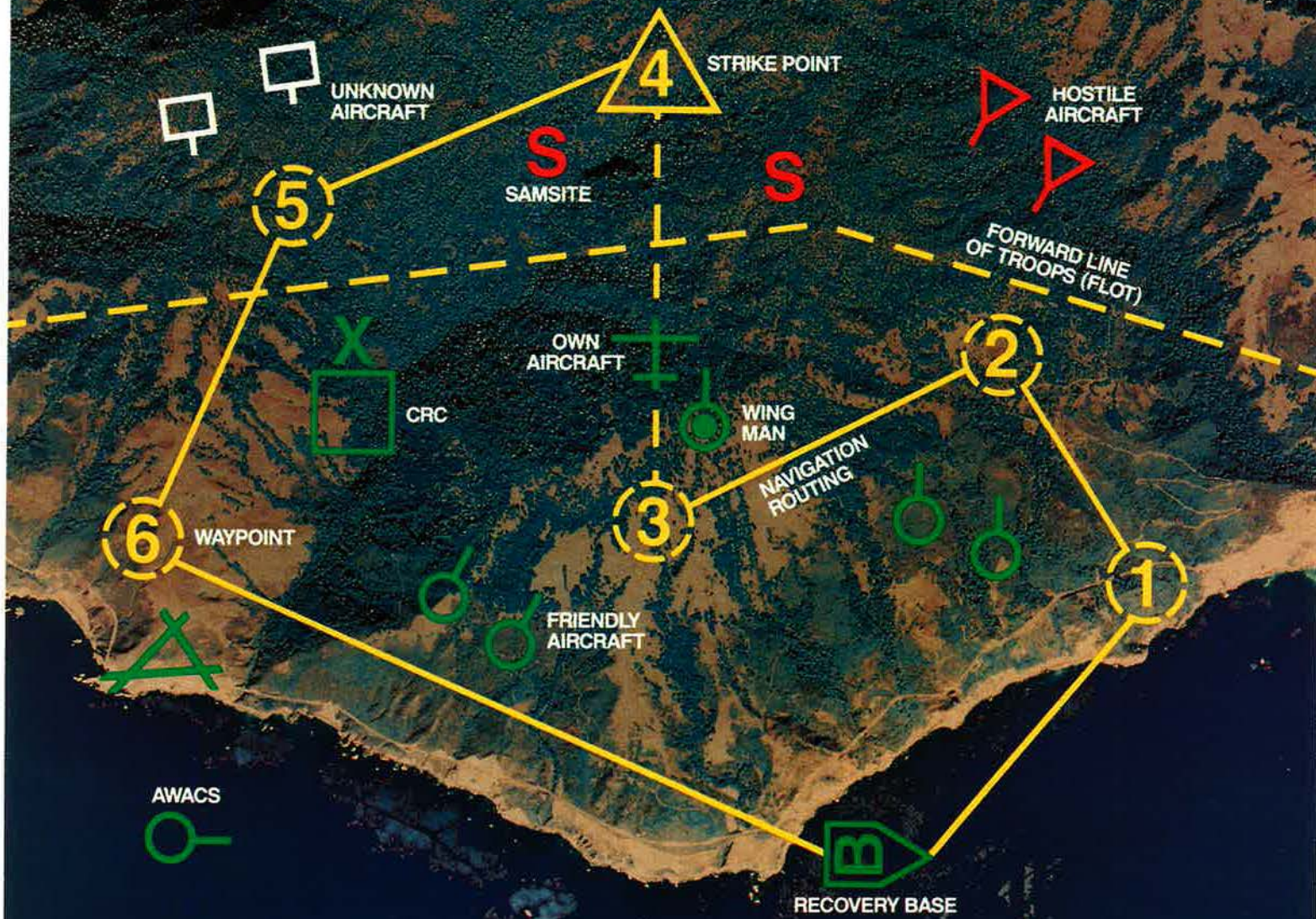
In 1984, most of us envisioned Yugoslavia as a civilized place, the picturesque setting for the Sarajevo Winter Olympics, the one where Torvill and Dean skated to a gold medal. That perhaps intensifies the shock of the incredible slaughter that has occurred in Bosnia-Herzegovina. Maj. Gen. Lewis MacKenzie of Canada, former UN commander in Sarajevo, estimates that pacification of the Balkans, "one of the most densely militarized areas of the world," might require a million troops.

History is littered with optimistic assumptions that turned out to be colossally wrong. So what do we make of it when the Chairman of the Joint Chiefs of Staff cannot stipulate who the B-2 is going to bomb or is unable to tell us who the armed forces are going to fight? Not much, except that he has no magic window on the future.

General Powell would no doubt be among the first to agree to the importance of surveying the risks and assessing the probable threats. That is fundamental to planning strategy and force structure. It is quite another thing to decide that a contingency does not exist if it cannot be demonstrated absolutely and described in detail today.

In June 1975, Teamsters President Jimmy Hoffa told a reporter, "I don't need bodyguards." A month later, Mr. Hoffa disappeared, and he has not been heard from since. ■

MULTI-SERVICE JTIDS: NOW NOBODY'S IN THE DARK.



You're in a high-threat tactical environment. Imagine being able to see at a glance the entire battle scenario. Now, for the first time, U.S. forces will have real-time interoperable data to maximize tactical situation awareness on land, sea and in the air. This system capability is provided by the Joint Tactical Information Distribution System (JTIDS).

Contact Collins Avionics and Communications Division, Rockwell International, Cedar Rapids, Iowa 52498. (319) 395-2208. Telex 464-421 COLLENGR CDR.



Rockwell International

where science gets down to business

The Air Force Family

I'm sure there are several other publications that write about the "Air Force Family." However, they will have to work very hard to top the August 1992 AIR FORCE Magazine. It is one of the best descriptions of the Air Force way of life that I have had the pleasure to read.

Bruce D. Callander's "The Enlisted Airman" [p. 46] was excellent. In a few pages, he enlightened us on the history of the Air Force in his interesting style. "Always With Valor" [p. 77], by John Frisbee, also highlighted the Air Force's heritage.

During my active-duty service and into my present job, I have used and still use the slogan "Air Force Family." This includes active duty, Air Force Reserve, Air National Guard, the retirees, and all dependents, widows, and widowers.

Congratulations to you on an excellent mixture of people and machines in showing the "Air Force Family" and the role the Air Force Association plays in our national defense posture.

Loyal L. Weaver

President, Air Force Enlisted Widows Home Foundation
Fort Walton Beach, Fla.

F-16s Against Iraq

I take exception to "Squeezing More From Space" [August 1992, p. 24]. There is an error in the discussion about the Global Positioning System (GPS). It was not the 69th Tactical Fighter Squadron (TFS) "Werewolves" that did the F-16 GPS pioneering. It was the 421st TFS "Black Widows" and the 4th TFS "Fightin' Fuujins" from the 388th TFW out of Hill AFB, Utah.

The 388th was the first operational wing to be equipped with the Block 40/42 GPS- and LANTIRN-capable F-16C. The wing deployed two of its three squadrons to the Persian Gulf during the August 1990 buildup. The 421st TFS, borrowing almost every LANTIRN-qualified, mission ready pilot in the wing, became the first F-16C squadron in the Persian Gulf region to be mission capable with the Low-Altitude Navigation and Targeting In-

frared for Night system. As more pilots were trained at Luke AFB, Ariz. (310th Tactical Fighter Training Squadron), in LANTIRN during that fall, they were sent to join the "Black Widows." From August 1990 to January 1991, led by Capt. Kevin "Duck" Perry and Capt. Mark "Stitch" Miller, this small core of LANTIRN pilots developed LANTIRN tactics, integrating GPS for the first time. The "Fightin' Fuujins" pioneered daytime medium-altitude tactics, continually practicing and refining their use of GPS in the Gulf arena. When Joint STARS became available, again the 388th was in the forefront, integrating Joint STARS information with GPS accuracy.

The 69th TFS showed up just a few days before the war to join the 388th TFW (deployed). We made sure we shared all we had learned over the previous months to bring them up to speed in minimum time. There was no hiding secrets or holding back hard-learned lessons. We were one team with an upcoming mission. The results of the 388th during the war were substantial. The "Fightin' Fuujins" pioneered the "Killer Scout" concept, using Joint STARS, GPS, and outright piloting to devastate Iraqi targets during the day. The "Black Widows" flew exclusively at night, using LANTIRN, Joint STARS, and GPS to decimate the elite Iraqi Republican Guard. The "Werewolves" became premier Scud-hunting experts, again using all we had taught them plus a few tricks of their own to bring ruination to Saddam Hussein's terror machine.

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

The F-16C community has been generally left out of the picture when it comes to acknowledging and accrediting who did what in the Persian Gulf War. We were there on night one. We were there on the "gorilla packages" to Baghdad. We were there, night after night, day after day, pounding the "less glamorous targets"—the Scuds, the Republican Guard, and flak-intensive north Kuwait. At one point, we were accused of "just pounding sand." Ask the Army after it rolled through the elite Republican Guards in 100 hours if we just pounded sand. I think not, thanks to the incredible accuracy available through the GPS.

Capt. John Wiebener,
USAF
Hill AFB, Utah

Faces of the Drawdown

I read "The Human Side of the Drawdown" [July 1992, p. 38] with annoyance. Of all the perspectives of the human side of the drawdown you could have chosen, it is interesting that you chose to focus on the plight of the banked pilot in your lead paragraph. After reading the article, particularly the opening paragraphs, who wouldn't sympathize with the terrible dilemma thrust upon the young lieutenant who may never make it into an active-duty cockpit? Never mind the 1,600 nonpilot officers who have been RIFed, or the other 5,900 men and women, who, for the most part, made it quite clear they would rather not leave the Air Force. Please don't even consider the 24,000 enlisted members who accepted the incentive to leave early rather than face being booted.

The human side of the drawdown has many faces. It takes the face of the man who came into the Air Force as an enlisted member and established a solid duty record but decided to make more of himself. Through personal initiative, he took classes at night while still meeting Air Force and family needs. After getting a degree, he successfully completed a commissioning program so that he could become an officer. Now, with a decade or more of active-duty time without



Tactical



Reconnaissance



Close Air Support



Defense Suppression



Surface Attack



Interceptor



Night Attack

BUY AN AIRPLANE, GET AN 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

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

Publisher
Monroe W. Hatch, Jr.

Editorial

Editor in Chief
John T. Correll

Executive Editor
Robert S. Dudley

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 Associates
Grace Lizzio, Amy D. Marchand

Administrative Assistant
Wendy L. Rivera

Advertising

Advertising Director
Patricia Teevan
1501 Lee Highway
Arlington, Va. 22209-1198
Tel: 703/247-5800
Telefax: 703/247-5855

Manager of Marketing Services
Elizabeth B. Smith—703/247-5800

Manager, East Coast and Canada
By Nicholas—203/357-7781

Manager, Midwest
William Farrell—708/295-2305

Manager, 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

BPA Circulation audited by
Business Publication Audit

Letters

bad marks on his record, he is vulnerable to a RIF in the ninety-five percent category or voluntary separation.

The human side of the drawdown takes the face of twelve-year staff sergeants with three kids. They have good records and perform their duties well but have the misfortune of working in supply, or transportation, or personnel. Through no fault of their own, they are not working in a more critical career field, where they might have been protected. They "voluntarily" take the incentive to leave, with only the prospect of competing in a stagnant economy with nearly half a million other similarly displaced non-essentials.

Maybe it is not the Air Force's fault that all this came about. After all, the world changed, and Congress said the numbers had to come down. Like it or not, any sensible professional understands the unavoidable pain that had to follow the decision to reduce the armed forces by at least twenty-five percent. But I don't think you will find a terribly sympathetic audience in the Air Force that sees the banked pilot as the tragic figure in this entire episode.

The Air Force Association has an annual membership drive in which some lowly company-grade officer gets the task of trying to sign up as many people as possible. The majority of subscribers would appear to be officers. Most enlisted personnel I have talked to see AFA as an officer sort of thing. Maybe the perception about AFA would change if you tried to see the world once in a while from some perspective other than the cockpit.

Capt. Gregory Noble,
USAF
Incirlik AB, Turkey

■ *Our July article wasn't exclusively about pilots, nor was it only about officers. You might also consider our August cover story, "The Enlisted Airman," in making your judgment about our priorities.*—THE EDITORS

Sensationalizing the Scud War

Freedom of the press is fine, but I think Mr. Powell, in his April 1992 article "Scud War, Round Two" [p. 48], has gone a bit far with his sensationalism about the supposed failures of the coalition's Scud-busting efforts. Those Tuesday-morning couch quarterbacks who debate the success or failure of the Gulf War based on the number of destroyed Scuds, or, for that matter, destroyed tanks or enemy troops, have certainly lost the real strategic picture.

Yes, Saddam Hussein's mobile Scuds, as a terrorist threat against the populations of Saudi Arabia and Israel, were a major challenge to the coalition forces. Yes, problems and shortcomings were encountered throughout the coalition's effort to neutralize the Scuds. Yes, some claims of success were later found to be overstated (Pentagon announcement, June 25, 1992). And yes, more effective tactical ballistic missile defense weapons were probably desired throughout the war.

Nonetheless, given the existing technology limitations of the available weapon systems, the coalition's Scud-busting efforts were, in this reader's mind, a tremendous success. They provided some hope and confidence to the populace and the coalition forces. The allied effort also seemingly put considerable fear into the Scud-launcher crews, since the launch rate was significantly reduced during the course of the war. Of utmost importance, the strategic goals of the war were achieved with astoundingly low casualty rates.

Secretary of Defense Dick Cheney hit the target when he recently said, "We can get it wrong if we allow the revisionists to rewrite history. [During the Gulf War], we were enormously successful as a nation in very thoughtfully, very prudently, but very decisively leading an international coalition to defeat the aggression in the Gulf" (quoted from *The Retired Officer*, June 1992, p. 21).

Besides being annoyed by Mr. Powell's inferences that the coalition forces' Scud-busting effort was a failure, I am having a difficult time finding any worthy issue for "round-two" debate in his article. Possible related debates include the weapons acquisition debate over which future tactical ballistic missile defense systems to support, with how much money; and, while we wait for the new systems, the debate over interim strategic, operational, and tactical responses to the next aggressor who uses tactical ballistic missiles, [but Mr. Powell did little to address them]. . . .

Lt. Col. Jay L. Baird,
USAF
Naples, Italy

■ *The controversy about the battle against the Scuds is far from over. See "Scud War, Round Three," by Stewart M. Powell, on p. 32 of this issue for the latest assessments of the coalition's campaign against Saddam Hussein's tactical ballistic missiles.*—THE EDITORS

Mourning the Aggressors

How soon we forget! "Demise of the Aggressors" does not mention that fellow with the old face, Col. Moody Suter. Moody, as a truly dedicated and probably obnoxious fighter pilot, did the trench work in the Pentagon that made the Aggressors a reality. Seldom is anything useful done in the Air Force in less than ten years, but through Moody's superb efforts, with the help of many other believers, including vocal and active support from some real fighter pilot generals, the Aggressors became a reality almost overnight.

Moody and our generation of fighter pilots demanded that the Aggressor pilots stick to the charter. I can clearly remember explaining to some Aggressors when they flew in the 51st TFW that they were "training aids" and had better stick to the script, damn it!

Such a loss, simply because the fighter force's corporate memory failed or because those of us who fought for and kept the Aggressors honest "graduated." There are a few of us still in the Air Force, but I suppose USAF has bigger challenges now than to protect the "heart and soul of the fighter business."

We learned long ago that providing Fighter Weapons School graduates alone is not the answer. I know a little bit about simulation, and I know that you cannot simulate the human mind and the resulting stick-and-rudder reactions to an airborne situation.

Moody, you did really well, but, as you know from history, peace encourages false economies. However, I am shocked that the present leadership allowed this to happen.

Col. Barry J. Howard,
USAF (Ret.)
Alva, Fla.

I found "Demise of the Aggressors" very interesting. However, I'd like to point out a possible research oversight. The 527th Aggressor Squadron, which provided dissimilar air combat training (DACT) in Europe, actually spent the majority of its active time based out of RAF Alconbury. It's my understanding they didn't move to RAF Bentwaters until after the conversion from the F-5 to the F-16, and they were operational there for a relatively short period before being inactivated.

While I'm sure being an Aggressor must be among the most satisfying experiences in a fighter pilot's career, the maintenance troops with whom I worked in the 64th, 65th, and 527th Aircraft Maintenance Units also took a lot of pride in being "Aggressors."

We worked long hours and performed tasks outside our specialties, but it was well worth it to be associated with those funny colored jets and the DACT mission.

MSgt. Ken Monk,
USAF
Ocean Springs, Mass.

A US-Built Trainer

This letter is in response to "Going It Alone," written by CMSgt. James Maultsby [August 1992 "Letters" p. 9], which expressed the writer's disappointment with various aircraft companies for teaming up with foreign companies to bid for the primary jet trainer contract for the Navy and Air Force. I too lament this turn of events, particularly knowing that the Air Force could have had at least 200 new US-built trainers at this point, had things worked out differently.

I am a former reliability engineer who worked for Fairchild Republic until 1987, when the T-46A trainer contract was canceled. The story of the T-46A contract termination is a sad one, particularly because a working product existed when the contract was canceled. This termination could have been prevented had company officials not made gross errors in scheduling and estimating the actual cost, which was under the tight guidelines of a fixed-price contract. In addition, members of the Air Force were just as guilty in punishing the company for an inadequate rollout milestone for the first aircraft. . . .

The cost overruns of this program pale in comparison with the recently canceled A-12 program. The average Fairchild Republic employee, with experience gained on the successful A-10, worked hard on the T-46A. The average employees were not the culprits. They really believed in this product.

There is no doubt in my mind that the problems that existed could have been worked out if both parties (the Air Force and Fairchild Republic) had been willing and more open-minded. Because the two sides could not agree, everyone lost: The Air Force did not get a new trainer to replace the aging T-37, and many Fairchild Republic employees lost their jobs.

The sad part is that, of the foreign-made trainers that exist, many do not meet the requirements that the original T-46A specification called for, and the Air Force and Navy will end up with a less-than-adequate compromise. The Air Force shares the blame for this continuing waste of the public's money.

Ken Neubeck
Patchogue, N. Y.

For AFA Members:

Vacation Travel Discounts



- Discount Cruises
- Tours
- Resorts

Panama Canal

11 Night Cruise
Holland America's Rotterdam
From \$1,992 including air fare

Europe

12 Night Best of Europe Cruise
RCCL's Song of Norway
From \$1,645

Hawaii

8 Days - Oahu and Maui
From \$534

Caribbean

7 Night Cruise
Dolphin Cruise Line's SeaBreeze
From \$795 including air fare

Low price guarantee on these and
hundreds of other vacations!



Call Fantasy Vacations Toll Free.
Say you are an AFA Member.
Not ready to travel? Ask for our catalog.

1-800-388-1212

1175 Hemdon Parkway, Suite 100 - Hemdon, VA 22079

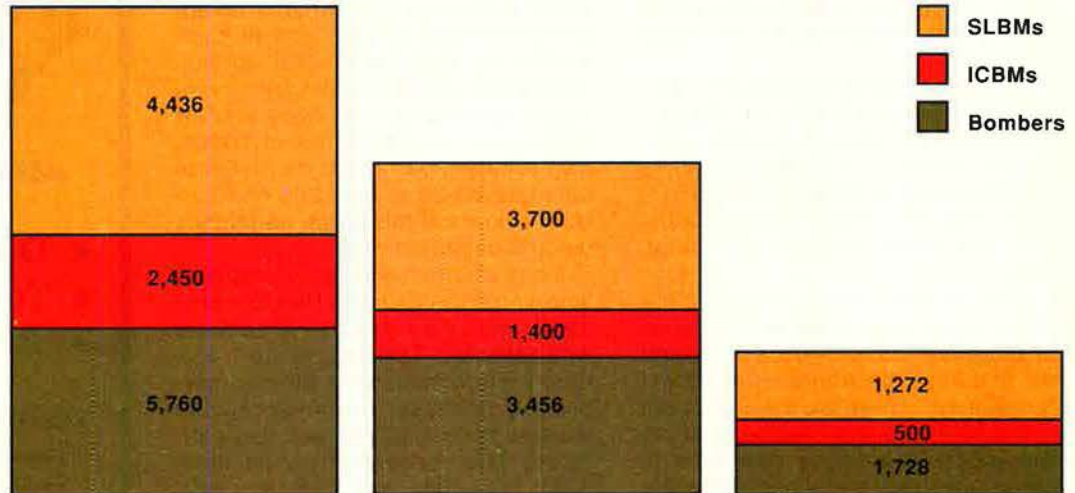
Prices subject to change and availability. Prices shown are per person, double occupancy. Air fare additional unless noted. When air is included, it is available from many, but not all, US cities.

The Chart Page

By Tamar A. Mehuron, Associate Editor

Reductions in the US Strategic Nuclear Arsenal

The June 1992 agreement between Presidents Bush and Yeltsin would reduce the US and Russian arsenals of strategic nuclear weapons to 3,000-3,500, or one-third of the current levels, by 2003. Russian SS-18s, or "heavy" ICBMs of more than 4,350 kg in throw-weight, would be eliminated, as would all other multiple-warhead landbased systems (MIRVed ICBMs), such as the US Peacekeeper and Russian SS-17.



Arsenal Baseline 1990

Delivery systems	Warheads
95 B-1B ^a	1,520
181 B-52(G/H) ^b	2,916
<hr/>	
	4,436
50 Peacekeeper	500
500 Minuteman III	1,500
450 Minuteman II	450
<hr/>	
	2,450
12 Trident with C4/D5	2,304
24 Poseidon with C3/C4	3,456
<hr/>	
	5,760
<hr/>	
Total	12,646

Post-START Force 1998^c

Delivery systems	Warheads
20 B-2	320
95 B-1B ^a	1,520
93 B-52H	1,860
<hr/>	
	3,700
50 Peacekeeper	500
500 Minuteman III	900
<hr/>	
	1,400
18 Tricent with C4/D5	3,456
<hr/>	
	3,456
<hr/>	
Total	8,556

Post-Summit 2003^d

Delivery systems	Warheads
B-2/B-1B (up to 100 counted as conventional bombers), B-52H	1,272
<hr/>	
	1,272
500 Minuteman III	500
<hr/>	
	500
18 Trident with C4/D5	1,728
<hr/>	
	1,728
<hr/>	
Total	3,500

^aTwo additional B-1Bs are assigned to Air Force Materiel Command at Edwards AFB, Calif., for testing.

^bExcludes conventional-only B-52Gs

^cAfter full implementation of START

^dAfter full implementation of Washington Summit Agreement

This weekend, take on a job that's over most people's heads.



Be an officer in the Air National Guard. You'll serve just two days a month and fifteen days a year. But you'll learn to lead a squadron of airmen. Organize combat missions. And take responsibility for some of the most advanced military equipment in the world.

We've got openings for engineers, medical officers, aviation officers, administrative officers. If you've got a college degree, you just might qualify.

Take your place at the top.

Contact your local Air Guard recruiter or call collect (301) 981-8407.

Air National Guard

Americans at their best.

Send to:

Air National Guard, P.O. Box 554, Hanover, MD 21076

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

Date of Birth _____

College Graduate _____



A2A10F**102PO

By James W. Canan, Senior Editor

The Coming Flap on Roles and Missions

The central issue is whether the Air Force or the Navy should stand first in long-range airpower.



The armed forces have had a long, uninterrupted run with the roles and missions each was assigned at the dawn of the cold war nearly a half-century ago. Now the cold war is over, the world is much different, and roles and missions are ripe for change.

They are under the microscope in a rigorous reexamination that has the look of history repeating itself. Air roles and missions are the major issues, just as they were in the wake of World War II when the Air Force was new. Today's big question is the same as the one back then: Should the Air Force or the Navy be the service of choice for the long-range projection of US airpower?

The review of roles and missions has a long way to go, and its outcome is uncertain. One thing is for sure: The Air Force will fight with all its might to retain primacy in the long-range bombing mission, the wellspring of its philosophy of global reach, global power and the main reason for its existence as a separate service.

The Air Force was created for one big reason: to carry out the strategic bombing mission with nuclear weapons. The mission is no longer called "strategic," and nukes are no longer the point, but the ability to strike targets around the world from bases in the US is what sets the Air Force apart. USAF has formed a new composite "air intervention wing" composed of bombers, fighters, and other kinds of aircraft for just such a purpose [see "Gunfighter Country," p. 24]. That wing is not built for nuclear weapons, although it presumably could resort to them if necessary.

Nukes aside, the thorniest roles and missions issue is still one of Air Force bombers vs. Navy carriers—more pre-

cisely, of long-range landbased bombers vs. carrier-based bombers—just as it was when the Air Force and the Navy first faced off forty-five years ago.

Sen. Sam Nunn (D-Ga.), influential chairman of the Senate Armed Services Committee and a leading advocate of roles and missions reform, sees a continuing need for both land-based aviation and seabased aviation because each offers "unique capabilities and assets" vital to national security. The issue is how much of each and for which missions.

The central question, says the Senator: "What is the best and most cost-effective way to provide air interdiction in the future—with long-range bombers from the United States or with large numbers of aircraft carriers with medium-range bombers on their decks?"

That question raises others. What is the tradeoff between upgrading the B-1B bomber fleet, as the Air Force proposes, and building and operating another aircraft carrier, as the Navy plans to do? What are the relative merits of Navy attack planes like the planned A-X and F/A-18E/F operating from carriers and of Air Force bombers, like the B-1 and the B-2, operating from land? Should aircraft carriers be confined to launching relatively short-range attack aircraft like the F/A-18 and relinquish longer-range varieties like the A-6 and the follow-on A-X?

Declares Senator Nunn, "The [carrier] overlap with Air Force landbased air comes into play now, more than it did during the cold war, because there is less emphasis on Air Force long-range bombers in the nuclear role and more emphasis on those bombers in the conventional role."

The interservice debate over long-range airpower was first resolved in favor of the Air Force more than forty-four years ago in a watershed document, "Functions of the Armed Forces and the Joint Chiefs of Staff." Published by the newly created Department of Defense, it came to be known as the "Key West Agreement" because it was forged in Key West, Fla., at a famous four-day interservice summit meeting in March 1948. Secretary of Defense James V. Forrestal had sum-

moned the service chiefs there to settle differences over roles and missions left ambiguous by the National Security Act of 1947.

The Key West Agreement made the services what they are today. They came to be recognized by the functions—commonly referred to as roles and missions—that the document assigned to each. Legislation in later years—the Defense Reorganization Act of 1958 and the Goldwater-Nichols Act of 1986—transferred much operational authority from the service chiefs to theater and regional commanders, but the services continued to be known by the roles in which the Key West Agreement had cast them.

Those roles have endured despite occasionally fierce flareups of interservice rivalries and periodic forays by military reformers. They have come to be deeply rooted in US military culture, but some are now more vulnerable than others. Shakiest, at a time of shrinking forces and rapidly dwindling financial resources, are those that foster duplication of operations and weapons across two or more services.

Senator Nunn leads the charge against them, claiming that "redundancy and duplication are costing billions of dollars every year." He prefers that the services take it upon themselves to revamp roles and missions. If they do not, he warns, Congress or the Defense Department will do it for them, with results not to their liking.

"A good first step would be a serious report coming from General Powell that addresses these issues and begins to analyze them," Senator Nunn told defense writers not long ago.

Gen. Colin Powell, Chairman of the Joint Chiefs of Staff, is expected to issue his report on "roles and functions of the armed forces" by the end of November. The Joint Staff has been working on it for some time. It is required by the Goldwater-Nichols Act. Whether it satisfies Senator Nunn and like-minded lawmakers remains to be seen.

Goldwater-Nichols specifies that JCS chairmen must "report not less than once every three years, or upon the request of the President or the

Secretary of Defense, . . . recommendations for changes in the assignment of functions, or roles and missions, to the armed forces . . . necessary to achieve maximum effectiveness of the armed forces." The law also requires the JCS chairmen to weigh three considerations in preparing their reports—changes in the nature of the threats faced by the United States, changes in military technology, and "unnecessary duplication of effort among the armed forces."

The first such report by a JCS chairman under the Goldwater-Nichols mandate came from Adm. William J. Crowe, Jr., in September 1989. It proposed greater centralization of military intelligence resources and not much else. Some of its recommendations, including the creation of interservice intelligence centers in combat theaters, have been implemented, but many have not.

Last July, in a landmark Senate speech calling for "a thorough overhaul of roles and missions," Senator Nunn characterized Goldwater-Nichols as "the most far-reaching step yet taken to create a coherent, efficient, and effective defense establishment." He contended, for example, that the law had set the stage for the impressive performance of US combined armed forces in the Persian Gulf War by strengthening the authority of theater commanders in chief, such as the Army's Gen. H. Norman Schwarzkopf, over their multiservice component forces.

Even so, the 1986 law "did not complete the process of reform" and left "considerable unfinished business," Senator Nunn maintained. "One of the biggest problems we now face," he said, "is an item that Goldwater-Nichols addressed in a limited way, and that is the issue of the assignment of roles and missions of the military departments." He called on General Powell to come up with "a no-holds-barred review."

The Senator acknowledges that the going is tough, noting that roles and missions issues bring forth deep feelings of "pride and tradition" and are all about "power and resources—controlling a mission means having a claim to budget resources." This is why roles and missions constituted "one of the most fiercely debated issues" confronting the Department of Defense at its formation, he reminded the Senate.

After World War II, the emergence of the Air Force and of new aviation technologies, notably jet engines, gave US military aviation new dimensions and washed out the dividing lines between roles and missions formerly confined to the Army and the Navy.

The National Security Act of 1947, also called the Unification Act, created the Department of Defense, the Joint Chiefs of Staff, and the Department of the Air Force and left roles and missions up for grabs. Executive Order 9877, issued concurrently to implement the new law, was no help. It dealt in generalities about service functions. At Secretary Forrestal's urging, the service chiefs tried to carve out roles and missions extemporaneously, but they bogged down in bickering.

Their stalemate is succinctly recounted in the recently published, two-volume *History of the Office of the Secretary of Defense* by military historian Steven L. Reardon. He writes:

"The JCS efforts to agree on service functions . . . foundered over fundamental disagreements: whether the Navy's carrier aviation should have a role in strategic air operations, and whether the Army or the Air Force should assume primary responsibility for land-based air defense. The Army tended to side with the Air Force on the naval air issue and urged limitations on naval aviation and the Marine Corps, while the Navy stoutly resisted their efforts to limit naval freedom of action."

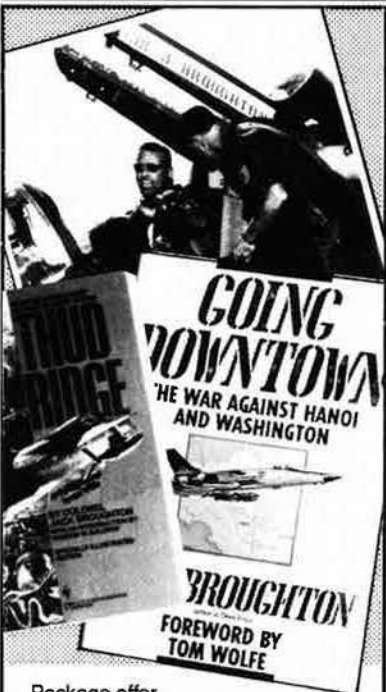
Amid the interservice acrimony, President Harry S. Truman rescinded the executive order and told everyone to try again. Secretary Forrestal opted for a change of scenery and arranged for a conference with the service chiefs in a retreat-like setting at Key West.

In general terms, the Key West Agreement of April 21, 1948, made the Air Force responsible for strategic air warfare, for defense of the US against air attack, and for air and logistic support of ground units; the Navy, for combat operations at sea; the Army, for land combat and for air-defense anti-aircraft artillery; and the Marine Corps, for amphibious warfare. It also assigned each service a number of collateral missions in support of one another. The Air Force, for instance, took on such ancillary responsibilities as antisubmarine warfare, aerial mine-laying, and sea-lane interdiction.

The Key West Agreement did not fully satisfy the Navy. The admirals grudgingly acquiesced to USAF's lead role in strategic bombing but balked at letting it call all the shots for that mission. The sea service wanted greater command and control of nuclear weapons. It insisted on the right to drop atomic bombs from its own planes—carrier-based or landbased—against targets of its own choosing. It pushed ahead with construction of an aircraft carrier to be named *USS United States* and designed for long-range nuclear bombers.

To settle matters, Secretary For-

Air War Classics



Package offer.
Author has secured last few copies.

- **Going Downtown** (hardback)
- **Thud Ridge** (paperback)
- **8x10 Glossy Photo**
(each individually signed per your request)

. . . .

Price \$50.00 complete, delivered.
Send Check or Money Order to:

- **Jack Broughton**
Suite 291 • 22365 El Toro Road,
Lake Forest, CA 92630

Call 1-800-497-4682 for information

COLLECTIBLES

OUT OF PRINT

restal and the service chiefs reconvened in August 1948, at the Naval War College in Newport, R. I. The so-called Newport Conference gave the Air Force full operational control of nuclear bombs. The Navy had to settle for the secondary role of helping the Air Force decide how best to use nuclear bombs in wartime. Construction of *USS United States* subsequently came to a halt. The Air Force had gained the upper hand.

Many years later, on becoming Secretary of Defense in 1973, national security scholar James R. Schlesinger colorfully recounted for Washington defense correspondents the run of events in the period following the formation of the Air Force—Soviet testing of atomic and hydrogen bombs, the Berlin Airlift, the onset of the Korean War.

Noting that US defense budgets sharply escalated during the course

of those events, Secretary Schlesinger said, "The Air Force comes away with forty-six percent of the defense budget—the upstart service casting the senior services into shame. The national strategy is now Air Force strategy. Massive retaliation. You step across the line in Iran, and by God, you lose every city in the Soviet Union. It wasn't a hell of a lot more sophisticated than that."

Nowadays, in a strikingly different world, national strategy and Air Force strategy are indeed a lot more sophisticated than that. But the Air Force still sees them as interdependent and inseparable and pegs its roles and missions squarely to them.

The Key West Agreement left much undone. It opened the gates to subsequent disputes over air roles and missions in allowing all four services to operate flying machines. At the time, "all argued that their organic [air] capabilities were needed to carry out war on land or at sea," Senator Nunn recalled in his Senate speech.

"The problem with the Key West Agreement," he asserted, "is that it largely failed to avoid the tremendous redundancy and duplication among the military services." He noted that "we are the only military in the world with four air forces."

The Senator expects each service to continue to operate aircraft. His goal, he says, is not to eliminate the air assets of any one service but to "crack down" on their overlaps. He claims the armed forces altogether spend "tens of billions of dollars every year operating tactical aircraft squadrons" and "have over \$350 billion worth of new combat aircraft on the drawing boards."

Aircraft programs and operations are not the only targets of the roles and missions review. For example, the Army and the Marines field look-alike light infantry divisions, the Air Force and the Navy build and operate satellites and cruise missiles, and, notes Senator Nunn, "each of the military departments has its own huge infrastructure of schools, laboratories, industrial facilities, testing organizations, and training ranges," plus individual chaplain, medical, dental, nursing, and legal corps.

In his Senate speech, he took note of "broad areas of substantial duplication and potential opportunity for streamlining," including projection of airpower, contingency or expeditionary ground forces, theater air defenses, space operations, helicopter forces, intelligence, functional organizations and activities, logistics and support activities, administrative and manage-

ment headquarters, and Guard and Reserve component forces.

Senator Nunn's campaign against redundant roles and missions is not merely rhetorical. At his direction, the Senate Armed Services Committee produced a Fiscal Year 1993 defense authorization bill that uses money as leverage to force the issue, cutting or deferring funds for allegedly redundant weapon systems until the JCS comes up with a roles and missions report that the Senate, at least, finds satisfactory.

Tactical aviation programs take heavy fire in the Senate bill. It prohibits the Air Force and the Navy from obligating more than half the funds authorized for their respective F-22 and A-X advanced aircraft programs pending the outcome of the JCS review. The bill arbitrarily chooses the Navy to handle all area jamming for Navy and USAF air operations. To back its play, it manipulates money for jammer aircraft upgrades, withholding funding requested by USAF for the EF-111 but doubling Navy-requested funding for the EA-6B. The bill also requires DoD to choose between the Air Force RC-135 and the Navy EP-3 intelligence-gathering planes.

That's not all by a long shot. The Senate bill directs the Air Force to adopt the Navy's F/A-18E/F strike fighter, now in the works, as its new multirole fighter, to give up on plans to develop its own MRF, and to cancel the F-16 fighter program.

Senator Nunn acknowledges that the Air Force may have good reasons for not adopting the upgraded F/A-18 and says he is "not absolutely locked in concrete" on the issue. His purpose, he says, is to make the services get together, if possible, in developing "a common multirole fighter."

He is pressing the Pentagon to rationalize redundancies of tactical air programs on a roles and missions basis within the next eighteen months. Otherwise, he says, Congress will take over. "There's just no way the services can keep going the way they want to go on tactical air," he asserts. "It's impossible. It can't be paid for."

General Powell has made it clear that he will not recommend a dramatic reshaping of tacair roles and missions or of plans to develop and produce planes for them. He flatly told the Senate Armed Services Committee that "four air forces are the right answer. . . . The question is how to make sure that [they] . . . are not redundant and are complementary."

The JCS Chairman reportedly sees the need to revamp some roles and

missions but prefers to take an operational, rather than a programmatic, approach. Unified military commands, such as the new, multiservice US Strategic Command and the US Contingency Command that is said to be in the offing, are counted on to cut duplication of roles and missions by the very nature of their joint operations.

Air Force officials say the service may be willing, even eager, to relinquish some roles in order to consolidate its dwindling forces and resources in others that it considers more important. Close air support comes to mind—but would the Army want it, after all?

The Air Force is dead set against relinquishing its area-jamming mission to the Navy, as dictated by the Senate bill. Among other things, the transfer would greatly complicate matters for USAF's new, blue-ribbon air-intervention wing. The wing's capacity for electronic warfare comes in great measure from its organic EF-111 Ravens. Without them, it might be lost. Working Navy jammer aircraft into the wing's deployment and operations plans would be awkward at best.

Air Force officials acknowledge that it is time to rearrange roles and missions but warn that the exercise will come hard and take several years. "It's just extremely difficult," says one Air Force general at the Pentagon. "The services have operated with definite roles and missions for a very long time. Trying to change them in a major way is a heavy endeavor. It's a lot more than putting electronic warfare into one service or the other. It's changing whole cultures."

There are signs that roles and missions debates are heating up among the services and on the Joint Staff amid final preparations for General Powell's report. There are also signs that the report will not go far enough to suit roles and missions reformers and that Secretary of Defense Dick Cheney will be drawn into the picture.

Sen. John Warner of Virginia, senior Republican on the Senate Armed Services Committee, sees the Powell report as only the beginning. He expects it will take until next year to produce "a significant work product on the roles and missions of the services." That product will represent the combined efforts of General Powell, Secretary Cheney, Senator Nunn, and himself, Senator Warner predicts.

Some students of US military history and of contemporary military affairs go further, predicting "Key West revisited" in two or three years to iron out interservice differences all over again. ■



People who know mission planning plan on Sanders.

Lockheed Sanders leads the industry in state-of-the-art mission planning systems for all the Armed Forces.

Backed by Lockheed mission planners, pilots flying F-117 stealth fighters in Desert Storm rewrote the book on aerial warfare. Air Force Special Ops Forces also rely on Sanders expertise, using our strategic/tactical mission planning system. And, we are currently delivering upgrade kits for mission support systems for composite wings throughout the United States Air Force.

For the future, we're building prototypes for the next generation mission support system (AFMSS), the most sophisticated, flexible and effective mission planner ever conceived. We're also an integral part of the Air Force's F-22 team, with development of that 21st century fighter's mission support element already under way.

And, Sanders' Special Operations Forces Planning and Rehearsal System will enable Navy SEALs and Army Special Forces to apply the latest automation technology to their unique and intensely demanding missions.

Strengthened by 40 years of defense electronics experience, Sanders delivers innovative, affordable mission planning systems—land, sea and air. That's how we became the industry's preferred supplier; and how we intend to stay that way.

Lockheed leads.

 **Lockheed Sanders**

Aerospace World

By Frank Oliveri, Associate Editor

First Officer RIF Under Way

Gen. Merrill A. McPeak announced the start of an Air Force officer reduction in force (RIF), a painful personnel measure that the service has not used for almost two decades.

In a late August statement, the Chief of Staff said the service was taking the step to meet the requirements of the 1990s drawdown. He explained that in 1992 and 1993 the Air Force had to shrink by the equivalent of sixteen wings of officers. "We will require an officer reduction in force, our first in nearly twenty years," he said.

General McPeak, noting that the Air Force also had to give up the equivalent of nine wings of enlisted personnel, said that USAF decided to convene another Selective Early Retirement Board (SERB), whose work would, for the first time, include senior noncommissioned officers.

The Air Force News Agency reported that a RIF board identified 1,600 Reserve officers for involuntary separation. They were given notice on August 27 that they must leave by December 31. Selectees came from the 1980-89 commissioned year groups.

General McPeak said the ongoing drawdown has already produced the smallest Air Force since 1950. "We're forcing a lot of good people out of the service. Unfortunately, I can't assure you that we've seen the end of this process."

Chief Summarizes Force Cuts

In the past year alone, the Air Force denied reenlistment to more than 1,000 trained, qualified airmen who wanted to stay, whom the service wanted to keep, and who would have been able to stay in earlier times.

So said General McPeak, who itemized other unpalatable personnel actions USAF has been compelled to take in the current retrenchment. "This drawdown hurts, and it hurts bad," he said. "I don't like it."

The Air Force reduced the so-called "high year of tenure possible" for senior noncommissioned officers. Master sergeants now retire at twenty-four years and technical sergeants at twenty years.

All but a skeleton staff of eighteen, which included the wing commander, were evacuated from Homestead AFB, Fla., before Hurricane Andrew struck. No base personnel were killed or injured, but the storm destroyed two F-16s and leveled nearly all structures on the base.



USAF photo by Ron Hall

The service told nearly 1,000 colonels and lieutenant colonels to retire earlier than they had planned and before they finished a full career. "These were experienced, highly qualified officers," said General McPeak. "The list includes former wing commanders, Silver Star winners, and ex-POWs."

Incentives to leave the service early have been accepted by about 25,000 NCOs and 5,000 officers.

The General noted that Air Force civilian employees have also been hit hard. "We've had hiring freezes, early retirements, some RIFs," he said. "These kinds of actions are likely to be more frequent and will cut deeper in the future."

The force drawdown is supposed to be complete by 1995, but General McPeak gave little cause for optimism

that the cuts will have run their course. "The Secretary [of the Air Force, Donald B. Rice] and I are doing everything we can to find some smooth air to fly in, but let's face it: There's not a whole lot we can do about it and, quite frankly, I don't know where the bottom is. There's likely to be some more pain in store for us."

Storm Levels Homestead AFB

With a powerful late August punch at southern Florida, Hurricane Andrew virtually destroyed Homestead AFB. The storm leveled nearly all structures. Also lost were two F-16s that could not be moved before disaster struck. Initial reports showed no injuries or loss of life on base, which the Air Force had evacuated.

The loss of Homestead marked the second time in little more than a year

that natural forces wiped out a USAF fighter base. After the mid-1991 eruption of Mount Pinatubo in the Philippines, the Air Force pulled out of Clark AB.

In the wake of the Florida calamity, the main concern of Air Force officials in the area has been to clean up wreckage and assist families and individuals who lost homes and possessions. The Air Force was studying its options for the thousands of service members who find themselves suddenly bereft of offices and work sites.

The Air Force said that Andrew's winds and rain destroyed Homestead's operations and maintenance buildings, commissary, control tower, and all runway lights. More than ninety percent of base housing was severely damaged or destroyed. President Bush has pledged to rebuild the base.

Damage figures were not immediately available, though the toll surely will total millions of dollars, raising doubts about whether Homestead, activated in 1942, will return to operation. The Air Force sent a damage assessment team to the area shortly after the hurricane struck in full force on August 24.

Evacuation Preceded the Deluge

Hurricane Andrew found Homestead virtually deserted. In the days leading up to the arrival of the storm, the Air Force evacuated 4,600 base personnel. Eighteen Air Force individuals, including the 31st Fighter Wing's commander, Col. Stephen B. Plummer, remained at the 3,345-acre



Hamilton Aerospace has completed a ground test of an all-composite prototype aircraft that company President George D. Hamilton plans to propose for the Joint Primary Aircraft Training System (JPATS) program. The aircraft is thirty-three feet, two inches long and ten feet, two inches high. It weighs a mere 5,150 pounds.

site throughout the storm to provide minimum presence and security.

Homestead, formerly a Tactical Air Command Base, became an Air Combat Command installation on June 1. It is the home of the 31st Fighter Wing and several other organizations. Based there were three squadrons of F-16s from the 31st FW, a squadron of F-16s from the 482d Fighter Wing (AFRES), and HC-130 and HH-60 helicopters of the 301st Rescue Squadron (AFRES).

The Air Force redeployed all but

four of the F-16 fighters to Shaw AFB, S. C., Jacksonville International Airport, Fla., and Robins AFB, Ga. The service did not publicly explain why it left the four fighters behind, though some speculated that these jets might not have been flyable.

The HC-130s were transferred to Maxwell AFB, Ala., and the HH-60s to Lackland AFB, Tex.

Homestead is the site of Air Training Command's sea-survival school, the 726th Control Squadron, Naval Security Group Activity, Detachment 1 of the 125th Interceptor Group (ANG), and the Inter-American Air Forces Academy.

USAF Rethinks F-16 Upgrades

In its new Fiscal 1994-99 program objectives memorandum (POM), the Air Force will reduce projected funding for some F-16 upgrades. Maj. Gen. Richard B. Myers, director of Tactical Programs, said the Air Force is taking steps in case the older F-16s are phased out of the inventory earlier than expected due to a drop below Base Force levels. The Pentagon's Base Force concept calls for maintaining 26.5 fighter wings.

"We hope the Base Force doesn't go any lower," General Myers said in July, "but we have to consider carefully what we put into the older A/B model F-16s. Several modifications will probably be taken off the table." He said the service is also looking at continued production of new F-16s.

The Air Force planned to upgrade the F-16A/B under a midlife update program with NATO allies. European allies have been pressuring the US to



At a Department of Energy facility in Oak Ridge, Tenn., managed by Martin Marietta Energy Systems, the Optics Manufacturing Operations Development and Integration Laboratory has been established as a research and testing facility for private industry striving to meet stringent SDI deadlines for optical components. Here, engineer William K. Kahl examines a machine that grinds ceramics.

proceed, and General Myers said the US had a "moral obligation" to continue with the program "in some manner." He said that Secretary of Defense Dick Cheney will ultimately decide on continued US participation in the development phase and on whether USAF will pursue production of F-16s.

MIA Documents Released

The Defense Department has declassified and released to the public 30,000 pages of material relating to service personnel listed as missing in action (MIA) in the Vietnam War. Pentagon spokesman Pete Williams said that the huge batch of papers released in July represented the first installment of 1.5 million pages of files to be released over the next two years.

The documents, some of which date back to 1973, outline approximately 1,800 purported "live sightings" over the past two decades of missing US military men in southeast Asia. They also include seven internal Pentagon memos and reports evaluating the government's efforts to answer MIA and prisoner of war (POW) questions, plus intelligence data. Nearly 600 former POWs and MIAs returned in early 1973 during Operation Homecoming.

Mr. Williams said that all the documents have been provided to the Senate Select Committee on POW-MIA Affairs, now in the midst of a full-scale inquiry.

This summer, the Senate passed a resolution urging President Bush to instruct the services and other executive departments to release all documents, files, and any other material pertaining to POWs and MIAs. On July 22, the President complied, signing an executive order requiring the agencies to review all documents, declassify those that can be released, and make them public.

Should USAF Get Navy Plane?

The Air Force signaled its resistance to any congressional move to declare the Navy F/A-18E/F USAF's new Multirole Fighter (MRF).

In its rewrite of the Fiscal 1993 defense budget, the Senate Armed Services Committee told the Air Force to plan on adopting the bigger, twin-engine Hornet to replace its single-engine multirole F-16. General Myers, the director of Tactical Programs, said he had problems with that provision because the Air Force has not yet drawn up its mission needs statement for the MRF program and will not until 1994 or 1995. "We're way apart on that one," he said.

The General did not rule out eventual selection of the F/A-18 as the MRF, claiming it "certainly" will be in the race.

However, General Myers highlighted basic differences in the two services' approach to that mission area. He noted that the Air Force prefers a single-engine aircraft because it costs less to buy and maintain. Rear Adm. Philip Anselmo, the Navy's deputy director of Air Warfare, said the Navy wants twin-engine planes for survivability over water. General Myers further explained that the new MRF is not needed until around 2015 and must have a useful service life of up to forty years. The implication seemed to be that the Air Force will require an aircraft more advanced than the F/A-18E/F.

Chief Demurs on Women in Combat

General McPeak told Congress he would be reluctant to order women into combat, and he suggested that his view is based on cultural factors. "Even though logic tells us that women can do that as well as men, I have a very traditional attitude about wives and mothers and daughters being ordered to kill people," he said.

The Air Force Chief of Staff made the statement in July testimony before the House Armed Services Committee's Subcommittee on Military Personnel and Compensation, which heard similar sentiments from the other uniformed service leaders. Last year,

Congress repealed combat exclusion laws that barred women from serving on combat aircraft and warships.

The Pentagon is studying how—and whether—to integrate women into combat jobs that once were off-limits to them.

General McPeak said he was aware that combat exclusion hinders the career advancement of service women. "Of course, the mission of the armed forces is not to provide excellent career opportunities," he remarked. "Our mission is national security."

The Air Force employs about 71,000 uniformed women and depends on their continued recruitment and reenlistment. In a question to all the chiefs, Rep. Patricia Schroeder (D-Colo.) asked, "Do you think you could do without women [in the force]?" The four military leaders unanimously responded, "No."

AFMC Maintenance Initiative

A two-level maintenance program being tested by the Air Force at Wright-Patterson AFB, Ohio, could lead to elimination of some base-level repair of aircraft parts and equipment, greatly streamlining the maintenance process.

The program focuses on using flight line and depot maintenance as the only levels of support for repair of aircraft. The benefit of the two-level maintenance system is that it eliminates costly base maintenance squadrons. "It's cheaper because civilian labor is cheaper than military labor," explained Maj. Gen. Richard D. Smith,



In August, the 145th Airlift Group, North Carolina Air National Guard, passed the 150,000 mishap-free flying hours mark. The unit has had thirty-four years of safe flying, the best safety record of any ANG airlift squadron. The 145th will receive Air Mobility Command's Unit Mishap-Free Flying Hour Milestone Award.

deputy chief of staff for Logistics at Air Force Materiel Command. Air Force civilian employees provide most of the work force for AFMC depots.

Greater emphasis on depot-level maintenance also simplifies the aircraft repair process by eliminating some of the equipment that units would have to carry in a forward deployment.

"As you cut down intermediate shops, you cut down the number of troops you have to deploy in situations like Desert Storm," said General Smith. That means a reduction in meals, cots, and anything else needed by maintenance personnel.

F-117 Crashes

An F-117 Stealth fighter crashed and burned in the New Mexico desert. Pilot Capt. John Mills successfully ejected from the aircraft before impact and was treated for minor injuries.

The aircraft crashed during a routine training mission in August. The Air Force is investigating the crash, but weather has been ruled out as a cause for the accident. While the Air Force acknowledges that the aircraft burned, it would not say whether the fighter caught fire before impact or on impact.

Two F-117 pilots died in crashes in the 1980s.

Force Reductions Hurt Cadets

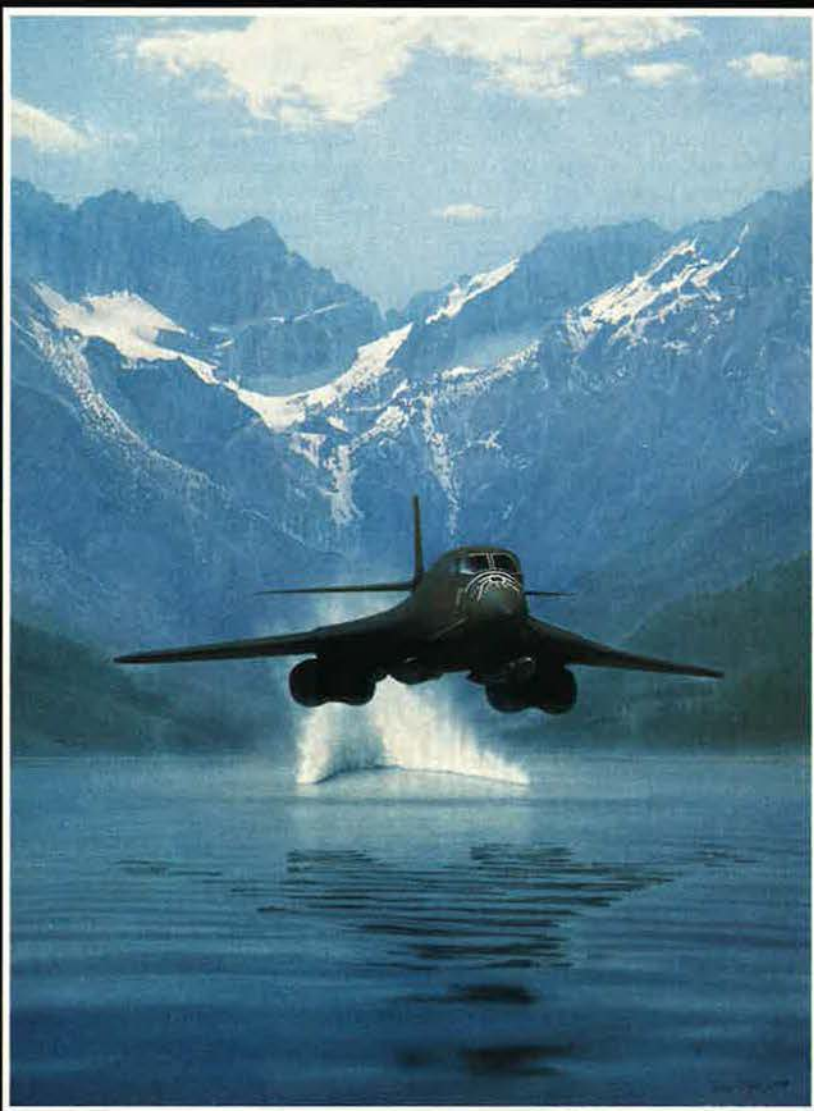
Air Force Academy graduates once could count on getting an immediate shot at undergraduate pilot training (UPT). Now, say senior officers, that guarantee is gone, and many cadets from the Class of '93 will be turned away because of reductions in quotas for flight training.

Until recently, USAF training rates were always healthy enough to provide room for all physically qualified volunteers from the Academy. In the 1980s, in forming UPT classes, the Air Force drew an average of thirty percent from the Academy and the rest from Reserve Officers Training Corps units, Officer Training School, and other sources.

The numbers are falling fast. In Fiscal 1990, pilot training candidates numbered 1,625. The figure for Fiscal 1992, which ended September 30, was a mere 870. The cut is needed to help maintain the proper mix of youth and age in the much smaller pilot force of the future.

Throughout the 1980s, Academy graduates entering UPT would number 600 to 800 per year. In Fiscal 1993, which ends next September 30, only 225 Academy cadets will go to UPT.

EXPERIENCE "POWER"



"POWER", by artist Dru Blair, was selected for Air Force Magazine's Oct. '89 cover. This B-1B painting is reproduced on 100 lb. Quintessence archival paper, each individually signed by the artist. Lithograph size: 24x36 overall. Price \$45.00, add \$5.00 S/H. Visa/MC, personal check, or money order accepted.

1-800-828-3634

BLAIR ART STUDIOS • 2329 BLOSSOM ST. • COLUMBIA, SC 29205

The Air Force says it needs to keep all of the Academy graduates in uniform but does not need them all to be pilots. The service has been forced to bank pilots who have already completed basic flight training. A selection board will convene January 19, 1993, to decide which 1993 graduates will go on to pilot training.

Replace Sidewinder with *What?*

In its search for a system to replace the venerable AIM-9 heat-seeking missile, the Air Force will take a hard look at the technologies and capabilities of Russia's AA-11 air-to-air weapon. "The world has changed a

little," noted General Myers, adding that the Air Force considers the AA-11 a very good missile.

Frank Kendall, the director of Tactical Warfare Plans in the Office of the Secretary of Defense, recently sent a memo to all the services requesting that they include the AA-11, along with Israel's Python and Britain's Advanced Short-Range Air-to-Air Missile, in the AIM-9X cost and operational effectiveness analysis.

The AA-11 missile, NATO code name "Archer," is Russia's most advanced tactical heat-seeking weapon, suitable for use on MiG-29 and Su-27 advanced fighters. Western experts

believe that Archer introduces into the Russian inventory a weapon that has the head-on attack capability contained in later models of Sidewinder.

The AA-11 is ten feet long and seven inches in diameter and weighs about 275 pounds. It has movable sets of control vanes and fins fixed on its cruciform surfaces. Four thrust-vectoring surfaces are set in the path of the engine exhaust—innovations that give the weapon great maneuverability. The AA-11 is reported to contain an active radar fuze, which may be replaced in later models by an active laser fuze. The new air-to-air missile has a thirty-three-pound fragmentation warhead.

"We are working a joint operational requirements document with the Navy to define our needs so we can go about procuring the next-generation heat-seeking air-to-air missile," General Myers said. "The plan has always been to pursue phased modification of the AIM-9, since the services already have so many of them in their inventories."

F-117 "Limitations" Reported

A House Armed Services Committee panel probing the performance of the F-117 against Panamanian forces in Operation Just Cause found reason to criticize the "limitations" of the aircraft.

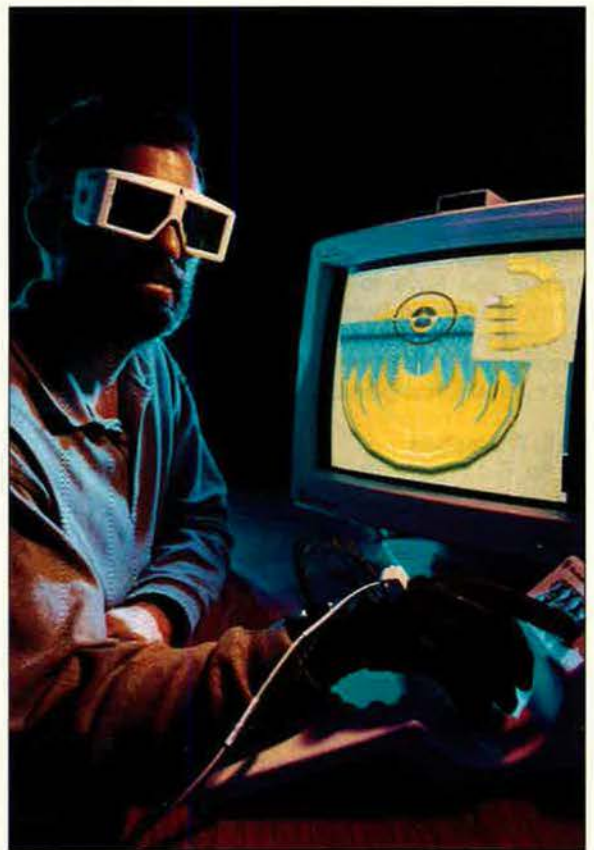
The Investigations Subcommittee noted that, in the 1989 invasion of Panama, two bombs dropped by F-117s in the opening stage of the operation fell more than 100 yards from intended targets. The bombs were intended to disorient Panamanian troops.

The subcommittee found no indication of equipment failure, per se. It found that the F-117 pilots were misled into placing the crosshairs of their laser-guided systems on the wrong areas. "The subcommittee, however, doesn't blame this on pilot error," the August report states, but instead cites system limitations.

Atmospheric conditions, chiefly high humidity, "severely and dramatically limited the amount of time the pilots had in which to visually identify their targets," the report says. "As a result, the pilots were confused and uncertain."

A videotape cited by the report reveals that, with only seven seconds remaining until release, the lead pilot was so uncertain that he moved the cross hairs off his chosen target to a known reference point in an attempt to recalculate the location of the correct target. The pilot failed. The second pilot used the first bomb blast as

Using stereo goggles, a data glove, and a video display terminal, Lockheed Advanced Computing Laboratory programmer Greg Stefanik can "reach into" the screen and modify parameters in three dimensions. The laboratory is researching 3-D acoustic data for antisubmarine warfare applications.



a reference point when the first pilot said he had hit the target.

The subcommittee stated, "Over Panama, the ground wasn't even visible until less than one minute remained to bomb release and the pilot couldn't see much through the muck even seconds before release."

B-2 Design Cleared

Deficient surfaces and edges—not faulty design—caused the B-2 Stealth bomber to fail a low-observability test last year, says Air Force Secretary Rice.

The Air Force greeted the news with relief because it means the problem can be fixed with low-cost measures. Secretary Rice reported that, once the modifications have been completed, the aircraft will meet or exceed specifications in the frequency range where it earlier failed.

The Air Force is still developing three options in its plan to achieve specified levels of stealthiness. It will report its findings to Congress next year. The service believes the proper changes can be financed within the current \$44.4 billion program budget, but it cannot confirm that belief until early next year.

Dr. Rice would not disclose the na-

ture of the changes now being considered, but he indicated that the shape of the edges would not change. In fact, he said that only the materials used in the edges will change.

Icebound P-38 Recovered

The Greenland Expedition Society completed the recovery of an icebound P-38 that was a part of the "Lost Squadron," which crash-landed on Greenland's ice cap in 1942 and vanished beneath tons of snow and ice. [See "Squadron in the Ice," June 1990, p. 88.]

Workers had to melt their way through ice with a hot water coil, disassemble the 10.8-ton, single-seat aircraft, and then lift the parts through a shaft four feet in diameter. Two former members of the Lost Squadron and some two dozen explorers were present on July 15 to witness completion of the recovery of the plane, one of eight lost, on the fiftieth anniversary of the crash.

The eight aircraft, two B-17s and six P-38s, were on their way to England to support military operations in Europe when they ran low on fuel and were forced to land. Over the years, the planes disappeared beneath snow and ice. Glacial movement had shifted

the planes one mile from the original crash site.

Explorers using advanced electronic equipment relocated the crash site in 1988. In 1990, portions of a B-17 were found, but the plane proved to be heavily damaged by movement of the glacier and the weight of the packed ice. The P-38 recovered in July is in restorable condition.

More Transition Aid

US military personnel leaving active duty from overseas bases will receive additional transition assistance benefits to help them find new jobs and homes, Secretary Cheney announced. The latest initiative increases from ten to thirty days the amount of authorized permissive temporary duty (PTDY), or time off with pay; authorizes individuals to use the thirty days PTDY in addition to terminal leave; and permits eligible separatees to select a processing station nearest to desired final destination in the US.

It also enables command-sponsored dependents to travel on government aircraft, on a space-available basis, on a round-trip between the overseas port and the port in the continental US or, for residents of territories or possessions, from overseas port to the port of entry in the territory or possession.

Thunderbirds Get New F-16Cs

In September, the Thunderbirds unveiled their new aircraft, the F-16C Fighting Falcon, at the Cleveland National Air Show. It is the ninth type used by the Air Force's aerial demonstration team, which last used the F-16A/B variant.

"We converted to the upgraded C model because we represent the rest of the Air Force—its people and inventory," said Capt. Marc Paquette, the team's maintenance officer. "Every front-line F-16 squadron in the Air Force employs the F-16C. It also made sound sense for logistical and combat conversion reasons."

Johnson Wins Kolligian Trophy

Capt. Jeffrey Johnson, a KC-135 instructor, received the Koren Kolligian, Jr., Trophy for saving his aircrew and aircraft from destruction in June 1991.

During a flight emergency, Captain Johnson's aircraft suddenly became stuck in a left bank 500 feet above the ground. He was performing instructor pilot duties from the right copilot's seat when he noticed the aircraft rolling left, although the upgrade pilot had full right aileron.

Captain Johnson took control of the aircraft and added full right rudder,

MOVE UP IN RANK WITH GENERAL.



The Dodge Dynasty, air bag equipped for added safety.

GET A FREE UPGRADE WHEN YOU PRESENT THIS AD.

Now when you rent from General, you'll automatically move up a grade. Just present this ad when you rent a compact or larger car, and we'll upgrade you to the next higher car category at no additional charge, subject to vehicle availability. We'll also give you great low rates on a full selection of quality Chrysler cars. Free unlimited mileage. And the kind of fast, friendly service you'll appreciate, no matter what your rank.

For reservations, call your travel coordinator or General at **1-800-327-7607**. For official business ask for rate plan **GV**. For personal travel ask for rate plan **GO**.

General
RENT-A-CAR
Going all out.

We feature quality products of Chrysler Corporation.

NATIONWIDE LOCATIONS IN: Arizona, California, Colorado, Florida, Georgia, Louisiana, Nevada, New Mexico, North Carolina, South Carolina, Texas, Utah, Washington. More locations opening.

6317

but the aircraft continued to roll. He turned off the rudder power switch, which stopped the tanker from rolling left, though it was still banking left.

While Captain Johnson controlled the aircraft, he directed the upgrade pilot to switch seats with the evaluator pilot, Maj. Joseph Wisniewski, and the two pilots took turns controlling the rudder and resting their right legs.

The two pilots raised the aircraft to an altitude of about 4,000 feet, where

they conducted controllability tests to see if landing was possible. After communicating with experts on the ground, including Boeing personnel, the crew devised a plan in which the number one engine was kept at ninety-five percent throttle until the plane landed safely.

Merger Saves \$50 Million

Merging the four services' commissaries has allowed the Defense Com-

missary Agency to improve its business practices and has helped save about \$50 million this year.

DCA Director Maj. Gen. John Dreska said in August that the system has been streamlined considerably, which has improved operations and reduced costs. "We now pay bills using one uniform system with two paying offices as opposed to over 130 paying

offices, each with a separate system, [used] previously," the Army's General Dreska said. "By consolidating a vendor's existing contracts we achieve a reduction of approximately 35,000 separate contracts, reducing the administrative burden and cost of doing business with the commissaries for both the vendor and the government."

DCA said it saved \$50 million largely by cutting some 1,600 positions above the commissary store level.

News Notes

■ In July, the Navy issued a \$3.96 billion contract to McDonnell Douglas for the development of the derivative F/A-18E/F. In August, the Pentagon Selected Acquisition Report (SAR) set the Navy F/A-18E/F program cost at \$94.6 billion in then-year dollars, which includes the \$722 million increase in development cited earlier this year.

■ The Senate confirmed Gen. Ronald R. Fogleman in August as the new commander of Air Mobility Command and commander in chief of US Transportation Command. General Fogleman, the former commander of 7th Air Force at Osan AB, South Korea, replaces Gen. H. T. Johnson, who retired in September. General Johnson headed USTRANSCOM and Military Airlift Command since 1989. MAC was deactivated on June 1, 1992, and most of its assets were folded into Air Mobility Command.

■ The three-ship test fleet of the C-17 airlifter reached the 400-hour flying plateau at Edwards AFB, Calif., in August after "T-1," the first test aircraft, completed a 7.1-hour flight. The C-17s had flown 406.8 hours through mid-August, the Air Force said.

■ The House Armed Services Investigations Subcommittee reported in August that fewer than 100 innocent bystanders were killed in the US invasion of Panama. The report refutes claims that thousands of civilians died in the military operation.

■ The US and Russia announced in July that they had plans to expand cooperation in life science and global change research, exchange an American astronaut and Russian cosmonaut, and complete a space shuttle rendezvous and docking with the Russian space station Mir.

■ In August, the Navy released a request for proposal for a V-22 derivative, intended to be an affordable medium-lift aircraft to meet Marine requirements. The proposal called for the design, fabrication, and flight testing of the V-22 derivative. Affordability would be of great concern in near-term and life-cycle costs.

■ The last flight of an Air Force F-4D Phantom II fighter took place in July at Eglin AFB, Fla. The 3246th Test Wing operated the last three D models of the F-4 in the US inventory. About 750 of the aircraft were built from 1963 to 1975. The old aircraft will be used on the Eglin AFB range as aerial targets.

Senior Staff Changes

RETIREMENTS: B/G Frank Cardile; M/G John A. Corder; B/G Jeffrey T. Ellis; M/G Harald G. Hermes; Gen. H. T. Johnson; B/G Graham E. Shirley.

PROMOTIONS: To be General: L/G Ronald R. Fogleman. To be Lieutenant General: Howell W. Estes III.

CHANGES: B/G Roger E. Carlton, from Spec. Ass't to C/S, SHAPE, Mons, Belgium, to Cmdr., 36th FW, USAF, Bitburg AB, Germany, replacing Col. Ronald E. Keyes . . . M/G Marvin S. Ervin, from Dir., Ops., DCS/P&O, Hq. USAF, Washington, D. C., to Dir., Forces, DCS/P&O, Hq. USAF, Washington, D. C. . . . Col. (B/G selectee) Marvin R. Esmond, from Cmdr., 347th FW, ACC, and Installation Cmdr., Moody AFB, Ga., to Cmdr., 56th FW, ACC, MacDill AFB, Fla., replacing B/G Ben Nelson, Jr. . . . M/G (L/G selectee) Howell M. Estes III, from Dir., Plans, DCS/P&O, Hq. USAF, Washington, D. C., to Cmdr., 7th AF, PACAF, Dep. CINC, UN Cmd. Korea; and Cmdr., ROK/US Air Comp. Cmd., CFC; Osan AB, Korea, replacing L/G (Gen. selectee) Ronald R. Fogleman . . . L/G (Gen. selectee) Ronald R. Fogleman, from Cmdr., 7th AF, PACAF, Dep. CINC, UN Cmd. Korea; and Cmdr., ROK/US Air Comp. Cmd., CFC; Osan AB, Korea, to CINC, USTRANSCOM, and Cmdr., Hq. AMC, Scott AFB, Ill., replacing retired Gen. H. T. Johnson.

B/G Ralph H. Graham, from Prgm. Dir. for F-16, ASC, Hq. AFMC, Wright-Patterson AFB, Ohio, to Dir., Special Prgrms., Under Sec'y of Defense for Acquisition, OSD, Washington, D. C. . . . Col. (B/G selectee) George A. Gray III, from Senior Mil. Ass't to Ass't Sec'y of Defense, Special Ops. and Low-Intensity Conflict, Under Sec'y of Defense, Policy, OSD, Washington, D. C., to Cmdr., 438th AW, AMC, and Installation Cmdr., McGuire AFB, N. J., replacing retired B/G Frank Cardile . . . M/G George B. Harrison, from DCS/Ops., and Dep. Dir., Ops., EACOS, Hq. USAF, Ramstein AB, Germany, to Cmdr., USAF Air Warfare Ctr., ACC, Eglin AFB, Fla., replacing retired M/G John A. Corder . . . B/G Hal M. Hornburg, from Cmdr., 4th Wing, ACC, and Installation Cmdr., Seymour Johnson AFB, N. C., to Dir., Ops., DCS/P&O, Hq. USAF, Washington, D. C., replacing M/G Marvin S. Ervin . . . M/G John G. Lorber, from Ass't to DCS/P&O, Hq. USAF, Washington, D. C., to Dir., Plans, DCS/P&O, Hq. USAF, Washington, D. C., replacing M/G Howell M. Estes III.

B/G Lance W. Lord, from Commandant, SOS, Hq. AU, Maxwell AFB, Ala., to Cmdr., 90th MW, ACC, F. E. Warren AFB, Wyo., replacing Col. Thomas A. Fagan III . . . B/G Eldon W. Joersz, from Dir., POW/MIA Affairs, ISA/POW-MIA, OSD, Washington, D. C., to Cmdr., 4th Wing, ACC, and Installation Cmdr., Seymour Johnson AFB, N. C., replacing B/G Hal M. Hornburg . . . B/G James I. Mathers, from Spec. Ass't to Cmdr., 16th AF, and Cmdr., CTF, Operation Provide Comfort, USAF, Incirlik AB, Turkey, to Cmdr., 347th FW, ACC, and Installation Cmdr., Moody AFB, Ga., replacing Col. (B/G selectee) Marvin R. Esmond . . . B/G Ben Nelson, Jr., from Cmdr., 56th FW, ACC, MacDill AFB, Fla., to Dep. Cmdr., 5th ATAF, Vincenzo, Italy, replacing retired B/G Jeffrey T. Ellis . . . B/G George W. Norwood, from Dir., Inspections, IG, USAF, OSAF, Washington, D. C., to Dep. IG, USAF, OSAF, Washington, D. C., replacing B/G Harold H. Rhoden.

B/G Rudolf F. Peksens, from Ass't DCS/Ops., Hq. USAF, Ramstein AB, Germany, to Cmdr., 410th Bomb Wing, ACC, K. I. Sawyer AFB, Mich., replacing Col. John E. Frisby . . . B/G Harold H. Rhoden, from Dep. IG, USAF, OSAF, Washington, D. C., to Vice Cmdr., 9th AF, ACC; and Dep. Cmdr., USCENAF, Shaw AFB, S. C., replacing retired M/G Harald G. Hermes . . . Col. (B/G selectee) David L. Vesely, from Chief, Plans, Concepts & Assessments Div., J-7, Joint Staff, Washington, D. C., to Vice Cmdr., Hq. AFIC, Kelly AFB, Tex., replacing retired B/G Graham E. Shirley . . . B/G James L. Vick, from Cmdr., Hq. AFDW, Bolling AFB, D. C., to Vice Cmdr., 8th AF, ACC, Barksdale AFB, La., replacing M/G Brett M. Dula . . . Col. (B/G selectee) David L. Young, from Dir., Jt. Planning & Exercise Activity, J-5, FORSCOM, Fort McPherson, Ga., to Dir., Plans, Policy, & Programming, FORSCOM, Fort McPherson, Ga.

SENIOR ENLISTED ADVISOR (SEA) RETIREMENT: CMSgt. Roy A. Boudreaux.

SEA CHANGE: CMSgt. Steve Beckman, from SEA, 7100th Combat Support Wing, Lindsey AS, Germany, to SEA, AU, Maxwell AFB, Ala., replacing retired CMSgt. Roy A. Boudreaux.

SENIOR EXECUTIVE SERVICE (SES) CHANGES: Thomas L. Miner, from Dir., Commodities Mgmt., Oklahoma City ALC, AFMC, Tinker AFB, Okla., to Principal Ass't DCS/Comptroller, Hq. AFMC, Wright-Patterson AFB, Ohio, replacing retired John E. Lang . . . Oral L. Smithers, from Dir., Flight Sys. Engineering, ASC, Hq. AFMC, Wright-Patterson AFB, Ohio, to Dep. Dir., Wright Lab, Hq. AFMC, Wright-Patterson AFB, Ohio, replacing James F. Bair . . . Merrill L. Minges, from Dir., Nonmetallic Materials Div., Wright Lab, Hq. AFMC, Wright-Patterson AFB, Ohio, to Dir., Plans and Prgrms., Wright Lab, Hq. AFMC, Wright-Patterson AFB, Ohio. ■

■ The Air Force reported in July that it has found that cooling tubes failed on the General Electric F101 turbofan engines used by the B-1B bomber, causing a fire that forced a bomber at Dyess AFB, Tex., to land before completing its mission in June. The Air Force plans to inspect and replace cooling tubes that may cause problems on all other B-1Bs. The tube helps remove hot gases from the turbine section of the engine. There are four such tubes. The tubes become worn when they rub against the compressor discharge nozzle case, Air Combat Command said.

■ NASA has begun construction of an unpowered research aircraft called Perseus, which will be a high-flying, lightweight aircraft that will measure ozone levels and other atmospheric conditions. NASA sees Perseus as the first step toward general use of advanced aircraft for many aspects of Earth sciences research. Aurora Flight Sciences Corp. received a \$2.25 million contract to design, build, and flight test two such aircraft. The first will be delivered next year.

■ The Russian Air Force is preparing to conduct the first flight of its own stealthy fighter, according to officials from the Mikoyan design bureau. *Jane's Defence Weekly* quoted Mikoyan First Deputy General Designer Anatoly Belosvet as saying that the aircraft is in the thirty-ton class. It will incorporate stealth and, possibly, thrust-vectoring technologies. The aircraft will use radar-absorbing material to reduce radar cross section.

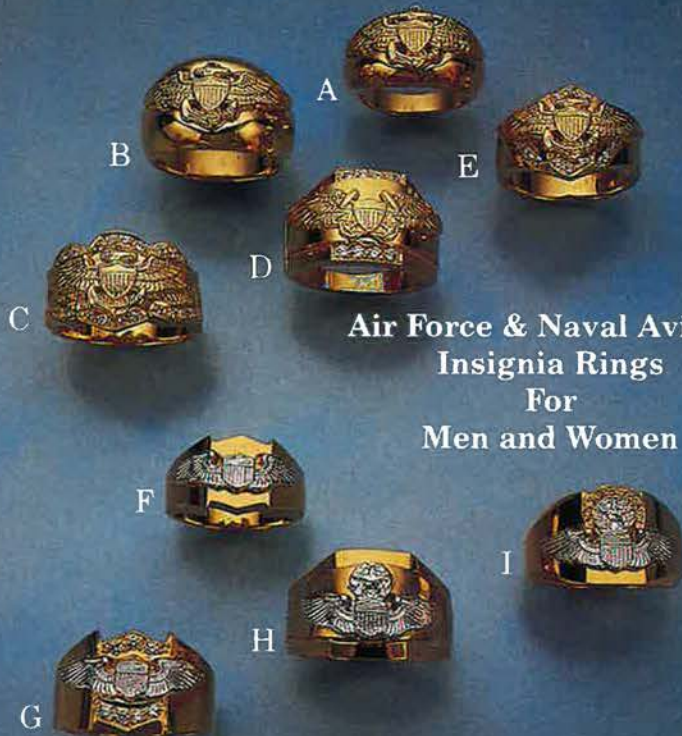
■ NASA has flown a complete 3-D high-performance aircraft in a super-computer for the first time, the space agency announced in July. Scientists at NASA's Ames Research Center reproduced the complete flow of air around an F/A-18 fighter. The airflow field, which duplicates high-angle-of-attack flight, lets researchers analyze the unsteady airflow that causes sporadic buffeting of tail surfaces and study improved control systems for the plane's forward fuselage.

■ The Pratt & Whitney F119 engine for the F-22 Advanced Tactical Fighter successfully completed Air Force critical design and initial production readiness reviews, which frees the contractor to further develop the engine, the firm said in August.

■ The Panther 800 helicopter completed a successful flight test program in July at American Eurocopter facilities in Grand Prairie, Tex. The LTV-led team plans to offer the Panther 800 as an off-the-shelf replacement for the Army's UH-1 light utility helicopter. The aircraft flew more than thirty-four times, spending sixteen

WINGS

WEAR THEM WITH PRIDE



Air Force & Naval Aviator
Insignia Rings
For
Men and Women

CREATIVE DESIGNS UNLIMITED

proudly presents it's fine collection of insignia rings.

Genuinely crafted in 14kt gold, several including diamonds. These rings are only for the few.

You earned your wings . . . Let your pride show!

MADE IN THE U.S.A.

1-800-241-2678

ORDER FORM

Ring Size _____

A - Ladies	NAVAL	\$ 450.	F - Ladies	AIR FORCE	\$ 399.
B - Mens	"	\$ 450.	G - Mens	" "	\$ 775.
C - Mens	"	\$ 995.	H - Mens	" "	\$ 475.
D - Mens	"	\$ 775.	I - Mens	" "	\$ 750.
E - Mens	"	\$ 895.	TOTAL		\$ _____

• California Residents add 8.25% Sales Tax •

Special Orders for Cubic Zirconia & White Gold Available

30 Day Money Back Guarantee

3-4 Weeks Delivery

Name _____ Phone _____

Address _____

City & State _____ Zip _____

Checks/Money Orders Accepted

Visa/Mastercard

For Faster Service

Call Our Toll Free Number

Card Number _____

Expiration Date _____

Signature _____

CREATIVE DESIGNS UNLIMITED
Post Office Box 57932, Sherman Oaks, CA 91413

WE SLASHED THE ARMY'S APU DEPOT MAINTENANCE BILL BY MILLIONS.



WE CAN DO THE SAME FOR YOU.

Imagine an APU depot maintenance program that not only saves millions of dollars, but offers a fast turnaround for increased operational readiness with a combat surge capability.

A cost-effective process that reduces waste and facilitates manpower reductions by eliminating hundreds of non-value-added activities.

A complete turn-key program that manages all elements of the repair process, providing a direct line to the OEM for quick identification, development, and incorporation of product improvements and technology insertion.

Garrett's Contractor Depot Capacity. A more streamlined approach to reduced APU maintenance costs that generates real savings for the customer in material management, inventory and pipeline assets.

From ground carts to fighters, bombers to tankers and cargo planes, wherever there's an opportunity to help cut APU maintenance costs, we're ready to show you what's giving the Army so much to smile about.

Garrett Auxiliary Power Division, Military Customer Support, P.O. Box 5227, Phoenix, AZ 85010-5227. (602) 365-5242.

hours aloft over a seven-week period.

■ TSgt. Zachary Wallace, 9th Reconnaissance Wing, Beale AFB, Calif., was named the Air Force's top crew chief for 1992 in July. The award recognizes individual excellence in critical aircraft mission support areas.

■ In July, the B-2 bomber refueled at night for the first time at Edwards AFB, Calif. During the four-hour flight, the B-2 made thirty-four refueling contacts with a KC-135 while the bomber's exterior lighting and performance were evaluated. It was the second of two night flights to assess the aircraft's capabilities.

■ In July, the Air Force chose teams led by Lockheed and TRW to move into the twenty-four-month demonstration/validation phase of the Follow-On Early Warning Satellite system. The Lockheed team was awarded \$240 million for its program, and TRW's team received \$239.9 million. FEWS is expected to replace the Defense Support Program satellite system.

■ Also in July, the Pentagon's Inspector General recommended cutting purchases of the Enhanced Flight Screener. The Air Force selected the Slingsby Firefly to fill the EFS requirement earlier this year.

■ The Strategic Defense Initiative Organization (SDIO) successfully tested the Extended-Range Interceptor (ERINT) in July. Its high-fidelity forebody propelled to operational velocity and destroyed a mock warhead with simulated nontoxic chemical submunitions.

■ Sen. Jake Garn (R-Utah) was selected in July to be the 1992 recipient of the Wright Brothers Memorial Trophy. The trophy is awarded to those who provide a significant public service of enduring value to aviation in the US. The award recognizes the Senator's life of service as military and civilian pilot, astronaut, and one of the US Senate's most effective spokesmen for aerospace.

■ A newly developed Patriot PAC-3 multimode missile successfully intercepted a tactical ballistic missile target at White Sands Missile range in New Mexico in July. The Raytheon-built missile completed the second successful guidance flight test, also demonstrating the ability to intercept at far greater altitudes than can the PAC-2 configuration.

■ DoD notified Congress of a proposed Letter of Offer from the government of South Korea for the purchase of thirty-seven AH-64 Apache attack helicopters, 775 Hellfire missiles, and eight spare T700 engines. Other ma-

terials critical to the operation of the systems were included in the \$997 million package.

■ Uncommanded brake pressure from a bad bracket caused the crash of a Navy T-45 trainer in June. A Navy investigation found a small piece of metal wedged between the brake pedal and the master cylinder, causing the brake to be applied on the left pedal. All other test aircraft have been checked out for the problem. This type of brake system will not be used on the production aircraft, the Navy said.

Purchases

The Air Force awarded Magnavox Electronic Systems Co. a \$9 million contract in July for building and qualification testing of the Single Channel Ground and Airborne Radio Subsystem. SINCGARS will provide anti-jam communications by frequency-hopping in a pseudo-random order. The system will be used to interoperate with the Army. Expected completion: 1995.

The Air Force awarded Martin Marietta an \$8.8 million firm fixed-price contract for long-lead procurement of up to ten Low-Altitude Navigation and Targeting Infrared for Night system targeting pods and spares. Expected completion: April 1993.

The Navy awarded Boeing Defense and Space Group a \$588 million firm fixed-price contract for the procurement of 120 composite replacement

wings for the A-6 Intruder aircraft. Expected completion: March 1997.

Deaths

Gen. James R. Allen, a former commander in chief of Military Airlift Command, died at Andrews AFB, Md., in August after a long bout with cancer. He was sixty-six.

General Allen served thirty-five years in the Air Force, including a combat tour in Korea flying the P-51 and another tour in Vietnam flying the F-4C. He also served as chief of staff of Strategic Air Command, superintendent of the US Air Force Academy, chief of staff of Supreme Headquarters Allied Powers Europe, and deputy commander in chief of US European Command.

Walter Singlevich, who served on the Manhattan Project and was the director of Nuclear Technology at the Air Force Technical Applications Center at Patrick AFB, Fla., died in June from complications following major surgery. He was seventy-three.

Harrison A. Storms, Jr., whose designs and leadership played key roles in the development of the B-25 bomber and the P-51 fighter during World War II, died in July of a heart attack. He was seventy-six. Mr. Storms also played an important role in Project Apollo's race for the moon in the 1960s. He worked on the F-86 fighter, the F-100 Super Sabre, and the X-15 rocket airplane. ■

Index to Advertisers

Air National Guard9
 Allied-Signal Aerospace Co.22
 Blair Art Studios17
 Classics of the Air War11
 Creative Designs Unlimited21
 Destinations56
 Fantasy Vacations7
 General Dynamics Corp.5
 General Rent-A-Car19
 Grumman Corp.31
 Hertz85
 Hughes Training Co.Cover III
 Lockheed Sanders Inc.13
 McDonnell Douglas Corp.Cover IV
 Rockwell International, Collins Avionics and Communications Div.3
 Showcase Model Co.86
 USAA45
 Vought AircraftCover II

AFA Insurance87
 AFA Member Supplies86
 AFA Symposium—Los Angeles75
Airpower in the Gulf79

The Air Force's first "air intervention wing" is taking shape at Mountain Home AFB, Idaho.

Gunfighter Country

By James W. Canan, Senior Editor

THE FLIGHT line at Mountain Home AFB on the high plains of southwestern Idaho is a panorama of integrated airpower for modern war. The gunfighters are gathered on the ramps, hard by the Snake River, in a new composite air wing with an unusually lethal look and a long-range mission to match.

It is the 366th Wing, the Air Force's first "air intervention wing," aptly named "the Gunfighters." Arrayed on its flight line are F-15C Eagles for air superiority, EF-111 Ravens for electronic warfare, B-52G Stratofortresses for heavy bombing, KC-135R Stratotankers, multimission F-16C Fighting Falcons, and dual-role, deep-interdiction F-15Es.

E-3 Sentry Airborne Warning and Control System (AWACS) planes have yet to occupy their ramp space. They have been deployed overseas since being earmarked for the composite wing earlier this year. EC-135 Compass Call communications aircraft may join the wing later on.

Brig. Gen. William S. Hinton, Jr., the wing commander whose F-16C bears tail number 366, likes what he sees on the ramps. "We'll be ready to go anywhere in the world on short



Photos by James Benson

Mountain Home AFB, Idaho—tail code "MO"—is the home of the new 366th Wing, a composite "air intervention wing" with different kinds of aircraft for swift-reaction combat in faraway places. Here, left to right on the flight line, are a KC-135 tanker, a B-52G bomber, and EF-111 jammer aircraft. Opposite: F-16Cs of the wing's 389th Fighter Squadron taxi out for composite training with the BUFFs.



MO
43



CAPT DOUG TROYER

RESCUE →

WARNING: THIS AIRCRAFT CONTAINS
A CANOPY REMOVER CONTAINING
AN EXPLOSIVE CHARGE

1 PUSH BUTTON TO OPEN DOOR
2 PULL RING OUT 6 FEET TO
JETTYSON CANOPY



SRA MIKE RADFORD



F-15E and F-16C pilots join an EF-111 pilot to coordinate plans for a composite training exercise involving their diverse squadrons. The 366th Wing will operate on its own with wide latitude wherever it goes and will devise its own deployment and battle plans in keeping with the circumstances.

notice and do some damage with a wide variety of assets," he declares. The wing "gives the Air Force the ability to project airpower rapidly and in new and different ways."

"What makes us unique is not necessarily that we're a composite wing," General Hinton explains. "The Air Force has done composite forces before. This one is different. We're coming together and training together in one place and as one wing—with integrated command, control, communications, and intelligence—to go somewhere else to fight, to intervene. Air intervention is the key."

The wing will be on its own wherever it goes. There will be no theater commander, no air component commander, on the scene to take charge of the Gunfighters and tell them what to do, as in the case of the air wings that deployed to the Persian Gulf.

"This wing has a lot of responsibility that has been reserved in the past for higher headquarters, such as CENTAF [Central Air Forces] in Desert Storm," General Hinton explains. "We'll go into a theater of operations and do our intelligence assessments, our target assessments. We'll generate and execute our ATOs [air tasking orders], and then we'll go back and do bomb-damage assessments."

The 366th Wing would polish off the enemy, if possible, or operate as a spearhead, the forerunner of a larger force. Early in the buildup of such a force, "the commander of this wing

could become a JFAC [joint forces air commander] or JTF [joint task force] commander," General Hinton says. "Those jobs would go to a higher-ranking general officer at some point, but it would all begin with the air intervention wing."

Awesome Firepower

The wing has the stuff. Col. Jerrold Callen, commander of the 366th Operations Group, calls his firepower "awesome." He asserts, "We employ, basically, the full spectrum of Air Force conventional weaponry. I would not want to be an adversary on the receiving end of it."

The 366th Wing is an outgrowth of the 366th Tactical Fighter Wing, which took the name "Gunfighters" after equipping its F-4C Phantoms with gun pods during the war in southeast Asia. Over time, the wing dwindled to one squadron of EF-111s, a unit that distinguished itself in the Gulf War. The new 366th Wing began forming up with new fighters at Mountain Home AFB a year ago. Its 389th and 391st Fighter Squadrons, with F-16Cs and F-15Es, respectively, were activated last March. Its 390th Fighter Squadron with F-15Cs is scheduled for activation this month.

Last June, the heavies began coming. The 366th Wing assimilated the 34th Bombardment Squadron of B-52s from Castle AFB, Calif., thus becoming the first wing in the new Air Combat Command to combine bombers

and fighters from deactivated SAC and TAC. Late last July, KC-135R Stratotankers from a number of former SAC air refueling bases began assembling at Mountain Home to form the composite wing's 22d Air Refueling Squadron, also scheduled for activation in early October.

The wing is scheduled to be at full strength by mid-1993. It will consist of fifty-eight aircraft—three AWACS planes, six KC-135Rs, seven B-52Gs, eighteen F-16Cs, twelve F-15Es, and twelve F-15Cs. By then, the EF-111s will have moved to Cannon AFB, N. M., redesignated as the 429th Electronic Combat Squadron with a place in the composite wing. The B-52 squadron will continue to bed down at Castle AFB but will send its bombers to Mountain Home AFB every week or so to train with the rest of the wing.

B-1B bombers are expected to replace the B-52Gs in the composite wing, but not until "some years into the future," if at all, Colonel Callen says.

Meanwhile, the BUFFs fill the bill. They make the wing much more powerful, but they also complicate its logistics. They require hangar space and other arrangements that Mountain Home AFB currently lacks. They also need a great deal of attention. Col. Robert L. Hart, the wing's logistics group commander, notes, for example, that "it takes one man two hours to two and a half hours to preflight a fighter, but it takes two men eight hours to preflight a B-52."

Challenging but Manageable

Colonel Hart sees the job of maintaining and servicing the wing's disparate airplanes as challenging but manageable. "It's been done on other bases," he says, "and there's no reason we can't do it here if we have the parts."

Deployment would be something else again, a "mind-boggling" prospect, Colonel Hart acknowledges. "If we deploy the entire wing overseas, more than 3,000 of the 4,500 people on this base likely will go," he says. As the deployment progressed, "there would be fewer and fewer people here to keep the pipeline going."

Can it be done? "Sure," he replies. "Anything can be made to work. We're reducing the 'boggle' by planning. We're innovating—finding ways to streamline, to cut down on the things we'd take along."

The deployment demands of the

The 366th Wing was the first Air Combat Command wing to combine former SAC bombers and TAC fighters, including the B-52G and F-16C shown here at Mountain Home. The big bombers add tremendous clout to the wing, but they also complicate its logistics.



Photo by James Benson

Photo by James Benson



B-52 squadron are huge. Colonel Hart says it could take "close to one hundred C-141s" to bring off a seven-day deployment of "X numbers" of the BUFFs—presumably the entire squadron—and their ground crews, munitions, and supporting gear. Those airlifters would come from Air Mobility Command; the 366th Wing has none of its own.

Despite their diversity, the composite wing's aircraft have a great deal in common—a big plus in maintaining them and keeping them mission-ready at Mountain Home or wherever they may go. All fighters are powered by variants of the same family of high-performance engines from a single

manufacturer—Pratt & Whitney—and can be repaired, for the most part, with the same or similar spare parts and maintenance procedures. Test equipment for all the fighter engines is essentially the same, a big leg up for logistics at home and abroad.

It also helps that all types of planes in the wing proved remarkably reliable, maintainable, and mission-ready in the Gulf War, thanks in large measure to the durability of their engines and avionics. The wing flies the latest and best of all those aircraft types.

Ample Augmentation

Aircraft attrition could be a bigger problem for the 366th Wing than for

most others. The wing is smaller than the standard Air Force wing and would feel each loss more keenly. But it should be able to hold its own and then some under all circumstances. It will also have ample backup.

"We anticipate some scenarios in which we would be augmented by other types of airplanes," explains Colonel Callen. For example, the wing trains with the Idaho Air National Guard's 124th Fighter Group of F-4G Wild Weasels, based at Boise's Gowen Field about fifty miles away. Those Weasels stand ready to deploy with the wing. F-111Fs at Cannon AFB and F-117As at Holloman AFB, N. M., could also come into play with the Gunfighters.

The 366th Wing was reorganized last January into the "objective wing" structure now standard throughout the Air Force. It is built around four groups—operations, logistics, support, and medical—each commanded by a full colonel. Group commanders have more responsibility and authority than did yesterday's deputy wing commanders for operations, maintenance, or resource management. The same goes for flying squadron commanders, who are now directly in charge of aircraft maintenance and maintenance personnel as well as aircraft operations and aircrews.

"The objective wing structure is very well suited to this composite wing," says General Hinton. "We're such a diverse unit, it takes all those

various commanders to pull everything together smoothly.”

The wing's top operational officers also seem well suited to a composite force. General Hinton, who holds the Distinguished Flying Cross and numerous Air Medals, has flown a wide assortment of operational aircraft—A-37s, A-10s, F-4s, F-16s, F-111s, and EF-111s—in his career. Colonel Callen has specialized in F-15s, having flown all variants, but knows his way around other combat aircraft. He was stationed in the early to mid-1980s at Kadena AB, Okinawa, Japan, which housed a conglomerate of fighters, tankers, AWACS planes, and reconnaissance aircraft.

Pointing the Gun

Of his wing, General Hinton declares, “We can point this gun wherever we need to. We will be able to go anywhere and be a force to be reckoned with for up to seven days. There are some places and situations that our leaders wouldn't send us into, but we should be able to deter or resist any aggressor in the kinds of contingencies we expect to see around the world, up to and including a Desert Shield type of operation.”

No one claims that the 366th Wing could have won the air war against Iraq all by itself, or that it could have deployed to Saudi Arabia faster than other Air Force wings or squadrons did. Those were monolithic units, each with a particular type of aircraft for a special



Photo by James Benson

An F-15C of the 366th Wing's 390th Fighter Squadron roars off the Mountain Home runway backdropped by Idaho mountains. F-15Cs are the wing's premier air-to-air fighters and have primary responsibility for “force protection.”

purpose, such as air-to-air or air-to-ground combat, and with comparatively uncomplicated logistical requirements. CENTAF had plenty of time to mold them into a composite fighting force after they arrived in theater.

Had Iraqi forces kept advancing from Kuwait into Saudi Arabia, a composite wing like the 366th, capable of doing a great many things rather than a great deal of any one thing, would have been able to attack them every which way. Gen. H. Norman Schwarzkopf, Commander in Chief of US

Central Command, expressed his wish for such an all-purpose air wing at the outset of Operation Desert Shield.

“There's no thought that we could take the Gunfighters and win a war like Desert Storm, but we could have been there in seventy-two hours to apply all varieties of airpower and have an impact in every respect,” General Hinton claims.

The wing is not training to go full tilt under all circumstances with a so-called “gorilla force” composed of every plane it flies. “Some contingencies may call for a lesser force,” General Hinton explains. “We wouldn't always take the whole wing.” One thing for sure: “AWACS would go every time.”

Figuring out which elements of the wing to deploy under certain conditions was a prime goal of its commanders from the beginning. They set out to devise force packages, mixing and matching different types and numbers of aircraft, and then to settle on a set of them.

Menu of Options

“We can't wait to tailor our force every time we pick up and go off somewhere into war,” General Hinton says. “We can't just decide to take some of these and some of those on the spur of the moment.” The wing “must have a menu of specific options” for force packages on which to base its training and its deployment plans, he explains.

Photo by James Benson



A1C Robert Wilson tends an F100/220 fighter engine in a Mountain Home engine shop. All fighters in the composite wing are powered by variants of the same family of Pratt & Whitney engines. Their commonality is a maintenance boon.

Right: F-16Cs and F-15Es are next-door neighbors at Mountain Home and would go to war as such if the composite wing were called upon to fight.

Below: A solitary F-15E, taxiing out at Mountain Home, exemplifies the solo nature of many deep-interdiction sorties that may be in store for the wing's Eagles.



Photo by James Benson

Photo by James Benson



Contingencies in which air superiority is not at issue and where targets are relatively few may require only a small force package—"a SWAT team," says General Hinton, "of maybe six to eight F-16s and an AWACS." Others in which airspace is strongly defended may require F-15Cs to protect F-15Es and F-16Cs en route to targets and may require the attack fighters to become air combat fighters while egressing. Their dual natures make them ideal for composite wings.

"Our targets may be such that we could get the job done with a gorilla strike in the middle of the night," Colonel Callen says, "or we might land and send F-15Es in the night to

take out command-and-control and early warning [targets]. While they're laying the groundwork, we're generating our other aircraft, briefing crews, getting ready. Early the next morning, the F-16Cs would go after other targets that their weapons are suited for, with the F-15Cs in a force protection role. In the middle of all that, or later in the day, the B-52s would attack, possibly from another location."

The B-52s give the wing a whole new dimension and quickly commanded the respect of its fighter jocks. "They add a lot, tremendous capability, day or night," says Lt. Col. Robin Scott, commander of the 391st Fighter Squadron of F-15Es. "If we have to

put iron on the target from Stateside, the BUFFs will be the first to go."

Lt. Col. Tim Nall, the 389th Fighter Squadron's operations officer, flew an F-16C in one of the wing's first composite training sorties pairing B-52s and fighters. "We started working with the bombers from the ground up, one thing at a time," he says. "We're melding different worlds—the SAC mentality and the TAC mentality. It takes time and practice."

A Way of Life

Colonel Nall calls the composite wing "something to be excited about." He notes that Red Flag exercises at Nellis AFB, Nev., have given many of the 366th's pilots some feel for composite forces in the past—"but only occasionally, and now composite operations have become a way of life for us."

The fighter squadrons of the 366th have developed a keen appreciation of one another's capabilities and mentalities. F-15Es and F-16Cs fly together against Navy fighters, with and against F-15Cs, and against one another. Says Colonel Scott, "Working together as squadrons is an upbeat experience for all of us."

In their first composite training exercise, the B-52s were tasked to bomb targets in the Navy range at NAS Fallon, Nev. Navy F/A-18s defended the airspace. The F-16s in the exercise had to do double duty—protect the big bombers from the Navy



These F-16Cs in impressive array at Mountain Home account for much of the 366th Wing's "awesome" firepower. The multimission Fighting Falcons serve as bombers and/or fighters. Their versatility makes them ideal for a composite wing.

fighters and also drop bombs on a separate set of targets. At the time of the exercise, there were too few F-15Cs in the composite wing to fly the offensive counterair mission.

"For the B-52s and the F-16s, it was a strike mission very much like those in the Gulf War, with targets suitable for heavy bombers and attack fighters," says Colonel Callen. "The air-superiority issue had been pretty well decided when we used B-52s in Desert Storm, but that wasn't the case in this exercise. We were exploring one of our key issues as a composite wing: how to protect the B-52s in areas where there are air threats."

The counterair mission of the F-16s was "force protection, not necessarily air superiority," the operations group commander explains. "The F-16s weren't doing a sweep, or the kind of classic air maneuvering, that we associate with F-15Cs. When we need outright air superiority, we'll use the F-15Cs. They're the best for that."

The composite wing uses the nearby Saylor Creek, Idaho, range for some training purposes, but it cannot do much there. The range is limited. Its impact area and airspace are small and can be used by only a few planes at a time. The 366th must fly to ranges in Utah and Nevada for virtually all composite exercises, must air-refuel its planes every time, and must get in line to schedule training time.

Idaho Gov. Cecil Andrus proposes to solve the problem by building a

166,000-acre training range at Big Springs, fifty miles southwest of Mountain Home AFB in an arid area sparsely inhabited by humans and wildlife. Some environmental groups oppose the plan, and the issue is unresolved.

The 366th Wing would have first call on the Big Springs range. "We need it badly for composite force training," General Hinton claims.

Complex Training

Such training is exceptionally complex, aimed at coordinating the skills and strengths of the individual squadrons and at compensating for whatever each may lack under certain conditions. Each brings something special to the team. For example, the F-15Es are the only fighters in the wing with LANTIRN pods for night navigation and targeting. The F-15E aircrews take their combat-ready checkrides after dark—a requirement, uncommon in the Air Force, that "sends a clear signal to everyone that our F-15Es own the night," Colonel Callen asserts.

The B-52s are armed with Hove Nap standoff missiles as well as bombs and are the only planes in the wing—and in the B-52 force at large—so equipped. The F-16Cs come equipped with Global Positioning System (GPS) satellite receivers for ultraprecise navigation and position-fixing en route to targets. The wing's F-15Cs are the only ones in the Air Force equipped with a communications and identification system

called "JTIDS" (Joint Tactical Information Distribution System).

"JTIDS provides the F-15C pilots with fast data," Colonel Callen explains. "It greatly enhances their situational awareness [SA]. They don't have to talk nearly as much over the radio to communicate SA to one another." This could save the day for the F-15C pilots, who may well be first on the scene of combat.

Colonel Callen calls C³I "the backbone of our wing—it ties us together and gets us going very quickly once we land. We'll know who's in control of what. . . . We may very well develop our frag order while we're en route. We'll know, by name, who will fly which missions, what they can do, and what they can't do. We'll know enough about each other to make sure that we task the right airplanes to do the right thing at the right time. We won't task the F-16s to do something that the F-15Es should do, or the F-15Es to do something that the B-52s should do."

Communication is crucial. "We may not all land at and operate from the same location," says Colonel Callen. "Some places may not have ramp space for all our aircraft and munitions, particularly for the B-52s." In that case, he says, "we'd better be able to communicate the ATO" to dispersed elements of the wing.

Before too long, EC-135 Compass Call aircraft may join the composite wing as airborne communications centers, a role that such planes played to the hilt in the Gulf War. The move is under study. General Hinton calls it "an attractive possibility" and says it would "give us additional command-and-control capability while en route and while initially deployed."

Other changes can be expected in the wing's makeup and capabilities. Some of its F-16s may come armed with high-speed antiradiation missiles for the Wild Weasel mission. F-16s would also be assigned to the close air support mission should the need arise for the wing to do CAS.

When all is said and done, the 366th Wing "will be able to do damn near anything, day or night, against hard targets and soft targets," Colonel Callen says. He claims that the synergy of the squadrons—"building on each other's strengths and offsetting each other's weaknesses"—makes for a composite wing in which "the whole is greater than the sum of the parts." ■

ONLY THE VERY BEST WILL FLY THEM, ONLY THE VERY BEST SHOULD BUILD THEM.

From Wildcats and Hellcats to Intruders and Tomcats, Grumman fighter and attack aircraft have fortified carrier airwings for more than 60 years. Now it's time for the next generation of strike aircraft—the AX, with long-range, all-weather precision attack capability.

For the next 50 years, no existing or planned aircraft will have the advanced features, combat punch, and mission flexibility of the AX. An affordable, versatile, multi-service AX is the means to meet our nation's need for a strike aircraft. It's the future of Navy aviation.

And your Grumman-Boeing-Lockheed team will ensure the best combination of strengths for the job. Boeing offers expertise in avionics integration and composites. Lockheed, builder of the remarkable F-117, excels at stealth technology. And Grumman brings a unique talent to the task ahead, having built the only true all-weather, medium-attack aircraft the Navy has operated.



The argument continues over the effectiveness of the US campaign against Saddam's terror weapon.

Scud War, Round Three

By Stewart M. Powell

THOUGH Operation Desert Storm ended long ago, arguments continue to flare about the effectiveness of the US-led campaign against Iraq's arsenal of Scud ballistic missiles. Indeed, this verbal, peacetime "War of the Scuds" has raged far longer than the forty-two-day conflict that pitted Air Force and Navy jets and the Army's Patriot antimissile system against the Scuds.

Postwar examinations have focused on two questions: First, how effective was the Scud-busting campaign mounted chiefly by the US Air Force to destroy missiles and launchers on the ground? Second, how reliable was the Patriot antimissile system in intercepting Scuds once they began plummeting toward targets in Saudi Arabia and Israel?

In the war's immediate aftermath, Washington took the position that the counter-Scud effort was flawed but effective. The Patriot had missed targets, said the Army. The US Air Force reported that, although air attacks dramatically reduced the frequency of launches, "the mobile missiles proved particularly difficult to detect and were never fully suppressed." Even so, the official assessment tended to be gen-

erally positive [see "Scud War, Round Two," April 1992, p. 48].

Things seem different now. Postwar United Nations inspections of Iraqi facilities suggested that the unimpeded air offensive had less impact on the Scuds than had been expected. Reviews of computer data from attempted Patriot intercepts raised new and serious doubts about how well the modified air defense system performed. The reviews left many worrying that US forces might enter the next war with less protection against missiles than initially had been thought.

In the Defense Department's comprehensive study of the conflict, "The Conduct of the Persian Gulf War," Secretary of Defense Dick Cheney reflected publicly and critically on the need to develop better techniques for dealing with the threat. "Tactical

Patriot antimissile batteries offered some help but no sure protection. Scuds were able to exploit software problems in the modified Patriot system to slip through. Here, a gas-masked soldier stands guard over the smoldering remains of an Iraqi Scud in the streets of Riyadh, Saudi Arabia.



ballistic missile defense worked, but imperfectly," Secretary Cheney wrote. "Mobile missile targeting and destruction are difficult and costly. We need to do better."

The US-led air campaign against the Scuds ran into difficulties right away. Commanders gave early priority to neutralizing Iraq's air defense network, 750 combat aircraft, and fifty-four main operating bases and dispersal fields before shifting attention to mobile launchers four days into the campaign.

Grave Underestimation

Senior US officers now admit that they underestimated the immense political impact that could be generated by even a handful of highly inaccurate Scuds, weapons that Gen. H. Norman Schwarzkopf described at the outset of the war as "militarily insignificant." The liquid-fueled rockets derived from the Nazis' buzz bombs of World War II were "not regarded initially as a threat to military forces unless they were equipped with unconventional warheads," conceded the Pentagon study.

This study further noted that the suppression of Scud attacks became

"crucial" only after the Persian Gulf conflict was well under way and it had become clear that Iraqi President Saddam Hussein was attempting, with repeated missile barrages against Israel, to goad that country into joining the war. The Bush Administration mounted an all-out military, diplomatic, and intelligence-sharing offensive to persuade the government of Prime Minister Yitzhak Shamir to resist the temptation to strike back. Four US-manned Patriot batteries joined two Israeli-manned batteries. These systems eventually went into action against forty-two Iraqi missiles fired at Israel.

In addition, the US committed three squadrons of combat aircraft and flew a total of 2,493 sorties against Scud targets.

The counter-Scud effort was huge, but the efficacy of this operation has been hotly disputed. Mark Crispin Miller of Johns Hopkins University, author of *Spectacle: Operation Desert Storm and the Triumph of Illusion*, stirred a furor not long ago with sensational reports of failure. Mr. Miller's claims, excerpted in the *New York Times*, charged that allied air forces scored few successes. He asserted that the operation destroyed only twelve

of Iraq's twenty-eight fixed launch sites. Of the remaining sixteen, he said, fourteen sustained only "slight" damage and two were untouched. As for attacks on moving Scuds, Mr. Miller said, raids "did not destroy a single mobile launcher." General Schwarzkopf had said that the allies had identified twenty mobiles possessed by Iraq.

The Ritter Claims

Mr. Miller's contentions were based, at least in part, on information provided by William S. Ritter, Jr., a captain in the US Marine Corps Reserve who served as a Scud missile analyst at US Central Command headquarters in Riyadh during the war. After the Persian Gulf War, Captain Ritter moved on to serve as a US-paid ballistic missile specialist on the staff of the UN Special Commission supervising the destruction of Iraqi weapons.

In a written account sent to *AIR FORCE Magazine* in mid-1992, Captain Ritter made a number of similar claims. He called US prewar estimates of the Iraqi Scud threat "inaccurate," said the initial forty-eight-hour onslaught on identified Scud sites "failed to achieve its objectives," and

approvingly cited published reports that showed that allied special operations forces were unable to close down Scud launches from western Iraq.

"The counter-Scud campaign against Iraq—despite the considerable and oftentimes heroic efforts of the men and women involved—did not achieve its objective of effectively interdicting Scud launches," wrote Captain Ritter. "The sooner the fact is admitted—and the shortcomings in the way our military plans to counter mobile, relocatable targets can be identified—the sooner a strategy for defeating such targets in the future can be had."

What made such statements compelling was that the Pentagon all but agreed.

In a briefing in late June—sixteen months after the conclusion of the war—Pentagon spokesman Pete Williams had this to say: "We don't have today a satisfactory, accurate count of how many mobile launchers we destroyed during the war, how many fixed launchers we destroyed during the war, and how many missiles were destroyed during the war."

Mr. Williams urged analysts to come up with some yardstick other than the number of destroyed missiles. "The . . . body count on Scud missiles is not the only measure of effectiveness," he said. "The real measure of effectiveness should be, 'Did we interrupt, slow down, or in any way discourage the Iraqis from being able to fire their Scuds?'" The counter-Scud effort did, in fact, "reduce Iraq's ability to launch missiles," said the Pentagon spokesman, forcing enemy forces to reduce the number of launches from five per day in the first ten days of the war to an average of slightly more than one per day for the remaining thirty-three days.

The Pentagon readily admitted frustration in trying to combat an elusive weapon that could be moved five miles from a launch site in ten minutes, a capability that could require an aircraft to search a seventy-eight-square-mile area.

The Pentagon study lamented that mobile Scud launchers had proven "elusive targets." Indeed, UN inspectors—Captain Ritter principal among them—said they could find no hard evidence that the allied air attacks had destroyed any mobile launchers. Many of the destroyed targets thought at first to be Scud launchers turned out, on examination, to be fuel trucks or

similar vehicles. These UN inspectors also found that "most production equipment, components, and documents" had been safely secreted away before the war.

One published report alleged that Captain Ritter denied the validity of these claims. In lengthy discussions with AIR FORCE Magazine, however, he reaffirmed them in their entirety.

"Recent intelligence estimates confirm that actual damage to Scud facilities is less than previously thought."

The Pentagon's postwar account acknowledged that, in the immediate aftermath of Desert Storm, the US believed that Iraq's "overall ability to modify or produce" Scuds and missile support equipment had been "severely degraded" and Baghdad's "overall potential" for producing liquid-propellant missiles had been "reduced." The report noted, however, that "recent intelligence estimates confirm that actual damage to Scud production and storage facilities is less than previously thought."

Lowballed Estimates

The Defense Department report said that, in the prewar period, allied target planners believed Iraq had 600 missiles, twenty-eight fixed launchers, and thirty-six mobile launchers. These "working estimates . . . proved to be too low."

As for the missiles, signs suggest that Iraq may have emerged from the war with a sizable working arsenal at

its disposal. Gen. Colin Powell, Chairman of the Joint Chiefs of Staff, said last spring that Pentagon analysts believed Iraq retained a residual arsenal of at least 250 Scud missiles. The UN's inspectors found evidence of the continued existence of at least 137 missiles at war's end and planned to keep looking for more.

Timothy Trevan, a spokesman for the UN Special Commission, said UN inspectors supervised destruction of sixty-four Scuds and had been "presented with evidence" of eighty-nine other missiles destroyed during the war.

"Given the degree of uncertainty about the number of missiles, we can't stop looking," said Mr. Trevan. "We don't know if undeclared missiles are out there, but we have to work on the assumption that they are."

Postwar reviews also revised downward the estimate of the Patriot's success against the thirty-seven-foot-long, seven-ton ballistic missiles.

Even while the war was going on, Israeli officials questioned the effectiveness of the modified antimissile system as Scuds slipped through Patriot defenses to slam into Israeli neighborhoods. Later, technical specialists such as Theodore A. Postol, a professor of science, technology, and national security policy at the Massachusetts Institute of Technology, challenged the Patriot's record.

A frequently bitter debate has ebbed and flowed for more than a year, pitting critics of the Patriot in the US and Israel against the missile's manufacturer, Raytheon Corp., and the US Army. The Army defended the performance of the 1970s-vintage anti-aircraft system, which had been given an antimissile capability shortly before the Persian Gulf War. American forces deploying to Saudi Arabia in August 1990 packed the Army's entire inventory of improved antimissile warheads—two.

Problems persisted in the system, which was seeing combat for the first time. Computer software was continuously revised to refine "engagement parameters" to enable the Patriots' 200-pound proximity warheads to explode near Scuds as they raced toward targets on a six-minute flight that reached altitudes of sixty-two miles and speeds of 4,500 miles per hour.

The Scud that destroyed a US barracks near the end of the war exploited

"an inexact computer software calculation," aggravated by four days of continuous operation, to slip through without a Patriot being fired. Truck-mounted Patriot batteries had been designed for a fast-moving European conflict where computers were expected to be moved and shut down for maintenance every fourteen hours.

Revising the Numbers

Last April, the Army formally revised its year-old public assessment of Patriot performance, shifting its measurement of success downward by ten percent. Army officials told the House Government Operations Committee that a "reevaluation" found that Patriot systems destroyed, damaged, or knocked off course more than seventy percent of the Scuds that came within range in Saudi Arabia and more than forty percent of those that came within range in Israel.

The new figures reflected "minor changes" that were "not statistically significant," testified Army Maj. Gen. Jay M. Garner, assistant chief of staff for Operations, Plans, and Force Development. "War is a bottom-line business," General Garner told the committee's panel on legislation and national security. "The bottom line on Desert Storm is that the United States and its allies won."

However, the testimony failed to lay the issue to rest, partly because the Army declined to make public an engagement-by-engagement account of the Patriot's performance. Officials said that disclosing such details would reveal the Patriot's strengths and weaknesses to prospective enemies.

Outside experts, including some who had access to the classified data, disputed the Army's findings. Steve Hildreth, a defense specialist with the Congressional Research Service who helped carry out a congressional investigation, said in April that he could find only "one warhead kill" when he used the Army's methodology for its initial study. However, Mr. Hildreth did not conduct an independent assessment of Patriot operations.

Reuven Pedatzur, who prepared a study on the US-Israeli Arrow anti-ballistic missile system for the Jaffee Center for Strategic Studies at Tel Aviv University, claimed that Israeli authorities could find "no authenticated proof" that any of the forty-two Iraqi Scuds fired at Israel had been "hit or destroyed" by Patriots.

Buried Truth

The truth remained buried in secret figures on each engagement and widely differing interpretations of what constituted a "successful engagement."

What was known was that 158 Patriots were fired at a cost of \$640,000 each, including one misfire at an allied aircraft returning to Incirlik AB, Turkey, without casualties.

The Pentagon contends that the Patriot "not only helped defeat the psychological threat of Iraq's Scuds . . . but also almost certainly reduced civilian casualties."

Of the eighty-eight Scuds launched toward Israel or Saudi Arabia by Iraq, fifty-three came within "coverage" areas defended by Patriot batteries. The remaining thirty-five Iraqi missiles fell into the desert or sea or were not fired upon because they were beyond Patriot range.

According to Army officials, the Patriot systems attacked fifty-one incoming Scuds, missed one, and failed to fire against the Scud that destroyed the US barracks in Dhahran, Saudi Arabia. About fifty-five percent of the Patriots were fired at Scud warheads, thirty percent at "Scud debris," and fifteen percent at "false targets."

Brig. Gen. Robert A. Drolet, the Program Executive Officer for Air Defense at the Army's Redstone Arsenal, Ala., declined to disclose in congressional testimony the exact number of confirmed Patriot "warhead kills." However, he did provide figures showing that the Army believed Patriots destroyed or knocked off course only about two dozen Scuds.

When one combines everything from "high confidence" kills to "low confidence" kills, said the Army, the Patriot can be said to have destroyed seven out of every ten Scuds "engaged" over Saudi Arabia and four out of every ten Iraqi missiles "engaged" by Patriots over Israel. The Army considered a Scud "successfully engaged" if the Patriot destroyed or damaged the warhead, caused a partial burn of warhead, or knocked the Scud body off course.

The critics, as well as Israelis who fired Patriots, considered the Patriot successful only when it destroyed a Scud warhead in midflight without allowing frequently deadly debris to fall to earth.

Mr. Hildreth, who briefed Congress in April, said a third and final Army presentation on Patriots' performance to select officials in midsummer made Army claims of Patriot performance "much clearer." Even so, Mr. Hildreth said his assessment did not represent an independent conclusion on his part.

The Pentagon's postwar report toned down early claims of success, saying only that the Army's Patriot "not only helped defeat the psychological threat of Iraq's Scuds, instilling a feeling of confidence in people in the targeted areas, but also almost certainly reduced civilian casualties."

As the second anniversary of the start of Operation Desert Storm approached, officials at the Pentagon were still poring over the results of the anti-Scud campaign and Patriot operations to determine what went right and what went wrong. It may not be until the next war that the success of revised antimissile operations can be properly assessed. ■

Stewart M. Powell, the White House correspondent for Hearst Newspapers, has covered security affairs in Washington, D. C., and overseas for more than a decade. He reported on Operations Desert Shield and Desert Storm from the first deployments in August 1990 through the liberation of Kuwait in February 1991. His most recent article for AIR FORCE Magazine was "Scud War, Round Two," in the April 1992 issue.

From cans of pemmican to computer keyboards, the history of the Air Force can often be found in the details.

Pieces of History

Photographs by Paul Kennedy

A piece of history is not necessarily an earthshaking event or a famous battle. It may be no more than that pack of matches you kept from the NCO club.

It's very often the commonplace things—the objects lived with day after day—that hold the most important memories. Over the next few pages, we have brought some of the things we may have once taken for granted and assembled them into these photographs. It is by no means intended to be a comprehensive portfolio. It should be thought of more as a representative sampling, showing that, as much as some things change, others stay pretty much the same. The images on these pages are intended to evoke memories of bygone eras and to depict where the Air Force is today.



Far-flung conflicts have been the specialty of the Air Force since before it became a separate service. Above: survival kit and escape maps from World War II's Pacific theater. Right: UN and Air Force medals from the Korean War. Opposite: Korean War montage.

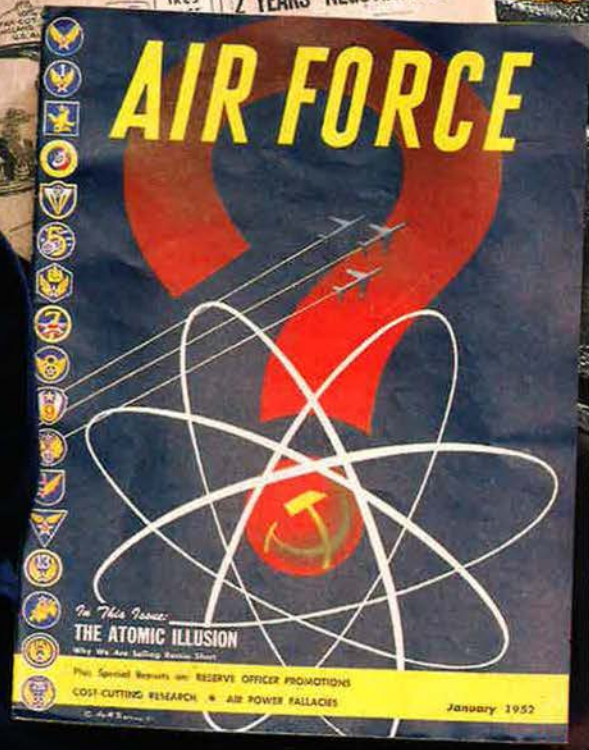


TRUCE IN KOREA WAR

Cease-Fire Halts 37 Months of Bloodshed

WORLD PEACE NOT YET WON, IKE DECLARES
Korea Just Single Battle, He Says

CEREMONY ENDS OVER 2 YEARS' NEGOTIATIONS





During World War II, airmen went aloft with headgear far less sophisticated than the average motorcyclist wears today (left). Opposite: artifacts from the Vietnam War, the most controversial of this country's twentieth-century conflicts. Often forgotten is the allied nature of this war—note the many flags on the safe-conduct pass in the lower middle of the photograph.

Military men (and, more recently, women) have brought home souvenirs of their service since before the Punic Wars. Useful items, such as this brass stein made of a 105-mm howitzer shell and a .50-caliber bullet, can be crafted from the detritus of war.



Propaganda was an important weapon in the Asian wars fought by the US in the latter half of this century. North Koreans were encouraged to surrender by some of the materials shown at left. Propaganda leaflets were also used to good effect in the Persian Gulf War.



GIẤY THÔNG HÀNH

The Pittsburgh Press
FINAL EDITION
U. S. Pulls Out Of Viet Nam, Cong Agree On Plan To End War
Saigon, Cong Agree On Plan To End War

AIR FORCE
SPACE DIGEST
The Mission of American Power | Published by the Air Force Association
HOW TODAY'S SPACECRAFTS CAN SHAPE THE AIR FORCE OF THE FUTURE
advanced technology



Military food has often been considered the bane of the troops in the field, valued more as the butt of grim humor than for its gustatory virtues. The best that can be said about it, from Korean War K rations to today's MREs, is that it kept body and soul together until something more edible could be found.

Pilots' scarves, though no longer essential to guard against extreme airborne cold, remain an integral part of pilots' style. A less glamorous but perhaps more practical relic from the Air Force's past is the mat (below) used to smooth landings at remote dirt airstrips.



No part of the Air Force wardrobe has undergone more extensive change than the "brain buckets" seen at left. From the simple cloth cover of World War II, the helmet has evolved into a technological marvel—an invaluable aid to a multitude of tasks. Counter-clockwise from upper left, helmets of the Korean War, World War II, Vietnam War, and Gulf War. Opposite: a montage representing today's Air Force, with computer and space-oriented elements but also with paperwork and patriotic symbols that an airman from "Hap" Arnold's day would recognize.



AIR FORCE
MAGAZINE
FEBRUARY 1991 \$2
PUBLISHED BY THE AIR FORCE ASSOCIATION

Desert

CAUTION: NOT FOR IDENTIFICATION PURPOSES
DD FORM 1 MAR 78
AIR FORCE ASSOCIATION
14000 W. WASHINGTON AVE. #100
FORT WORTH, TX 76154

THE UNITED STATES
AERIAL MILE
THE UNITED STATES

FOR FLIGHT

The head of the General Staff Academy takes a hard—and familiar-sounding—line on defense policy.

A Russian View of Russian Interests

By Mary C. Fitzgerald

DURING four days in May, a “scientific conference” on the topic of “Russia’s Military Security” was held at the General Staff Academy of the Russian Armed Forces. The keynote speech—“Some Approaches to Developing Russia’s Military Doctrine”—was given by Col. Gen. Igor Rodionov, the influential head of the Academy.

The speech evidently impressed many. Gen. Pavel S. Grachev, Russia’s Defense Minister, described the speech as “a bold one.” Another commentator said that, in earlier days, what General Rodionov said would not have been heard from the lips of a military man “even in a situation of strict secrecy.”

The speech dealt with Russia’s new draft military doctrine, which was shaped and adopted this year [see “Russia’s New Military Doctrine,” *September 1992*, p. 76]. The strong reaction of those who heard it and a review of the speech itself suggest that the 1992 published doctrine resulted from a compromise between harder and softer views on the requirements for military security.

General Rodionov argues that Russia’s new military doctrine must unambiguously identify Russia’s vital national interests, current threats to

these interests, and the probable nature of future wars and military actions. He warns that the doctrine must ensure “that we not deceive first of all ourselves and that we not [subscribe to doctrinal provisions that] either justify hasty political declarations or seek to increase trust in us by the world community.”

Russia’s new military doctrine, he stresses, must serve the Russian people “not in words but in deeds.”

General Rodionov first describes the “global, regional, and national interests” of Russia—none of which is specified in the 1992 published doctrine. He begins by stating that any attempts at the political, economic, scientific, and cultural isolation of Russia (be they in Europe, Asia, or some other part of the world) or the creation of any military-political alliance directed against Russia will “violate Russian national interests.”

Expansive Vital Interests

According to General Rodionov, the very expansiveness of Russia predetermines that its “vital interests” on the Eurasian landmass extend from the Atlantic seas to the Pacific Ocean. These vital interests include the east

Col. Gen. Igor Rodionov, head of the General Staff Academy of the Russian Armed Forces, says Russia’s vital national interests extend well beyond its borders and are still threatened, despite the end of the cold war. MiG-31 interceptors (like these, stationed somewhere on the Kamchatka peninsula) are Russia’s first line of defense against air attack.



Photo by Sergey Skrynnikov / AviaData / Arms Communications

European states (former members of the Warsaw Pact) that border on the nations of the Commonwealth of Independent States. At the very least, according to General Rodionov, these states must maintain their neutrality because their entry into military-political groupings aimed directly or indirectly against Russia would seriously damage the latter's security.

General Rodionov notes further that Russia's vital interests, which include the Baltic states, require that these states recognize Russia's right to free access to seaports, unconditionally reject both the stationing of third-country military forces on their territory and entry into military blocs aimed against Russia, and guarantee the civil rights of the Russian population.

The General contends that, for centuries, Russia has struggled to acquire an exit to the Baltic and Black Seas and that "the deprivation of such free exits would contradict [Russia's] national interests."

As for the CIS countries, all are deemed to be in Russia's sphere of vital national interests. Russia must prevent these states from becoming a kind of buffer zone or *cordon sanitaire* separating Russia from the countries

of the West, South, and East. Attempts by any state in Europe, America, or Asia to capitalize on existing disputes among the CIS states or to strengthen its influence in these states could negatively affect its own situation. Such attempts would violate Russia's national interests and security.

Finally, Russia's national interests include maintaining mutually advantageous economic relations with all countries of the Near East, South Asia, and the Far East and using the world's oceans for free navigation and economic activity.

General Rodionov then describes the existing threats to Russia's vital national interests, none of which is specified in the 1992 doctrine.

First, Russia's interests in the aforementioned regions are said to conflict with the interests of other states—and above all with the vital interests of the United States in these regions.

Second, the US and NATO are said to be not only maintaining but also rapidly increasing their vast military might. The incorporation of new, more effective types of weapons is quickly compensating for some quantitative reductions in their armed forces. General Rodionov claims that the NATO

countries have about 20,000 means of air attack, as well as a developed system for basing them near Russian borders. He contends that, as a result, these countries possess massive offensive power that is rapidly being further developed. In addition, one of the strategic principles of the US is said to be the maintenance of superiority in "aerospace" and on the seas.

A Military Threat

According to General Rodionov, many military conflicts since World War II—including the Persian Gulf War—demonstrate that the US and NATO could use military force in order to achieve their military-political objectives. He concludes by stressing that a military threat to Russia's national interests "currently exists and is unlikely to disappear in the near term." Therefore, "it is impossible to agree with the view that no one now threatens us" simply because ideological differences are disappearing: "This is completely false."

After enumerating Russia's vital national interests and current threats to these interests, General Rodionov suggests that the Russian military adjust the 1992 doctrine in three areas:

- The probable nature of future wars.

- Possible military actions at the outset of war.

- The role of nuclear weapons in future war.

In describing the probable nature of future wars, the published doctrine maintains that a large-scale conventional war could arise with the escalation of local wars either aimed against Russia or the CIS or unleashed in regions adjacent to their borders, and after a "prolonged threat period" involving general mobilization.

General Rodionov, adding a third scenario, says a major conflict could emerge "when military assistance is provided to one or several countries that have been subjected to aggression." (Why this would not remain a local war is unclear.)

In addition, General Rodionov states that local wars that violate Russia's national interests may arise, not only near the borders of Russia and the other CIS countries, but also "in remote areas."

General Rodionov emphasizes the possibility of conflicts—national, religious, and civil—that undermine stability within Russia and require the intervention of armed forces. Russia's new doctrine must therefore focus much more attention on the principles of conducting "conflicts designed to restore stability within the country."

He contends that "opposition forces struggling for power" reject the notion of using the Russian armed forces to accomplish domestic missions but that, once in power, they begin to look differently at the role of these forces.

Defensive Doctrine Disappears

In describing possible military actions at the outset of war, the published doctrine states that Russia will conduct all types of military action, will conduct offense and defense equally, and will seize the strategic initiative to destroy the opponent. Indeed, it describes the final demise of ex-President Mikhail Gorbachev's 1987 "defensive doctrine."

While General Rodionov welcomes these provisions of the published doctrine, he apparently believes that they require greater elaboration.

Soviet military doctrine, he begins, recently envisaged the conduct of only defensive actions at the outset of war. After that, a counteroffensive would dislodge the opponent from captured

territory. Military actions would cease upon reaching the state border and would not be conducted on the aggressor's territory: The opponent would be fought "not on foreign but on our own territory." In essence, the opponent was to be ejected beyond the state border and the mission of destroying him was not assigned.

According to General Rodionov, it is impossible to agree with such tenets regarding the conduct of military actions. They reflect certain political moods and ignore the laws of armed combat. These tenets are essentially "fatal" for the state and predetermine its defeat in war. History demonstrates that defense, passivity, and loss of the strategic initiative have never led to victory. Gorbachev's defensive doctrine prematurely surrendered the initiative to the opponent.

General Rodionov therefore stresses that Russia's new military doctrine must succinctly, clearly, and unambiguously reflect the premise that if the opponent initiates aggression, then the laws of armed combat will immediately take effect: State borders will cease to exist. The armed forces should then select and implement those forms and methods of military action that are the most effective in the given situation: offense, defense, and delivering fire strikes on the opponent no matter where he is. Above all, these methods must include the delivery of strikes on the aggressor's own territory, on his most important military and economic targets.

One explanation for this dramatic change stems from Russian perceptions that a future war will be waged with standoff, conventionally armed, "aerospace" weapons. General Rodionov concludes that it is therefore necessary to reject such notions as defensive doctrine, defensive strategy, defensive armed forces, and so forth.

In describing the role of nuclear weapons in any future war, the published Russian doctrine implies that there is a growing possibility of a limited nuclear conflict and that Russia might launch a nuclear response to conventional strikes on Russia's nuclear and other "dangerous" targets.

General Rodionov offers a much more provocative view of the role of

nuclear weapons in Russia's military doctrine. According to the General, the US can reach Russian territory on all sides and throughout its depth not only with nuclear weapons but also with general-purpose forces. Russia, on the other hand, can reach neither the US nor many other potential opponents with its general-purpose forces—all the more so in light of conversion. Therefore, Russia is left with only its strategic nuclear forces, above all the Strategic Missile Troops.

However, he continues, Russia's new military doctrine tries to rearticulate the nuclear no-first-use pledge. In General Rodionov's opinion, statements on "no first use of nuclear weapons, retaliatory strikes, and defensive nature" only repeat past mistakes that stemmed from the "self-advertising of political leaders" and inflicted "irreparable damage" on the nation's defense. For the foreseeable future, nuclear weapons are the basic political weapon for deterring aggression and preventing war.


It will be an "irreparable mistake," he charges, if Russia does not openly declare that in the event of aggression it will use its entire arsenal—including nuclear weapons—to destroy the opponent and defend its own interests. General Rodionov goes so far as to propose that statements on the use of nuclear weapons be excluded altogether from Russia's new military doctrine. (One explanation for Russia's rejection of the nuclear no-first-use pledge may be that it has lost confidence in its own conventional options.)

Russia's 1992 published military doctrine proceeds from a striking civil-military consensus on the nature and requirements of future war and directions for the near- and long-term development of Russian military art and force structure. While the Russian military has reasserted dominance over development of doctrine, Russian political leadership will likely determine the character of the country's vital national interests.

Even so, General Rodionov's bold views about the new doctrine may well reflect a civil-military rift concerning the extent to which old Soviet imperial interests should be pursued by military means. ■

Mary C. FitzGerald is a research fellow at the Hudson Institute in Washington, D. C. Her most recent article for *AIR FORCE Magazine*, "Russia's New Military Doctrine," appeared in the September 1992 issue.

THE DIFFERENCE BETWEEN AN EDUCATED GUESS AND AN INFORMED DECISION.



USAA Investment Management Company manages a family of no-load mutual funds and employs professional teams of mutual fund sales and service experts. Here's one of our teams, which provides informed, objective guidance to help our investors achieve their financial goals. This service is offered via the team's direct toll-free number absolutely free of charge! Full service. No-load. What could be better?

Here's what each team offers you:

- Individualized financial guidance concerning your mutual fund investments
- Prompt and friendly service
- Accurate account information
- On-the-spot telephone exchanges and redemptions*

Call today to begin a lifetime of financial service.

1-800-235-0484

For more complete information about the family of mutual funds, including management fees charged and expenses, call for a prospectus. Read it carefully before you invest or send money. ■ *Telephone redemptions may not exceed \$25,000 and are paid to the registered shareholder(s) of record and mailed to the address of record. Six exchanges per calendar year are allowed out of each account at a cost of \$5 each. Both of these privileges are established on the application and may be modified, terminated, or waived at any time.



By 2010 or so, the fleet's punch will be consolidated into two multimission fighters, the A-X and an improved F/A-18.

A New Tack for Naval Air

By Frank Oliveri, Associate Editor

IF THE US Navy has its way, the story of naval aviation two decades hence will be a tale of only two combat aircraft.

Rear Adm. Riley Mixson, the Navy's acting director of Air Warfare, contends that carrier combat operations will be based largely on a pair of airplanes. One, the A-X, will be an exotic, stealthy fighter. The other will be a muscular makeover of today's F/A-18 Hornet. Both, says the Navy, will be multimission warplanes.

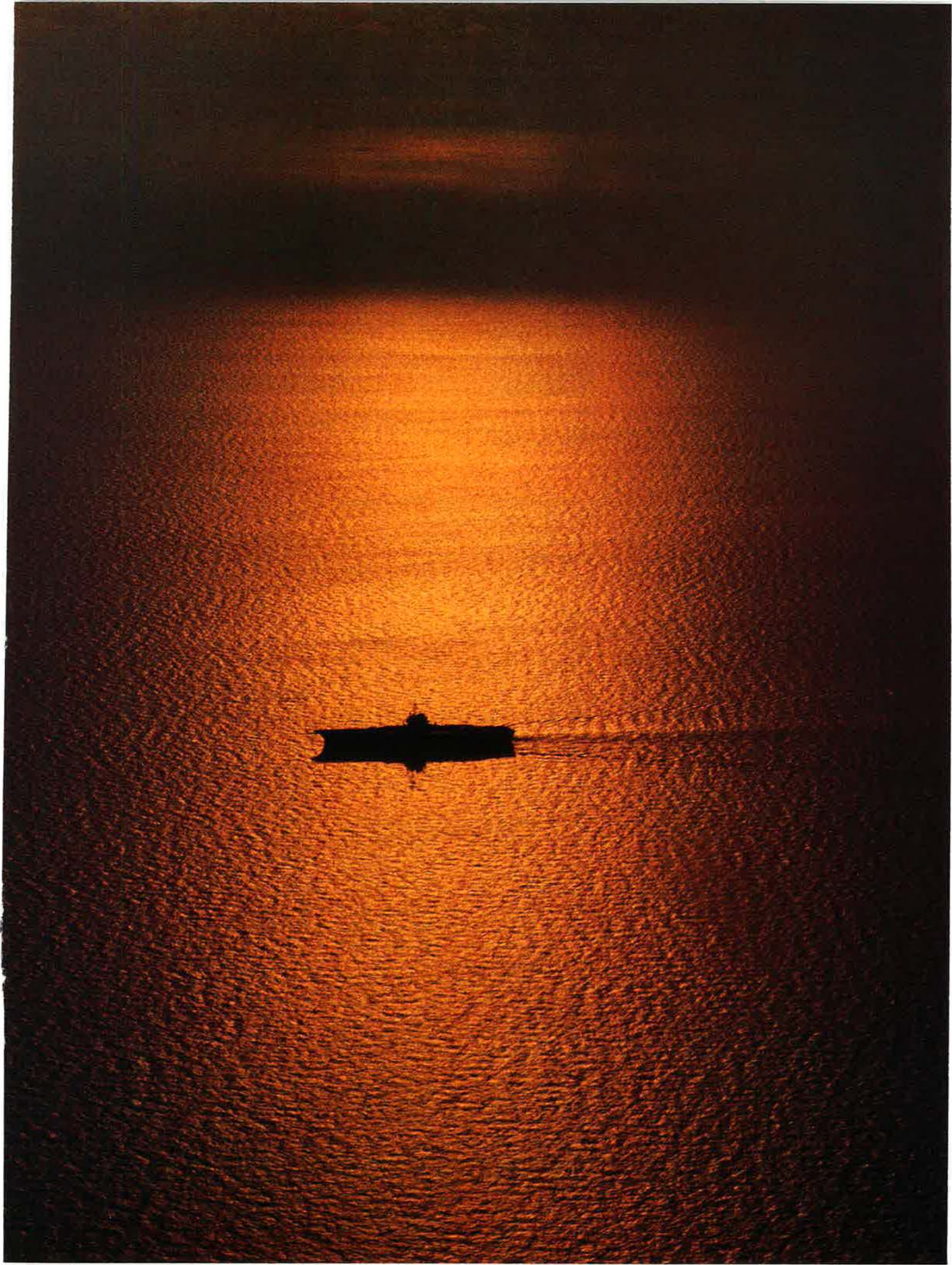
Deployment of this "all-multimission" force by about 2010 would be a notable shift for the Navy, which currently fields three basic fighters, two of which are optimized for a single mission. The A-6 Intruder, an all-weather medium bomber, performs only strike operations. The F-14 Tomcat interceptor specializes in fleet air defense. The third basic warplane, the F/A-18C/D strike fighter, can handle both air-to-air and attack missions, but does neither so well as single-mission F-14s or A-6s do.

Even so, the Navy is signaling that the future belongs to multipurpose fighters. "We're not going to build single-mission airplanes," declares Rear Adm. Philip S. Anselmo, the



The Navy is banking much of its future on an advanced variant of the F/A-18 Hornet, shown above preparing for a carrier launch, but Naval aviation plans face trouble.

Photos © William G. Lotz, 1992



Navy's deputy director of Air Warfare and formerly director of Aviation Plans and Requirements. "The investment I should be making should cover the full mission scenario."

Critics of the Navy's modernization program—and they are many—fault the order of its priorities and high cost. Admiral Mixson, however, maintains that the Navy has "a reasoned, well-articulated plan" for modernizing the carrier air fleet.

Under the new plan, the first new aircraft to come on the scene would be the F/A-18E/F, a bigger, faster, far more powerful cousin of the F/A-18C/D Hornet now in fleetwide service. The Navy began procuring the original C/D strike fighter in the 1980s.

The updated model would sport many of the original F/A-18's features. For example, the twin-engine F/A-18 can be specially configured to perform fighter, strike, or intercept missions from carriers or from bases ashore. It is fifty-six feet long, has a wingspan of thirty-seven feet, weighs up to 52,000 pounds in the attack configuration, and can carry up to 17,000 pounds of bombs and missiles for ground attack. It can reach a top speed of Mach 1.8+.

Building the Workhorse

Admiral Anselmo says the new Hornet figures to be the workhorse of the future carrier force. He explains that the proposed E/F fighter, like today's C/D Hornet, would be capable of performing both air-to-air and strike operations.

Modifications would give the plane greater striking range than is found in today's model, which has a fighting range of about 500 nautical miles in the surface attack configuration. Plans call for structural changes to the Hornet airframe that will increase internal fuel capacity by 3,600 pounds, or thirty-three percent. This will increase the aircraft's range by about forty percent.

Admiral Anselmo says the addition of the AIM-120A Advanced Medium-Range Air-to-Air Missile (AMRAAM) to the Hornet's bag of weapons would give the E/F a greatly enhanced air combat capability. The E/F would be able to destroy targets at greater ranges more effectively. Structural changes also include stretching the Hornet's fuselage by thirty-four inches and enlarging the wing surface by an additional 100 square feet. The aircraft



Photo © William G. Lotz, 1992

The F/A-18E/F, based on the C/D (above), is to become the mission generator. With its increased range and payload, the F/A-18E/F will perform air-to-air and strike missions.

will have two more external weapons stations, increasing the total to eleven.

To bring today's F/A-18 up to the proposed E/F level, the Navy in July awarded McDonnell Douglas the first engineering manufacturing development contracts.

The Navy plans to increase the power of the new twin-engine E/F Hornet by thirty-five percent over the C/D, from 32,000 pounds to 44,000 pounds of thrust. The aircraft will also sport new defensive electronic systems and a fuel protection system. The Hornet is already twice as reliable as other Navy fighter and attack aircraft, requiring half the maintenance man-hours.

The current acquisition plan calls for a first F/A-18E/F flight early in Fiscal 1996, with initial operating capability in Fiscal 2000. The service plans to buy 1,000 of the E/F variant. The Navy wants to deploy about forty of the new planes on each of its projected twelve carrier decks, with the rest used for training, testing, replacement, and maintenance.

The high end of the Navy's "high-low" aircraft mix would be provided by the proposed A-X aircraft. It would have longer legs than the E/F Hornet, though the exact range has not been formally determined. The most critical feature of the A-X, however, would be its stealthiness, an attribute that would be valuable whether the plane is conducting attacks or air-to-air operations.

Navy officials report that the developmental A-X, like the E/F Hornet, will be a multimission warplane, though they say its capabilities would far exceed those of the E/F. As Admiral Anselmo tells it, the plane that the Navy wants will not only have all-weather strike capabilities but will also be fast and maneuverable enough to achieve "air superiority."

The Navy's Silver Bullet

Admiral Mixson views the A-X as the future carrier fleet's "silver bullet," a weapon system built in limited numbers but able to penetrate even the most densely defended target sites, perform superbly in the air-to-air role, and significantly affect the outcome of a conflict. As matters now stand, the Navy plans to deploy twenty A-Xs on each deck. The A-X, like the E/F Hornet, would perform missions now carried out by F-14s, A-6s, and F/A-18C/Ds.

The Navy says that the A-X may have an unmatched air-superiority capability and will be able to handle much of the air battle around the carrier battle group. While the inclusion of air superiority into the A-X's mission profile may seem new, Admiral Anselmo notes that the F-14 was built with several missions in mind. Because of the scale of the Soviet threat, however, the Navy dedicated the Tomcat to fleet air defense.

"The A-X may provide a better air-superiority capability than it does an

attack capability," Admiral Anselmo says. "It may turn out that the air-to-air capability of that airplane may be better [than] the other air-to-air capable airplanes we have. Air superiority will be embodied in the A-X."

Then why, some critics ask, would the Navy buy a new, bulked-up version of the Hornet at all, given the projected capabilities of the A-X?

"The purpose of the E/F is to do the level of effort," declares Admiral Anselmo. "It's like the relationship of the F-16 and F-15E. If you have a target set that requires you to go off and destroy targets in different areas, that becomes the finite role of the A-X." Once primary air and ground threats are cleared, the F/A-18E/F would become the primary sortie generator, says the Admiral.

The A-X is in concept exploration and definition. Five contracting teams are vying for the work: General Dynamics, McDonnell Douglas, and Northrop; Grumman, Lockheed, and Boeing; Lockheed, Boeing, and General Dynamics; McDonnell Douglas and LTV; and Rockwell and Lockheed.

Naval air assets are aging, but aircraft like the venerable E-2C Hawkeye, here in mid-stroke off the carrier catapult, do not fly stressful missions and will last well beyond 2000. The A-6E Intruder (below) is another story. This workhorse will be nearly forty by the time all models are replaced.



Photo © William G. Lotz, 1992



Photo © William G. Lotz, 1992

No Competing Prototypes

Demonstration and validation will begin in mid-1993. One team will be chosen to go into engineering and manufacturing development, which would begin in mid-1997. Only one team will build a prototype, however. Navy officials said that development of competing prototypes, as was done in the highly successful Air Force F-22 program, would cost the govern-

ment an additional \$2 billion, delay initial operating capability by two years, and require substantially more oversight.

The Navy says it will want to buy 575 A-X aircraft. The Air Force is also planning to procure later production models of the A-X and use them to replace F-117s and F-15Es.

The Navy intends to focus its attention on these premier combat aircraft.

It is able to do this because, in the area of support aircraft, the Navy can perform well with what it has in hand, says Admiral Anselmo.

The S-3 Viking antisubmarine warfare aircraft, the EA-6B Prowler electronic warfare aircraft, the E-2C Hawkeye surveillance aircraft, and the KA-6D refueling aircraft are aging platforms. However, Admiral Anselmo says that they do not usually fly in high-stress environments and so will not be replaced until around 2020. In addition, the Navy is converting its helicopter fleet from the older SH-3 ASW to the search-and-rescue SH-60F and HH-60. These are both variants of aircraft flown by two other services.

The Navy will have to fight hard for its two-plane program, with no assurance of success. Congress has taken a strong hand in the debate over Navy tactical aviation. Defense committee members have begun assessing the Navy's modernization programs from the standpoint of cost and effectiveness. Sen. Sam Nunn, the chairman of the Senate Armed Services Committee, has promised close scrutiny of the Navy's entire aviation program.

The age of the current fleet of single-mission aircraft—especially A-6Es—



Still one of the world's most formidable fighters, the F-14 Tomcat will perform its mission well beyond 2000. Nevertheless, the Navy has decided not to produce an upgraded Quickstrike Tomcat or other variant.

and the unraveling of the Navy's first modernization plan during recent years have forced the aircraft issue to the center of the congressional budget debate.

The two-seat A-6E is a modernized version of the Navy's original A-6A, which was developed in the late 1950s and made its first flight in 1960. The plane stands more than sixteen feet high, is nearly fifty-five feet long, and has a maximum carrier takeoff weight of 58,600 pounds. Its wingspan is fifty-three feet. This subsonic plane is equipped with two Pratt & Whitney engines, and it carries a variety of bombs, rockets, and air-to-surface missiles.

The A-6E is still a formidable weapon. It is equipped with a microminiaturized digital computer, a solid-state weapons release system, and a single integrated search and track radar. The target recognition and attack multi-sensor version has a forward-looking infrared system and a laser designator and receiver.

The Tomcat, which comes in F-14A, F-14A+, and F-14D variants, is a twin-engine, two-seat, variable-sweep-winged, supersonic fighter. Most are equipped with the AN/AWG-9 weapon control system, capable of controlling six AIM-54 Phoenix missile launches while simultaneously tracking twenty-four targets. The F-14's mission is to attack and destroy multiple airborne targets in all weather conditions and at night.

Still one of the world's premier fighters, the giant F-14 has a length of more than sixty-two feet, height of sixteen feet, wingspan of sixty-four feet, and maximum loaded weight of more than 70,000 pounds. It is in the Mach 2+ class and can carry a combination of Sparrow and Sidewinder air combat missiles, as well as the Phoenix, which has the capability to destroy targets with conventional warheads at great ranges.

Though both aircraft have been thoroughly upgraded—some A-6s, for example, have recently received new composite wings and sophisticated avionics—their designs are now more than twenty years old. It will be another decade, at the earliest, before new planes can be brought on line to replace them.

The Blueprint Crashed

Helping to make the naval aircraft issue seem even more urgent has been the collapse of the Navy's earlier tactical modernization blueprint, drawn up in the mid-1980s.

One part of the plan called for new production of a more powerful Tomcat, the F-14D, to replace F-14A interceptors that were due to "age out" of the fleet. The service wanted to buy 127 of these new-production D model aircraft. Faced with a lack of funds, the Navy was forced to reduce the scale of the program greatly and then end it altogether. No new F-14Ds are now being produced.

For a time, the Navy also contemplated procuring a seagoing variant of the Air Force's F-22 Advanced Tactical Fighter, the Naval ATF, as a long-term replacement for the Tomcat. Funding limitations forced the Navy to all but pull out of that program. It is now involved mainly as an observer.

The problem was especially acute with attack aircraft. In the mid-1980s, the Navy developed a two-track plan for modernizing its attack fleet. In the near term, the service planned to procure several hundred A-6Fs, new-production airplanes based on the Intruder design but with greatly enhanced avionics and engines. For the longer term, the Navy would buy the stealthy Advanced Tactical Aircraft, later designated A-12.

The Navy, encountering funding difficulties, had to cancel the A-6F project. In early 1991, the A-12 program also died. Defense Secretary Dick Cheney, alarmed about cost, technical problems, and schedule delays, terminated the A-12 program, taking the Navy virtually back to square one.

The termination of the A-12 forced the Navy to quickly restructure its entire tactical aviation modernization plan. Before a replacement can be brought in, the A-6Es will be thirty-five to forty years old, Admiral Anselmo says, "so that cancellation created some rapid responses to reinstate some programs to fill the gaps."

Though the charge seems justified to some, Admiral Anselmo rejects the notion that naval aviation is in disarray. He says the word disarray "connotes a dysfunctional organization" and cites the Navy's performance in Operation Desert Storm as evidence to the contrary. Still, even Navy supporters concede that the service's plans are tenuous, and Admiral Anselmo acknowledges there is little margin for error.

Who Goes First?

One major question raised by critics is why the Navy would want to produce the Hornet E/F first. They point out that the age of the A-6 makes it the prime replacement priority and that the new Hornet won't do nearly as much as the proposed A-X to take up the slack in that mission area.

Some members of the House Armed Services Committee have argued that the entire A-X program should be

accelerated in lieu of building the F/A-18E/F. Navy officials adamantly oppose this course. They argue that the A-X program plan is already extremely aggressive and that more money could not accelerate the program. Moreover, says the Navy, the fleet needs to bring on a high-quality fighter relatively quickly, and the E/F is the only candidate that can be gotten into service within a decade.

The Navy further says it must produce the two airplanes in sequence in order to spread out the cost over time. "The timing for the E/F and A-X is absolutely crucial for us because we can't afford to bring on—even in good times, but especially so in bad times—two aircraft at the same time," Admiral Mixson says.

The Navy has decided to forgo prototyping the new Hornet—another highly controversial move that has provoked congressional criticism. The House Armed Services Committee, in its version of the Fiscal 1993 defense authorization bill, took the unusual step of ordering the Navy to include prototypes in its E/F program. However, the Navy is confident in its decision. Prototyping the E/F would delay the program two years, according to Admiral Mixson. The Navy has accumulated thousands of flying hours on the F/A-18C/D and views the existing airplanes as flying prototypes for the new aircraft.

"The fact of the matter is that the avionics of the [new] aircraft are ninety percent common with the C/D," says one Navy officer. "Although the airframe is 100 percent touched by the upgrade, the tooling, structure, stress analysis, wind tunnel characteristics, and flying characteristics are very similar."

Another question raised by critics: Is the upgraded Hornet the right plane for the mission? The Navy says it carefully evaluated the Hornet E/F variant against a number of alternative aircraft. These included the original A-12, the A-6E, the uprated A-6G, the French-built Rafale fighter, the F/A-18C/D, and four multimission variants of the Tomcat (Super Tomcat 21, Advanced Tomcat 21, F-14D, and F-14D Quickstrike).

Why They Failed

The Navy found the two most advanced Tomcats highly capable but too expensive to build and support. The F-14D and the F-14D Quickstrike



Photo © Zone Five / Arms Communications, 1992

While the Navy is looking to other types of aircraft, some in Congress and in the Navy admire the long-range power of the variable-geometry-winged F-14 Tomcat. However, cost is a problem.

Tomcats both lacked strike capability relative to the Hornet E/F and would have increased the Navy's support costs. The Navy determined that neither of the proposed A-6 variants was cost-effective. The Rafale, said the Navy, did not meet operational needs. The F/A-18C/D can no longer be expanded and "is not responsive to the operational requirement."

The Pentagon's Inspector General faulted the Navy's evaluation of the alternatives. The IG's office reported in June that the Navy did not properly consider the alternatives in its cost and operational effectiveness analysis. Some would like to see the Navy undertake another analysis.

In addition, some in Congress, and even within the Navy, favor an F-14 Quickstrike or other F-14 variant over the E/F. Their main argument is that an F-14 upgrade would have greater range than the E/F, even with increased loads. Moreover, they say, the F-14 has the long-range Phoenix missile system. The Navy recently terminated the Advanced Air-to-Air Missile, which would have given the F/A-18E/F a similar capability. On top of this, say F-14 proponents, the Quickstrike could be produced earlier and at lower cost—a claim disputed by the Navy.

Compounding these difficulties is the overall problem of financing the two big programs. Senator Nunn, in a July speech to the Senate, repeatedly remarked on the high cost of weapon systems. He did not single out the

Navy for criticism; plenty of Air Force, Army, and Marine Corps programs were cited for high cost. The Senator did, however, note that "the Navy operates twelve aircraft carriers. If the Defense Department decided that long-range aviation could eliminate the need for two aircraft carriers, you save \$7 billion in operating costs and \$9 billion required to build two new aircraft carriers."

Senator Nunn further said, "This year's budget request contains an \$800 million down payment on a \$4.8 billion aircraft carrier and \$165 million to start development of a \$60 billion to \$80 billion new, stealthy, medium-range bomber to fly off aircraft carriers—the so-called A-X airplane. . . . The Navy wants to buy a new version of the [F/A-18] that will cost nearly \$5 billion to develop and \$55 to \$75 billion to procure."

These high costs, among other factors, have prompted Senator Nunn to call for a wide-ranging, no-holds-barred review of all service roles and missions—especially the projection of tactical airpower. [See "Capitol Hill," p. 14, and "Aerospace World," p. 19, September 1992.]

Admiral Anselmo applauds Senator Nunn's call for a new examination. The review, he says, "will be a healthy debate for all of us." The Admiral says the Navy will have to make some "major ideological shifts in how we have gone forward as a department and a service." ■

Aviation was new stuff. It took a new vocabulary to talk about it.

Jargon of the Air

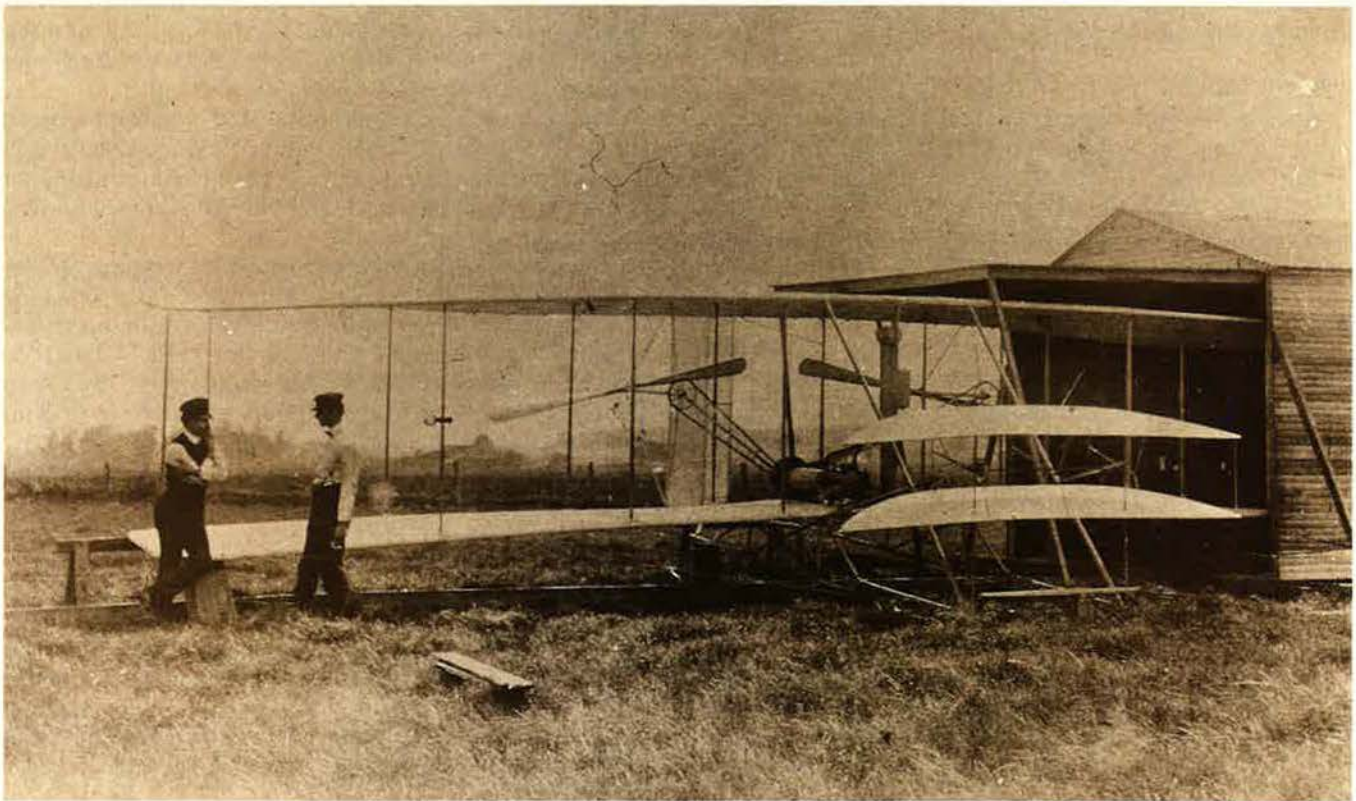
By Bruce D. Callander

IN THE mid-1930s, *Liberty Magazine* sponsored a contest to find an official song for the Army Air Corps. Robert Crawford's winning entry was unveiled at the 1937 Cleveland Air Races. Its lyrics caught the thrill of flying ("Off we go, into the wild blue yonder"). They described an as-yet-unnamed enemy ("Here they come, zooming to meet our thunder") and rekindled images of World War I dog-fights ("Down we dive, spouting our flame from under").

The song was reminiscent of the old sea chanteys that celebrated the lure of the open ocean and spoke of the sailor's almost casual acceptance of its perils. That was no accident; much of aviation's early jargon was borrowed from the language of mariners. Their three-dimensional world well understood the concepts of roll, pitch, and yaw. Like boats, flying machines had rudders, ribs, spars, stays, and screw propellers. For a time, the new vehicles were called aeronefs (air ships) and their operators were known as aeronauts (air sailors). One reporter, trying to describe how an early pilot banked his machine in flight, wrote, "The navigator threw over his helm."

This new aerial ocean, however, had its own dynamics and a language of its own. Long before men flew, a British engineer, trying to build a better windmill, explored its nature. He found that curved blades worked better than flat ones. He measured their efficiency and the forces they met. Only years later, however, did others finally give names to the principles of "lift" and "drag."

In 1855, Joseph Pline of France combined two Greek words to form the term "aeroplane." It would take until the turn of the century to produce a machine worthy of the name. By then there was substantial technical jargon available to describe it.



"Aeroplane" was the term favored by Orville Wright for the invention he and his brother referred to as "the machine." "Flyer" was the name applied to it by the Smithsonian, but the Wrights used the proper noun only as a name for their dog.

To the press and the public, however, flying was still the grist of jokes and fantasy. One 1904 knee-slapper had an earnest young man asking his inventor friend when he would "wing his next flight," to which the scientist replied, "Just as soon as I can get the laws of gravity repealed."

A Flying Locomotive

By that time, the Wrights already had beaten gravity at Kitty Hawk, but reports of their flight were garbled. Newsmen miles from the scene invented an eyewitness account of a "big box pushed into the air by a six-bladed underwheel and propelled by an engine suspended from the navigator's car." Even those who saw the Wrights' later flights in Dayton, Ohio, had trouble adequately describing them. One reporter asked his readers to "imagine a locomotive climbing into the air right toward you, with wings instead of wheels."

By 1909, the US Army had begun testing its first flying machine and the press was beginning to learn the language. After one acceptance flight, a Washington, D. C., reporter described the scene:

"The propellers were cranked. Orville turned on the motor and released the machine. Near the end of the starting rail, he turned up the forward horizontal rudders and the machine rose. Down the field, the aeroplane sailed, curved gracefully and flew back up along Arlington Cemetery. . . . On the sixth round, Mr. Wright came down in successive glides until within a few feet of the earth, when he pulled the string that stops his motor. The machine glided smoothly over the grass on its skids until it came to a stop."

Newspapers began running glossaries of aeronautical

terms including "adjusting surfaces," "center of effort," "chassis" and "fish section," the streamlined shape that designers had discovered reduced drag.

Orville Wright became aeronautics editor for the Funk & Wagnalls Dictionary and helped standardize aviation jargon. He defined such terms as "air speed," "camber," "fuselage," "hangar," "lift," and "taxi." He selected "aeroplane" as the proper term for winged machines, noting that "aeronef" should be applied to lighter-than-air craft. He also defined "aerodrome" as a place for flying. This contradicted aviation pioneer Samuel Langley, who had used that word for his ill-fated flying machine.

The Wrights had not always been so fastidious about their nomenclature. They had called their device "the apparatus," "the machine," or simply "the flyer." The Smithsonian Institution in Washington, D. C., eventually labeled their 1903 machine the "Kitty Hawk Flyer," but the only time the Wrights used "Flyer" as a proper noun was as a name for their dog.

The term for those who flew also underwent an evolution. At first, the press called them "operators," "airmen," "birdmen," "aerial navigators," and even "aeroplanists." "Aviator" emerged as the preferred term. Soon the word had a feminine gender. Harriet Quimby, the first woman to fly the English Channel, was dubbed "the Dresden China aviatrix." [See *"The Bad Luck of Harriet Quimby,"* April 1992, p. 72.] In time, both gave way to another word borrowed from the sea: "pilot" (from the Greek word for oar), which originally referred to a boat's steersman.

The early Funk & Wagnalls dictionary defined "runway" only as a path to a barn and "airway" as a mine ventilating shaft, but as early as 1914 it included "jet

propulsion” as a means of moving an airship by forcing air from an opening at the stern.

Vild for Veelbur

Almost from the beginning, aviation had an impact on other cultural institutions. After Wilbur Wright flew in France, local shops sold replicas of his headgear as “Veelbur Reet” caps. When the airplane carried the first woman passenger, her husband tied her dress around her ankles to ensure modesty; designers caught the effect in the hobble skirt. Silver Brand detachable collars were advertised in biplane and monoplane models.

Advertisers cashed in on the craze. One candy company’s advertisement showed an airplane with wings made of Hershey Bars. When the Armour Co. sponsored Calbraith P. Rodgers’s coast-to-coast flight, it painted the name *Vin Fiz* on his plane to promote its new grape drink.

Also in 1911, show business discovered aviation. Lt. H. H. Arnold, attending an air meet on Long Island, stayed on to fly as a stunt man in the movie “The Military Air Scout.” In downtown New York, the Ziegfeld Follies floated Lillian Lorraine over the audience in a miniature plane as she sang, “Up, Up in My Aeroplane.”

The biggest show, however, was aviation itself. Exhibition flyers performed ever more daring aerial stunts, inspiring aviation metaphors: Star-crossed young lovers went into nose dives, and unfortunate investors were thrown for a loop in the market.

Aviation was a big part of World War I. Adventurous American youngsters ran off to join the Escadrille Americain (later the Lafayette Escadrille). The French press called the best flyers “aces.” Frank Luke was well known as the best of the “balloon busters.” The knights of the sky flew “chasse” planes with such names as Spad (Société Pour Aviation et ses Derivées) and Sopwith Camel (the “Hump”). They met the Hun in aerial “dogfights” and dodged ground fire from German “Archies.” The Curtiss JN-4 trainer would be immortalized under the name “Jenny.”

Airframes now were covered with cloth and “doped,” a term based on the Dutch word for sauce. Elevator and aileron controls were combined in a single “joystick.”

American pilots, copying the looping combat maneuver of German ace Max Immelmann, established the rule that would serve not only future flyers but businessmen and politicians as well: “Always watch your tail.”

After the war, the legend of the aces was kept alive by “barnstormers.” It was a descriptive term used for decades by traveling theatrical troupes. Now it meant the itinerant flyers who hangared their Jennies in barns, staged rural air shows, and sold joyrides.

Movies embellished the air war. “Wings,” starring Clara Bow and Buddy Rogers, won Hollywood’s first Oscar. In “The Dawn Patrol,” Douglas Fairbanks, Jr., immortalized the line, “You can’t send the kid up in a crate like that.” In the 1930s, Laurel and Hardy took to the air as “The Flying Deuces.” Mickey Mouse starred in “Plane Crazy,” King Kong battled warplanes from a skyscraper, and chorus girls danced on the wings of a flying transport in “Flying Down to Rio.”

Lindy and Amelia

Real life was even more exciting as new air heroes emerged. America’s favorite was a shy youngster who had trained as an Army air cadet, become a barnstormer, and flown the mail. When he crossed the Atlantic solo, aviator caps became a fad among small boys and their parents danced the Lindy Hop. Girls found a role model in Amelia Earhart, first woman to fly the Atlantic solo, and copied her short hair style.

By the 1930s, private aero clubs sprang up in farmers’ fields and weekend flyers bought time in aging biplanes. America dreamed of the flying flivver that would share the garage with the family’s Model A.

Commercial air travel gave the country wings. Sleek new “airliners” and modern “clipper ships” spanned continents and oceans. As the system of airways spread across the nation, new bands adopted the phrase “on the beam.” “Fasten your seat belts” signaled the approach of a wild night on the town.

World War II greatly enlarged the aviation vocabulary. Newsman Edward R. Morrow, broadcasting from wartime London under fierce Nazi aerial bombardment, gave new

The jargon of the air is not exclusively the domain of English. The German word Fliegerabwehrkanonen gave rise to the acronym “flak,” which has achieved currency in military and civilian circles alike.



prominence to the word "blitz." In late 1941, when the world war became America's war, the language of what now was called "airpower" came home to color teenage slang and the shoptalk of Rosie the Riveter. It spoke of milk runs, flight lines, and bomb bays, of "sweating it out" and "hitting the silk."

Americans learned and began to use a few German words, among them flak (for *Fliegerabwehrkanonen*) and Stalag Luft (air prison).

Fighters "scrambled." Bombers "laid eggs." Radio operators were "static benders," and navigators were "star gazers." The ball turret gunner worked in a bathtub, and the bombardier worked in a greenhouse. Planes carried extra gas in Tokyo tanks, bombed with radar called Mickey systems, and sometimes ditched in the drink. A night on the town became a sortie. Our fighters were "little friends." Theirs were "bandits."

Hollywood made some believable air films, including the documentary "Memphis Belle," but many screenwriters never seemed to get the language right. It was understandable. Flyers, then as now, spoke in a mixture of technical terms, military jargon, and slang that came and went with the moment.

One crewman gave this description of a mission: "The ceiling was ankle-high but we got off and homed on the buncher beacon. The target was Big B. The bogies came in at twelve o'clock high, did a Split-S and came up under us. Tail-end Charlie took a hit. She lost an engine, feathered, and aborted. The yellow-noses jumped her, and she augered in. We counted a couple of chutes but I guess most of the crew bought the farm."

Blitzes and Blockbusters

In the postwar world, "blitz" became a football term. Movies hyped as "blockbusters" often "bombed" at the box office. "Flak" survived as a synonym for harassment, but much of the other wartime slang died as aviation and its jargon underwent a series of evolutions.

First, aircraft lost their engines and became flying stovepipes. The change gave us the turbojet, jet aces, the jet set, and jet lag. As the pace of life quickened, we kicked in the afterburners and hung on.

In 1947, Capt. Charles E. Yeager broke the sound barrier. From then on, the speed of flight would be measured in Mach numbers, a scale developed by an Austrian physicist when Orville Wright was still in high school.

In 1957, a Russian word meaning "traveling companion" crashed into the world's aviation vocabulary: Sputnik, the tiny satellite that shattered US complacency and helped spur the space effort. American astronauts (star sailors) vied with Soviet cosmonauts. They talked about "liftoff," "weightlessness," "fly-by-wire," "reentry," and "splashdown."

Since then, the terminology of space and weaponry has grown. Much of it is too technical to interest the layman. Every so often, however, the eccentric and inventive language of airpower still can be heard. In Vietnam, the durable Gooney Bird reappeared as the latter-day gunship "Puff the Magic Dragon." We learned about "flameouts,"

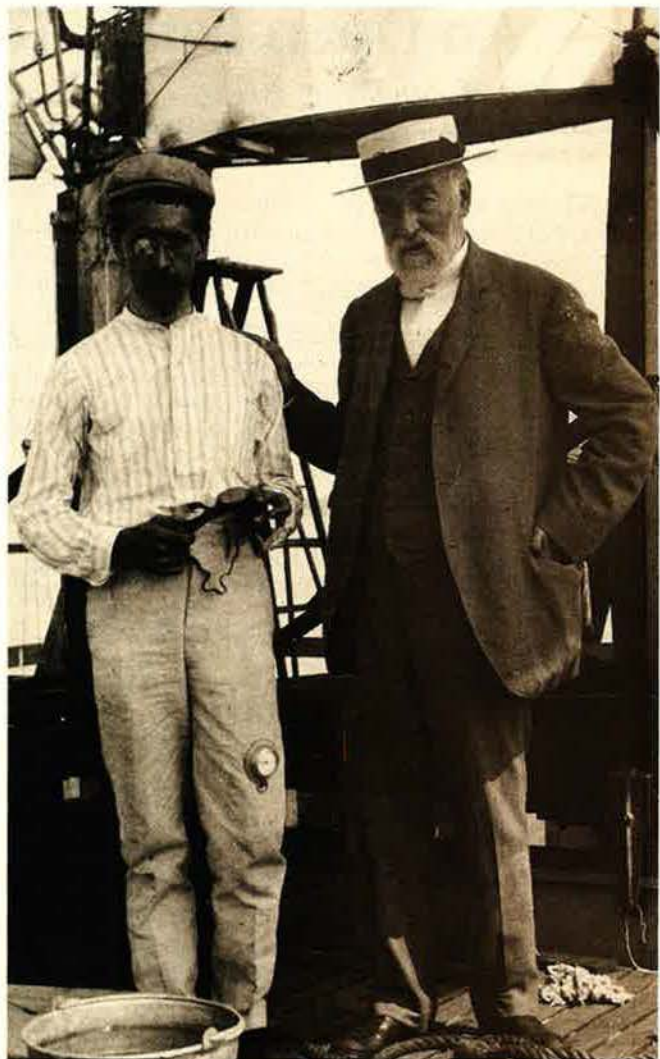


Photo from Smithsonian Institute

Samuel Langley (at right, with assistant Charles M. Manley) vied with the Wrights to establish aviation's nomenclature as well as to achieve sustained flight with a heavier-than-air machine. His term for the flying machine, "aerodrome," fared no better historically than did his aerodromes themselves, most of which ended up in the Potomac River.

"smart bombs," "MiG Alley," the "Jolly Green Giant" helicopter, and the F-105, affectionately dubbed the "Thud."

The nonflying world continues to borrow jargon from the world of aerospace and aviation. Auto builders talk about putting "head-up displays" and "inertial navigation systems" into cars. Ad agencies and politicians "MIRV" their campaigns to target numerous selected audiences. Sportscasters talk about "stealth" plays on the gridiron.

The Air Force has listed 600 words that could be used in voice-activated systems to control future aircraft. This basic vocabulary omits many words that have enriched aviation jargon in the past, but it's a good bet that it will include "bandit," "chopper," "dogfight," "friendlies," "jam," and "zap." ■

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, "The Enlisted Airman," appeared in the August 1992 issue.

An Open Letter To All AFA Members

50% Off Hotel Rates Brings AFA Members Terrific Savings On Winter Travel

Dear AFA Member,

Hard to believe, but winter is almost here. And when winter arrives here in Washington State, I'm ready to get away. *And so can you...*

California.

Florida.*

Arizona.

Mexico.

Hawaii.

HURRICANE UPDATE

Considering Florida This Winter?

**While Hurricane Andrew wreaked havoc in certain areas of South Florida, the vast majority of Florida's terrific hotels, beaches, and theme parks are ready and waiting for you.*

You'll find hundreds of outstanding "Sun Destinations" listed in Quest's directory. Over 1,700 participating hotels in all. And they're just waiting to give you 50% off this winter.

If you're one of the hundreds of AFA members who already belong to Quest*—you're set! You now have access to over 1,700 Quest affiliated hotels, motels and resorts—at a full 50% off.

**(For those of you who did enroll—read on. I've included a special note just for you.)*

But if you're not a Quest Member yet—and you're considering travel this winter—right now is the perfect time to join.

You'll get your personal copy of Quest's 80-page hotel directory. And if you sign up now, you'll have plenty of time to look through your directory carefully. Use it to help you plan your trip. You'll be amazed at the outstanding lodging opportunities available to you at a full 50% savings!

WHY WOULD A HOTEL GIVE 50% OFF?

Because every night *more than 35 of every 100 hotel rooms sit empty*—that's why!

Look -- hotels can easily see that letting a \$90.00 room go for \$45.00 is certainly better than nothing at all. After all, the staff is already there. The restaurant has to be open. Why not give Quest Members a deal to help ensure occupancy levels (and profits!) are as high as possible?

ARE DISCOUNTED ROOMS AVAILABLE DURING THE BUSY WINTER MONTHS?

It's true that many "Sun Destinations" can book to full occupancy during the hectic winter travel season. But not as often as you might think. And remember, *Quest hotels want your business*. And on top of that, space is available the vast majority of the time—and your discount is a full 50% from their standard rates.

On top of everything else, these are recessionary times. Hotels are fighting for business. So, with over 3,000,000 members looking to their Quest directory for the best deal on lodging, Quest makes more sense than ever—for you—and for Quest's hotels.

FULLY ENDORSED BY THE AFA AND AN AMAZING DOUBLE GUARANTEE

The fact is, I understand that the idea of 50% hotel savings is a little hard to swallow—so keep this in mind.

Quest is whole-heartedly endorsed by the Air Force Association. They've already checked Quest out for you. And our company, (Destinations, Inc.), is licensed by Quest as their exclusive distributor to members of associations—like the AFA.

AS AN AFA MEMBER...

...you have preferred access to Quest at the special Air Force Association rate of just \$29.95. That's \$70.00 below Quest's regular annual fee of \$99.00.

Not only did AFA check out the Quest Program. No sir—they didn't stop there. They've also checked out the outstanding level of customer service we provide.

And to further put your mind at ease, (and to confirm that high level of member satisfaction), your Quest Membership is fully backed by an exclusive "Double-Guarantee".

YOUR FIRST GUARANTEE

The Quest Rate quoted for any confirmed Quest reservation is fully guaranteed. Simply make your reservation at a participating Quest Hotel according to the guidelines in your directory. All the details are included with your membership. Quest stands behind you.

YOUR SECOND GUARANTEE

You must be fully satisfied with Quest or get all your money back. Prompt and hassle-free! Your exclusive money back guarantee is valid for the full term of your membership. *The whole year*. Even after you use Quest and save 50%—if there's just one thing you aren't delighted with, you get your entire enrollment fee back.

You simply have nothing to lose! The "Double-Guarantee" clinches it! And on top of an incredible 50% savings, your 80-page Quest directory is a terrific guide to quality hotels all over the world.


"U.S. NEWS" GIVES QUEST TOP HONORS

In an article covering several hotel discount programs, U.S. News & World Report said, "All clubs offer price breaks on hotels. However, the best deal is available through Quest whose members pay \$99.00 and get a 50% discount..." (at participating hotels).

Find out for yourself what a terrific program Quest really is! **Give us a call TOLL-FREE, at 1-800-782-9450.**

You'll find an order form at the bottom of this page. Feel free to call, fax or send in your application today! See just how much you can save this winter. I think you'll be impressed.

Sincerely,


Randall E. Wilkinson
President-Destinations, Inc.

P.S. -- If you need a second Quest card for your spouse—it's only \$7 additional!

HERE'S WHAT YOU GET

- ◆ Access to more than 1,700 terrific Quest locations at an incredible 50% off their standard rates!
- ◆ Your own personally embossed "AFA/Quest" affinity membership card.
- ◆ Your own 80-page, full-color directory with details on more than 1,700 Quest locations.
- ◆ A full year of Quest's Hotel Directories sent to you every 90-days. (Other Quest members pay \$6.00)
- ◆ Preferred access to Quest at an incredible 50% savings! Just \$29.95! (Retail cost: \$99.00)
- ◆ Our exclusive "Double Guarantee".
- ◆ Automatic renewals! Annual renewals are sent and billed to you automatically providing you with uninterrupted service until you choose to cancel.
- ◆ Terrific hotels to choose from! Just take a look...
 - Westins • Howard Johnsons • Sheratons
 - Radissons • Holiday Inns • Hiltons
 - Marriotts • Best Westerns • ...and more!

Over 1,700 locations in small & large cities!

SPECIAL NOTE TO AFA/QUEST MEMBERS

As Quest celebrates its 10th year this September, Linda Johnson—Vice President, Hotel Division, reports that Quest's hotel base will reach 2,000 properties by the end of this year. Watch the mail for your updated directories.

AFA/Quest Enrollment Form

name _____

address _____

city, state, zip _____

daytime phone (____) _____

SELECT ONE

\$29.95 AFA/Quest Membership Please add \$5 if outside U.S.

\$36.95 AFA/Quest Membership -- including an additional spouse card

spouse name _____

METHOD OF PAYMENT

Here's my check Checks drawn on U.S. banks only. All credit card orders are welcome.

Charge my Visa M/C Am/Ex

card # _____

exp. / / signature _____

MAIL THIS FORM TO:

AFA/Quest Offer, One Lake Aspen Park,
P.O. Box 22800 Yakima, WA 98907-2800

1-800-782-9450

or, fax this form to us at 509-452-3569

AFA Access # 1890-15

Gallery of Middle East Airpower

By John W. R. Taylor and
Kenneth Munson

Fighters and Attack Aircraft

A-4 Skyhawk

The A-4 Skyhawk is proof of the inestimable value of getting a design right the first time, though perhaps even its creator, the redoubtable Ed Heinemann, could not have foreseen quite the length of career that his "bantam bomber" was to enjoy when he designed it in the early 1950s. Major operators like Singapore and New Zealand have recently invested large sums of money in upgrade programs to keep their A-4s in service through the 1990s, and a lively trade in second- and third-hand resales continues.

The two Middle East operators of A-4s, Israel and Kuwait, both fly second-generation "camel" Skyhawks, with the characteristic saddleback hump (for avionics and extra fuel) first introduced by the A-4F and perpetuated in subsequent models such as the A-4M Skyhawk II built for the US Marine Corps. The A-4F introduced a zero/zero ejection seat, underwing spoilers to reduce landing run, and nosewheel steering; a tail braking parachute, square-tipped vertical fin, and other detail improvements came in with the A-4M. Israel's A-4N (117 built) and Kuwait's A-4KU (30) were both broadly equivalent to the A-4M, although the former have been the subject of a major upgrade by Israel Aircraft Industries since their delivery in the mid-1970s. In addition to airframe life extension and complete rewiring, other ingredients of the IAI upgrade included 30-mm (replacing 20-mm) guns, an extra underwing station each side (making six), lengthened nose and jetpipe, a chaff/flare dispenser just ahead of the brake-chute fairing, dual disc brakes, and above all an advanced Elta WDNS (weapon delivery and navigation system), which includes provision for firing Gabriel missiles. The number of A-4Ns in Israeli service has lately dwindled to somewhere in the region of 70-75 aircraft, but they still equip three squadrons of the IDF/AF. The service also has 30 or so TA-4H and -4J Skyhawk trainers.

Kuwait's A-4KUs had dwindled to about 24 (plus six TA-4KUs) at the time of the Iraqi invasion in August 1990, serving with Nos. 9 and 25 Squadrons at Ahmed al Jaber air base. Representing, at that time, the country's principal combat aircraft type, 20 of the A-4KUs successfully made their escape, initially to Bahrain and thence to Dhahran in Saudi Arabia. From here, temporarily emblazoned with the legend "Free Kuwait," they joined with other coalition forces in fighting for the recovery of their homeland, during which at least one was lost. Typical mission loads during these operations were five Mk 7 cluster dispensers (two underwing, three on a centerline triple ejector rack) or five Mk 82SE Snakeye bombs, plus a pair of 450-gallon drop tanks. Aircraft captured by the invading Iraqis were returned early this year, restoring the inventory to 23 single-seaters and two or more trainers. Kuwait is now in the process of receiving F/A-18 Hornets as an eventual replacement for its Skyhawk fleet. (Data for A-4N.)

Contractor: Douglas Aircraft Company, US.

Power Plant: one Pratt & Whitney J52-P-408A turbojet; 11,200 lb thrust.

Dimensions: span 27 ft 6 in, length 40 ft 3 3/4 in, height 15 ft 0 in.

Weights: empty 10,465 lb, gross 24,500 lb.

Performance: max speed at S/L 670 mph clean, 646 mph with 4,000 lb weapon load, service ceiling approx 40,000 ft; T-O run 2,730 ft, combat radius (hi-lo-hi) with 4,000 lb weapons load 340 miles.

Accommodation: pilot only (two seats in TA-4).



A-4KU Skyhawk, Kuwait Air Force
(Paul Jackson)



Alpha Jet MS2, Egyptian Air Force



Tzukit (CM 170 Magister), Israeli Air Force (Ivo Sturzenegger)

Armament: one 20-mm Mk 12 gun (30-mm DEFA in Israeli refit) in each wingroot; one centerline and four underwing stations (six in Israeli refit) for AAMs, ASMs, bombs, rockets, or gun pods; max (five-station) external load 9,195 lb.

Alpha Jet

Most advanced jet trainers have a secondary capability for close support/ground-attack missions, but the Franco-German Alpha Jet's design was undertaken with more attention to the latter role than many of them, initially to meet the requirements of the former West German Air Force. This tended to make it somewhat more expensive than others in its class, or exports might have been higher. Nevertheless, in addition to the 351 built for France and Germany, a further 152 were completed to meet orders from eight other countries, three of them (Egypt, Morocco, and Qatar) in the Middle East/North Africa region. Sales were 45, 24, and six, respectively. All three air forces employ their Alpha Jets for both advanced/weapon training and close support duties, those of the Qatar Emiri Air Force equipping No. 11 Squadron at Doha.

Egyptian Air Force Alpha Jets, most of which were license-assembled in that country by AOI (Arab Organi-

zation for Industrialization), are of two models. The first 30, designated MS1, are standard-model trainers generally similar to those built for the French Air Force and most export customers. The final 15, however, were optimized for the attack role. Known as MS2, this version is equipped with a SAGEM Ullis 81 inertial nav/attack system, Thomson-CSF HUD and nose-mounted laser rangefinder, and a Thomson-TRT radio altimeter, all managed by a Dassault Electronique multiplex digital data bus. This advanced system enables the MS2 to designate targets automatically, fire guns or rockets in a dive, release retarded bombs in level flight, and release free-fall bombs automatically in the toss mode. **Contractor:** Dassault Aviation, France, and Dornier GmbH, Germany.

Power Plant: two SNECMA/Turbomeca Larzac 04-C6 turbofans; each 2,976 lb thrust.

Dimensions: span 29 ft 10 3/4 in, length 43 ft 5 in, height 13 ft 9 in.

Weights: empty 7,749 lb, gross 17,637 lb.

Performance: max speed (clean) at 32,800 ft Mach 0.85, at S/L 621 mph, service ceiling 48,000 ft, T-O run 1,215 ft, landing run 1,640 ft, close support combat radius (hi-lo-hi) 363 miles on internal fuel, 668 miles with two 119-gallon drop tanks.

Accommodation: crew of two, in tandem.

Armament: hardpoint under fuselage and two under each wing for 5,510 lb of stores, including centerline 27-mm or 30-mm gun pack, four free-fall, retarded, or cluster bombs, gun or rocket pods, and two 82- or 119-gallon drop tanks.

CM 170 Magister

As related in the "World Gallery of Trainers" [December 1991, p. 31], the Magister, with more than 900 built, was the most successful of the European-designed first generation of jet trainers. Of five current Middle Eastern/North African operators of the type, four (Israel, Lebanon, Libya, and Morocco) were among the Magister's original customers, those of Israel being license-built in-country. Designed for advanced (including weapon) training, the Magister was also eminently suitable for light ground-attack duties, and the Royal Moroccan Air Force still uses a portion of its approximately 22 Magisters in the counterinsurgency role. The Algerian Air Force has a similar number for advanced and weapons training. Numbers in the other three inventories have naturally been depleted over the years and are now almost certainly retained only for training. Israel's original 80 Magisters, known locally as Tzukits, have dwindled to about 45, and a replacement is being sought; Libya has about a dozen, Lebanon about five.

Contractor: Aerospatiale (originally Fouga), France.

Power Plant: two Turbomeca Marboré IIA turbojets; each 880 lb thrust.

Dimensions: span over tip tanks 39 ft 10 in, length 33 ft 9 1/2 in, height 9 ft 2 1/4 in.

Weights: empty 4,268 lb, gross 6,978 lb.
Performance: max speed at 30,000 ft 443 mph, service ceiling 30,000 ft, T-O run 1,800 ft, range 576 miles.
Accommodation: crew of two, in tandem.
Armament: provision for two nose-mounted 7.62-mm machine guns, plus hardpoint under each wing for two 110-lb bombs, four 55-lb rockets, or a Nord SS.11 wire-guided missile.

F-4 Phantom II

Of three Middle Eastern nations that fly F-4s, Israel has the largest inventory and the best-equipped version. Iran acquired 32 F-4Ds and 177 F-4Es, armed



F-4 Phantom 2000, Israeli Air Force
 (Paul Jackson)



F-5E Tiger II, Bahrain Emiri Air Force (Paul Jackson)

with Sparrow and Sidewinder AAMs, Maverick ASMs, and laser-guided bombs, before its war with Iraq. Losses were high, and estimates of surviving F-4s range from 25 to 45+. Egypt has two squadrons of ex-USAF F-4Es in dual interceptor/attack roles. Israel is upgrading its more than 100 F-4Es to Phantom 2000 standard, for extended life and improved maintainability and safety. New avionics integrated by Elbit Computers include a Norden/UTC multimode high-resolution radar, Kaiser-licensed wide-angle HUD, multifunction electronic displays in both cockpits, digital weapons delivery and navigation system with HOTAS (hands on throttle and stick), and improved ECM and self-protection systems. Airframe changes by Israel Aircraft Industries include reinforced skins and fuel cells in the fuselage and wings, dual MIL-1553B data buses, complete electrical rewiring, renewal and rerouting of hydraulic lines, improved crew comfort, and small strakes added to the engine air intake trunks to enhance maneuverability and stability. About half of the Israeli F-4s are now to Phantom 2000 standard, with redeliveries continuing at the rate of two per month.

Alternative weapons adapted to Israeli F-4s include 30-mm DEFA guns, AGM-62 Walleye and Hobos guided bombs, Luz TV-guided ASMs, AGM-84A Harpoon and Gabriel antiship missiles, AGM-45 Shrike and AGM-78 Standard ARMs, and Maverick ASMs. (Data for F-4E.)

Contractor: McDonnell Aircraft Company, US.
Power Plant: two General Electric J79-GE-17A turbojets; each 17,900 lb thrust with afterburning.
Dimensions: span 38 ft 7 1/2 in, length 63 ft 0 in, height 16 ft 5 1/2 in.

Weights: empty 31,853 lb, gross 41,487-61,795 lb.
Performance: max speed at height above Mach 2, average speed 580 mph, service ceiling 54,400 ft, T-O run 3,180-4,390 ft, landing run 3,040-3,780 ft, combat radius 494-786 miles.

Accommodation: crew of two, in tandem.
Armament: one M61A1 20-mm multibarrel gun under nose; four semisubmerged underbelly mounts and four underwing pylons for AAMs, ASMs, bombs, cluster bombs, rocket packs, gun or ECM pods, totaling about 16,000 lb.

F-5E/F Tiger II

To evaluate the type's combat potential, Tactical Air Command sent a squadron of Northrop's F-5A Freedom Fighters to southeast Asia in the fall of 1965, under the project name "Skoshi Tiger." The second part of that title became such a popular nickname for the aircraft that Tiger II was a natural choice for its improved successor, the F-5E. The Royal Moroccan Air Force still flies ten F-5As and two F-5B tandem trainers as part of its overall F-5 fleet; the Royal Jordanian Air Force has 14 and four, respectively; and



F-15C Eagles, Royal Saudi Air Force
 (Paul Jackson)

two-seaters are also retained by Saudi Arabia (15) and Yemen (four).

The main improvements between the F-5A and F-5E, largely as the result of that southeast Asia experience, were the adoption of the Dash 21A version of the J85 engine, providing 22.5 percent more thrust than the A model's J85-GE-13; a wing of 10 percent greater area, embodying modified root strakes and full-span leading-edge maneuvering flaps; increased internal fuel capacity; a two-position nosewheel leg, enabling angle of attack to be increased to shorten the takeoff run; and a runway arrester hook. First flight of an F-5E was made in March 1969, the aircraft received USAF approval as its chosen IFA (international fighter aircraft) for export to friendly nations in November 1970, and the first production aircraft flew for the first time on August 11, 1972.

The F-5E and its combat-capable tandem trainer, the F-5F, serve with seven Middle Eastern/North African air forces, approximate current numbers being as follows: Bahrain (eight Es and four Fs); Iran (80 or less; fewer than half of the 169 originally received); Jordan (52 Es and seven Fs); Morocco (20 plus four); Saudi Arabia (61 plus 21); Tunisia (15 plus four); and Yemen (ten Es). All four squadrons of the Royal Saudi Air Force (Nos. 3, 10, 15, and 17) and the single F-5 squadron of the Bahrain Emiri Air Force flew attack missions in support of the coalition forces during the 1991 Gulf War; as described in a separate entry, the RSAF also operates a unit of ten photoreconnaissance RF-5Es. Jordan's four F-5E/F squadrons (Nos. 9, 11, 17, and one other) were not involved. In the non-unified air force of Yemen, the F-5Es and Bs represent the only front-line Western aircraft in an inventory composed mainly of types supplied by the former Soviet Union. (Data for F-5E.)

Contractor: Northrop Corporation, US.

Power Plant: two General Electric J85-GE-21A turbojets; each 5,000 lb thrust with afterburning.

Dimensions: span 26 ft 8 in (27 ft 11 1/2 in over wingtip AAMs), length 48 ft 2 in, height 13 ft 4 in.

Weights: empty 9,683 lb, gross 24,676 lb.

Performance: max speed at 36,000 ft at 13,350 lb combat weight 1,077 mph, service ceiling 51,800 ft, T-O run 2,000-5,700 ft, landing run with brake-chute 2,500 ft, typical hi-lo-hi combat radius with max internal fuel, two 530-lb bombs, and two Sidewinder AAMs 553 miles.

Accommodation: pilot only (two seats in F-5F).

Armament: two 20-mm M39A2 guns in nose (one in F-5F); AIM-9 Sidewinder AAM at each wingtip; one underfuselage and four underwing stations for up to 7,000 lb of bombs (incl one 2,000-lb), cluster bombs, rocket launchers, napalm tanks, or auxiliary fuel tanks; provision for AGM-65 Maverick ASMs or laser-guided bombs.

F-14A Tomcat

This formidable swingwing carrier fighter, custom-built for the US Navy, has only been exported to one country, and it is indicative of the influence held in Washington in the mid-1970s by the late Shah of Iran that this then-new and advanced weapon system should have been approved for sale outside the US. An initial 40 were ordered in June 1974—a month before the F-14A achieved IOC with the US Navy—and a second batch of 40 in the following January; they differed from standard USN F-14As only in having slightly different ECCM for the AN/AWG-9 aiming and firing system for their AIM-54A Phoenix missiles. Seventy-nine of the ordered 80 Tomcats were delivered to Iran, along with 284 Phoenix AAMs and other missiles (AIM-7 Sparrows and AIM-9 Sidewinders).

Once described as having "the best mix of air-to-air weapons available to any fighter in the world," the F-14A export to Iran was clearly expected to be a powerful weapon for peace in the Middle East, but with the overthrow of the Shah its value diminished under the Khomeini regime. Iran's Air Force did not have the expertise necessary to maintain the advanced Phoenix weapon system, and obtaining spares for the F-14 airframe and engines became virtually impossible. Consequently it is difficult to be certain how many of these aircraft remain airworthy (perhaps about two dozen, according to one estimate) or how effective their present armament may be.

Contractor: Grumman Aircraft Systems Division, US.
Power Plant: two Pratt & Whitney TF30-P-412A turbofans; each 20,900 lb thrust with afterburning.

Dimensions: span 64 ft 1 1/2 in (min 20° sweep), 38 ft 2 1/2 in (max 68° sweep), length 62 ft 8 in, height 16 ft 0 in.

Weights: empty 40,104 lb, gross 58,715-74,349 lb.
Performance: max speed at high altitude 1,544 mph, at low altitude 912 mph, service ceiling above 50,000 ft, max range with external fuel 2,000 miles.

Accommodation: crew of two, in tandem.
Armament: one 20-mm M61A1 gun in port side of forward fuselage; four AIM-7 Sparrow or AIM-54 Phoenix AAMs semirecessed under fuselage; pylon under each inboard (fixed) wing portion for additional Phoenix/Sparrows, and/or Sidewinder AAMs, or various missile/bomb combinations.

F-15 Eagle

Most effective fighters in the region, Eagles proved their capability in the 1991 Persian Gulf War. Thirty-eight Iraqi aircraft were destroyed by F-15s in air combat, including five MiG-29s and two MiG-25s, without loss. Two of the victories, both Mirage F1s, were claimed by an F-15C pilot of the Royal Saudi Air Force, including 24 ex-USAF F-15s supplied as an emergency measure during the war, Saudi Arabia now has 92 single-seat F-15Cs and two-seat F-15Ds, in four squadrons. Israel has received 50 F-15A/Bs (29 of them ex-USAF), 24 F-15Cs, and seven F-15Ds; four are known to have been lost in accidents. With F-16s and F-4s and controlled by E-2C Hawkeye AEW&C aircraft, they fought fierce battles with Syrian MiG-21s and MiG-23s over the Bekaa Valley in Lebanon in 1982. Eighty-five victories were claimed, 40 by F-15s, without loss in air combat. Weapons on Israeli F-15s include Rafael Shafrir and Python 3 infrared AAMs.

The basic F-15 radar is a Hughes X-band pulse-Doppler APG-63, able to provide long-range detection and tracking of small high-speed targets flying at all altitudes down to treetop level. Data are fed to an IBM central computer, to ensure optimum missile launch and gun firing. The pilot has head-up and head-down weapon system, navigation, and IFF displays. Radar warning, automatic ECM jamming, and chaff dispensing systems are standard. The F-15C and D each carry 2,000 lb more internal fuel than the F-16A and B and have provision for conformal fuel tanks (CFTs) on the side of the engine air intake trunks. (Data for F-15C.)

Contractor: McDonnell Aircraft Company, US.

Power Plant: two Pratt & Whitney F100-PW-100 or F100-PW-220 turbofans; each approx 23,450 lb thrust with afterburning.

Dimensions: span 42 ft 9 3/4 in, length 63 ft 9 in, height 18 ft 5 1/2 in.

Weights: empty 28,600 lb, gross 44,630-68,000 lb.

Performance: max speed Mach 2.5, service ceiling 60,000 ft, T-O run (interceptor) 900 ft, landing run without brake-chute 3,500 ft, ferry range with external tanks more than 2,878 miles, with CFTs 3,570 miles.

Accommodation: pilot only (two seats in F-15B/D).

Armament: one M61A1 20-mm multibarrel gun in starboard wingroot; four AIM-7 Sparrow and four AIM-9 Sidewinder AAMs; provision for up to 23,600 lb of bombs, rockets, or additional ECM.

F-16 Fighting Falcon

To date, 416 F-16s have been ordered by four Middle Eastern air forces. The Bahrain Emiri Air Force began equipping with eight F-16Cs and four F-16Ds in March 1990. These have General Electric F110-GE-100 engines and were supplied with Sparrow and Sidewinder AAMs, Maverick ASMs, Mk 20 Rockeye cluster bombs, GBU-10/12 laser-guided bombs, ALQ-131 ECM and laser designator pods, and ALE-40 chaff/flare dispensers. The first batch of Egyptian aircraft, comprising 34 F-16As and seven F-16Bs, was delivered from March 1982 with Pratt & Whitney F100-PW-200 engines and AIM-9L Sidewinder AAMs, as MiG-21MF replacements. Thirty-six F-16Cs and four F-16Ds, with F100-PW-220 engines, followed. A third batch of 40 F-16Cs and seven F-16Ds, for 1991-93 delivery, switched to F110-GE-100 engines. Sparrow AAMs and Egyptian IFF introduced on these aircraft were also retrofitted to early models, and Mavericks became available for air-to-ground missions. The 46 additional F-16C/Ds ordered for 1994 delivery will come from license production by TAI of Turkey.

Eight of the 67 F-16As and eight F-16Bs with F100-PW-200 engines supplied to Israel from January 1980 were the first Fighting Falcons used in combat. Escorted by six F-15s, they destroyed Iraq's Osirak nuclear reactor on June 7, 1981. In 1982 they shot down 44 Syrian MiG-21s and MiG-23s over the Bekaa Valley in Lebanon. Political embargo delayed until the end of 1986 delivery of the first of 51 F-16Cs and 24 F-16Ds, with F110-GE-100 engines. Some of these F-16Ds have deep spines housing equipment for "Wild Weasel" defense-suppression roles, including Elisra SPS 3000 self-protection ECM; locally modified F110-GE-100A engines give much-increased thrust at low level. A further engine change, to F110-GE-200s, has been made in the latest batch of 30 F-16Cs and 30 F-16Ds for Israel, together with Elta ECM instead of the usual Loral Rapport. Standard armament of Israeli F-16s includes Sidewinder, Sparrow, and Python 3 AAMs, Maverick ASMs, GBU-10/12 laser-guided bombs, and Rockeye cluster bombs. Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) pods are being made available for the latest aircraft.

Allowing for slight attrition, Egypt now is believed to have about 119 F-16s; Israel will have more than 200 when batch three deliveries are complete. In addition, the Pentagon notified Congress a year ago that it proposed to supply 20 ex-USAF F-16A/Bs to Morocco. (Data for F-16C with F110-GE-100 engine.)

Contractor: General Dynamics Corporation, US.

Power Plant: one General Electric F110-GE-100 turbofan; 28,984 lb thrust with afterburning.

Dimensions: span over missiles 32 ft 9 3/4 in, length 49 ft 4 in, height 16 ft 8 1/2 in.

Weights: empty 19,020 lb, gross 27,185-42,300 lb.

Performance: max speed at height above Mach 2, service ceiling above 50,000 ft, radius of action 392-852 miles.

Accommodation: pilot only (two seats in F-16B/D).

Armament: one M61A1 20-mm multibarrel gun in port wing/body fairing; up to 12,000 lb of stores on wingtip AAM mounts, centerline hardpoint, and six underwing pylons, as listed above.

F/A-18C/D Hornet

The Hornet is no stranger to the region, for in 1986 an attack on targets in Libya by four F/A-18A squadrons (VFA-131 and 132, US Navy, and VMFA-314 and 323, USMC) marked the first combat deployment of this twin-turbofan fighter-attack aircraft, and the type is on regular service in the Mediterranean with units of the US Sixth Fleet. In September 1988, Kuwait became the first export customer in the region to buy Hornets, ordering 32 single-seat F/A-18Cs and eight dual-seat F/A-18D combat-capable trainers, in a multimillion-dollar package that also included AGM-65G Maverick, AGM-84 Harpoon, AIM-7F Sparrow, and AIM-9L Sidewinder missiles.

Deliveries had not begun when Iraq invaded Kuwait in August 1990, but they were not long delayed once the country's sovereignty had been restored. The first Kuwaiti Hornet made its first flight on September 19, 1991, was formally handed over in the US in the fol-

lowing month, and the first six KAF aircraft arrived in-country in January of this year. They are the first Hornets to be powered by the Dash 402 version of the F404 engine, which produces some 1,700 lb more thrust than the original F404-GE-400 and is now installed also in USN/USMC aircraft delivered from this year. Kuwaiti Air Force deliveries are due to be completed in September 1993. Based initially at Ali el Salem, they will replace the service's now-elderly A-4KU Skyhawks. (Data for F/A-18C.)

Contractor: McDonnell Aircraft Company, US.

Power Plant: two General Electric F404-GE-402 turbofans; each approx 17,700 lb thrust with afterburning.



F-16 Fighting Falcon, Egyptian Air Force (Denis Hughes)



F/A-18C Hornet, Kuwait Air Force



Hawk Mk 65, Royal Saudi Air Force (Paul Jackson)



Hunter Mk 70, Lebanese Air Force (Paul Jackson)

Dimensions: span 37 ft 6 in, length 56 ft 0 in, height 15 ft 3 1/2 in.

Weights: empty 23,050 lb, gross 36,710 lb (fighter), 56,000 lb (attack).

Performance (16,000 lb thrust F404-GE-402 engine): max speed at high altitude above Mach 1.8, service ceiling approx 50,000 ft, T-O run less than 1,400 ft, typical combat radius (interdiction) 340 miles.

Accommodation: pilot only (two seats in F/A-18D).

Armament: one 20-mm six-barrel M61A1 gun in nose; nine external stations (wingtips, four underwing, two nacelle, and one centerline). Weapons can

include AIM-9 Sidewinder AAMs at wingtips; Sidewinders, AIM-7 Sparrows, AIM-120 AMRAAMs, AGM-84 Harpoons, or AGM-65 Mavericks underwing; Sparrows or sensor pods (nacelles). Centerline and inboard underwing stations suitable for drop fuel tanks.

Hawk

After beginning life as an advanced flying and weapons trainer for the UK's Royal Air Force, the Hawk progressed through a series of increasingly aggressive dual-role trainer/light attack versions to the 100 series two-seat enhanced ground-attack model and the 200 series single-seat multirole combat aircraft. After the United Arab Emirates formed a Central Air Force, they decided to standardize on the Hawk as their basic trainer. Dubai contributed eight Mk 61s, with a 5,700 lb thrust Adour 861 turbofan, equipping what is designated a fighter squadron. Abu Dhabi's 15 similar Mk 63s are being upgraded to Mk 63A, with an Adour 871 and new "combat wing" with four stores pylons and wingtip AAMs. It is also acquiring 18 Mk 102s, with Adour 871, combat wing, MIL-1553B data bus, HOTAS controls, HUD, color multipurpose CRT in each cockpit, radar warning receiver, and provision for an ECM pod, plus laser ranging and FLIR in the extended nose.

Five of the Kuwaiti Air Force's 12 Mk 64s remain airworthy after escaping to Bahrain during the August 1990 Iraqi invasion. They were placed under the control of the Royal Saudi Air Force, which is believed to have used some of the 30 Hawk Mk 65s bought for its own Nos. 21 and 37 Squadrons for light attack missions into Kuwait. Under its Al Yamamah II program, it is expected to purchase a further 60 Hawks. Most will be single-seat Mk 205s, with Westinghouse APG-66H multimode radar, but some 100 series may be included. Oman is another customer for these latest versions, with orders for four Mk 103s and 12 Mk 203s. The single-seaters will have a fixed in-flight refueling probe and 6,614 lb weapon load. (Data for 100 series.)

Contractor: British Aerospace plc, UK.

Power Plant: one Rolls-Royce Turbomeca Adour 871 turbofan; 5,845 lb thrust.

Dimensions: span 30 ft 9 3/4 in, length 40 ft 9 in, height 13 ft 8 in.

Weights: empty 9,700 lb, gross 20,061 lb.

Performance: never-exceed speed at height Mach 1.2, max speed at S/L 632 mph, service ceiling 44,500 ft, T-O run 2,100 ft, landing run 1,980 ft, combat radius 620-900 miles.

Accommodation: basically, crew of two in tandem. Pilot only in combat role.

Armament: one 30-mm Aden Mk 4 gun pack on centerline; four underwing pylons for packs of 18 x 68-mm or 12 x 81-mm rockets, bombs up to 1,000 lb, cluster bombs, Maverick ASMs, or Sidewinder/Magic AAMs. Optional AAM on each wingtip. Max stores load 6,614 lb.

Hunter

Until it has been reequipped with Hawks, Oman's No. 6 Squadron of Hunters will remain the only significant operator of these vintage British fighter-bombers in the Middle East and North Africa. Numbering about 13, they are survivors of a variety of Hunter Mk 6, 10, 73A, and 73B single-seaters that once flew in the markings of the Royal Jordanian Air Force. A handful of Mk 6 and Mk 70 Hunters form the sole combat inventory of the Lebanese Air Force. Their current airworthiness is unknown, as is that of the five ground-attack Hunter Mk 76s and two Mk 76 reconnaissance-fighters of the Somali Aeronautical Corps. (Data for Hunter Mk 73A.)

Contractor: Hawker Aircraft Ltd, UK.

Power Plant: one Rolls-Royce Avon 207 turbojet; 10,000 lb thrust.

Dimensions: span 33 ft 8 in, length 45 ft 10 1/2 in, height 13 ft 2 in.

Weights: empty 12,760 lb, gross 17,750 lb.

Performance: max speed at height 627 mph, at S/L 715 mph, service ceiling 51,500 ft, range 1,840 miles.

Accommodation: pilot only.

Armament: four 30-mm Aden guns under nose; five hardpoints under each wing; two bombs of up to 1,000 lb, two clusters of six 3-in rockets, or two packs each with twenty-four or thirty-seven 2-in rockets on inboard hardpoints; up to twenty-four 3-in rockets on outboard hardpoints; alternative weapons include napalm containers.

Jaguar International

Jaguar International, first flown in August 1976, is the export version of the basic attack aircraft of which 403, including two-seat combat trainers, were built for the air forces of Great Britain (203) and France (200). After India, where the final 46 of a total order for 131 are now being license-assembled by Hindustan Aeronautics, the largest export customer was the Sultanate of Oman, which ordered 24 in the late 1970s in two

batches of 12 (20 single-seat and four two-seat); the 21 that survive currently equip No. 8 and No. 20 Squadrons, based at Masirah, having been upgraded at the end of the 1980s with a Ferranti FIN 1064 inertial navigation system. Destined to continue in service for the remainder of the 1990s, they are employed in the air defense role as well as that of ground attack, in the former configuration carrying a pair of overwing AIM-9P Sidewinder AAMs.

Omani Jaguars were not involved in the 1991 Persian Gulf War, but a significant part was played by British and French examples, the former operating from Muharraq in Bahrain and the latter from Al Ahsa in Saudi Arabia. Twenty-four French Jaguar As from the 7th and 11th Escadres (Wings) flew 615 sorties without loss; an almost identical number (618) were flown by the 12 Royal Air Force GR. Mk 1As from Nos. 6, 41, and 54 Squadrons and No. 226 OCU, for one prewar loss in a low-level accident. RAF Jaguar attacks, all daytime, were made from medium, rather than low level, carrying two overwing AIM-9Ls (not needed) and delivering a mixture of free-fall and cluster bombs and Canadian CRV-7 air-to-ground rockets.

Contractor: SEPECAT, a Franco-British company.

Power Plant: two Rolls-Royce Turbomeca Adour Mk 811 turbofans; each 6,400 lb thrust with afterburning (8,040 lb Mk 804s in first 12 Omani aircraft).

Dimensions: span 28 ft 6 in, length 55 ft 2½ in, height 16 ft 0½ in.

Weights: empty 15,432 lb, gross 24,149–34,612 lb.

Performance: max speed at 36,000 ft 1,056 mph, at S/L 840 mph, service ceiling approx 50,000 ft, T-O run with typical tactical load 4,100 ft, landing run without brake-chute 2,200 ft, typical hi-lo-hi combat radius 530 miles on internal fuel, 875 miles with auxiliary fuel.

Accommodation: pilot only (two seats in trainer).

Armament: two ventral internal 30-mm guns (one in trainer); one centerline and four underwing stations for mixed loads including free-fall, retarded, cluster, or laser-guided bombs, or air-to-surface rockets, on understations; provision for one AIM-9 Sidewinder, Matra Magic, or similar AAM overwing each side. Max external stores load 10,500 lb.

Kfir

Israel received 72 single-seat Mirage IIICJ interceptors from France in 1972, and it was the Israeli requirement for a simplified, VFR ground-attack version that was chiefly responsible for Dassault developing the Mirage 5 (which see), but an order for 50 Mirage 5Js was embargoed by the French government after the Six-Day War of 1967. As a result, and aided by smuggled Mirage III/5 drawings, IAI first developed the Nesher, retaining the French Atar 9C engine. The Kfir was the second stage in this domestic development cycle, in which the Atar turbojet was replaced by the somewhat larger US J79; associated airframe changes included a shorter and fatter rear fuselage, a large dorsal air scoop for afterburner cooling, strengthened landing gear, and a lengthened nose. The initial Kfir variant, the C1, was built in comparatively small numbers before the appearance of the C2, which featured fixed canards, small nose strakes, and dogtooth wing leading-edges for improved maneuverability and shorter runway requirements. IAI produced 27 Kfir C1s and 185 C2s (including a proportion of combat-capable TC2 tandem-seat trainers with longer noses), later upgrading most of the latter to C7/TC7 standard with more advanced avionics, notably HOTAS controls, an improved weapon delivery and navigation system, two additional external weapon stations, and a "combat plus" engine power reserve giving an extra 890 lb of optional thrust in afterburner mode.

The Kfir still equips about four IDF/AF interceptor or attack squadrons, but up to one-half of those built have been in storage for some years, for some of which IAI has received export orders from Colombia (13), the Philippines (18), and Taiwan (40). Ironically, because of the Kfir's J79 engine, US restrictions limit the number of countries to which Israel can offer the aircraft, but relaxation of imports from France now permits it to be offered with a more powerful version of the "original" engine, the Atar 9K-50—in effect "reinventing" Dassault's own Mirage 50. In this form, and with other changes that include a lengthened nose and mid-fuselage, it is named Nammer by IAI. A prototype was reported to have flown in the spring of 1991, though this is as yet unconfirmed. (Data for Kfir C7.)

Contractor: Israel Aircraft Industries Ltd, Israel.

Power Plant: one General Electric J79-J1E (Israeli modified J79-GE-17) turbojet; 17,860 lb thrust with afterburning (18,750 lb with "combat plus" reserve).

Dimensions: span 26 ft 11½ in, length 51 ft 4¼ in, height 14 ft 11¼ in.

Weights: empty 16,060 lb, gross 22,961–36,376 lb.

Performance: max speed (clean) at 36,000 ft and above more than Mach 2.3, at S/L 863 mph, service ceiling 58,000 ft, T-O run 4,750 ft, landing run 4,200



Jaguar International, Royal Air Force of Oman



Kfir C7, Israeli Air Force (Ivo Sturzenegger)



L-39 Albatros, Iraqi Air Force (Swedish Air Force)



MiG-21MF, Egyptian Air Force (Denis Hughes)

ft, combat radius 482 miles (high-altitude interception), 737 miles (hi-lo-hi ground attack).

Accommodation: pilot only (two seats in TC7).

Armament: one 30-mm DEFA 552 gun in lower lip of each air intake duct; five underfuselage and four underwing stations for weapons, ECM or other sensor pods, or drop tanks, to max weight of 13,415 lb. Python 3, Shafrir 2, or Sidewinder AAM on each outer wing station as interceptor; bombs (standard, smart, cluster, or other), Shrike or Maverick ASMs, napalm tanks, or rocket launchers for ground attack.

L-39/L-59 Albatros

First flown on November 4, 1968, the L-39 advanced jet trainer/light attack aircraft has been in continuous production for nearly 20 years, with more than 2,800 built by the beginning of this year. The great majority of these have been trainer-only L-39Cs for the Czech and Slovakian Air Force and the former USSR, but, of more than 700 non-Soviet exports, approximately 370 have been to countries in the Middle East and North Africa, with Iraq (81), Libya (181), and Syria (99) the major customers. All three have the L-39 ZD version, first flown in August 1975, which has increased stores-carrying ability on four (instead of two) underwing pylons and a correspondingly reinforced airframe. Syria's fleet, which included 44 ZAs, remains at nearly full strength, but that of Iraq may have dwindled to as few as 20 through attrition in

its long war with Iran, and the airworthiness of even these is uncertain. Libya, too, is thought to have lost more than a few in its border conflicts with neighboring Chad, and in 1990 donated ten of its L-39s to Egypt, but more than 100 probably remain. The fifth operator in the region is Algeria, whose Air Force received 32 of the L-39 ZA specialized ground-attack/reconnaissance version, which has an underfuselage 23-mm twin-barrel gun as standard in addition to the four underwing weapon stations.

The L-59 is an improved Albatros, first flown (as the L-39 MS) on September 30, 1986. It has a more powerful (4,850 lb thrust) Lotarev/ZVL DV-2 turbofan engine, strengthened airframe, and upgraded avionics that include head-up/head-down displays, IFF, and a radar altimeter. Egypt placed a \$204 million order for 48 L-59s, deliveries of which are due to start about now. (Data for L-39 ZD.)

Contractor: Aero Vodochody Company Ltd, Czechoslovakia.

Power Plant: one Progress/Ivchenko AI-25 TO turbofan; 3,792 lb thrust.

Dimensions: span over tip tanks 31 ft 0½ in, length 39 ft 9½ in, height 15 ft 7¾ in.

Weights: empty 7,672 lb, gross 10,031–12,346 lb.

Performance: max speed at 16,400 ft 391 mph, at S/L 379 mph, service ceiling 24,600 ft, T-O run 3,182 ft, landing run 2,625 ft, range (unarmed) with max internal/external fuel approx 1,000 miles.

Accommodation: crew of two, in tandem, but normally flown solo in attack role.

Armament: four underwing stations for up to 2,535 lb of external stores, including bombs of up to 1,102 lb size, UB-16-57 rocket pods (sixteen 57-mm), infrared AAMs (outer stations only), daytime reconnaissance pod (port inner only), or drop fuel tanks (inboard stations only).

MiG-19/F-6

The Egyptian Air Force received the first of 40 Shenyang F-6s (Chinese-built MiG-19s) in 1979, in a deal that involved transfer of MiG-23s for study by the Chinese aircraft industry. Others followed, for assembly in Egypt, and more than 75 of these supersonic fighter-bombers are thought to be operational today with the EAF. Egypt also assembled about 40 F-6s for Iraq, but it is doubtful that any of these remain airworthy. Nor is the present status known of up to 30 F-6s sent from China to Somalia in the early 1980s. (Data for F-6 day fighter.)

Contractor: Shenyang Aircraft Corporation, People's Republic of China.

Power Plant: two Shenyang/Chengdu WP6 turbojets; each 7,165 lb thrust with afterburning.

Dimensions: span 30 ft 2¼ in, length incl probe 48 ft 10½ in, height 12 ft 8¾ in.

Weights: empty 12,700 lb, gross 22,045 lb.

Performance: max speed at 36,000 ft Mach 1.45, at S/L Mach 1.09, service ceiling 58,725 ft, range 1,366 miles.

Accommodation: pilot only (two in tandem in FT-6 trainer).

Armament: three 30-mm NR-30 guns, in nose and each wingroot; two pylons under each wing, inboard of hardpoint for external fuel tank, to carry packs of eight air-to-air rockets, AAMs, two 550-lb bombs, or air-to-surface rockets of up to 212-mm caliber.

MiG-21/F-7

The MiG-21 continues to be flown by more air forces in the Middle East and North Africa than any other fighter/attack type of aircraft. Current estimates, including F-7s produced in China, total around 800 aircraft, serving in eight nations. Since becoming independent of France in 1962, Algeria has equipped its air force almost entirely with Soviet aircraft. Three of the four interceptor squadrons have early-model MiG-21F/MFs, of which about 80 remain in the inventory. The Egyptian Air Force continues to deploy about 200, divided equally between Soviet-built MiG-21s of all versions from F to MF, and Chinese-manufactured F-7As. The latter came initially from Chengdu ready to fly, before assembly lines were set up in Egypt for its own Air Force and for Iraq. Most of the fighters in Egypt have been updated with a Marconi HUD, air data computer, RWR, ECM jamming, and armament of Sidewinder or Magic AAMs. Some are MiG-21Rs with a locally designed underfuselage pack of three reconnaissance cameras.

Many MiG-21s and F-7s were among the 250 Iraqi aircraft destroyed in the air and on the ground in the Persian Gulf War. With so many MiG-29s lost, the survivors of some 70 prewar MiG-21s and 80 F-7s are likely to have extended service lives. Meanwhile, Iran had begun rebuilding its Air Force by ordering 100 of Chengdu's much-refined F-7M Airguard, with a GEC Avionics HUDWAC (head-up display and weapon-aiming computer), new ranging radar, IFF, more secure radio communications, air data computer, two additional underwing pylons, provision for PL-7 infrared AAMs,

birdstrike-resistant windshield, strengthened landing gear, zero height/81 mph ejection seat, and WP7B(BM) turbojet, requiring no separate gasoline starting tank.

Syria still has about 180 MiG-21s, including late-model MiG-21bis, in eight squadrons; Libya has at least 50, Yemen 75. Jordan is reported to have 20 Chengdu F-7Bs, with Magic AAMs, and F-7Ms. (*Data for Chengdu F-7M Airguard.*)

Contractor: Chengdu Aircraft Industrial Corporation, People's Republic of China.

Power Plant: one Chengdu WP7B(BM) turbojet; 13,448 lb thrust with afterburning.

Dimensions: span 23 ft 5½ in, length 48 ft 10 in, height 13 ft 5½ in.

Weights: empty 11,629 lb, gross 16,603 lb.

Performance: max speed at height Mach 2.05, service ceiling 59,710 ft, T-O run 2,300–3,120 ft, landing run with brake-chute 1,970–2,955 ft, range 1,081 miles with three drop tanks.

Accommodation: pilot only.

Armament: two 30-mm Type 30-1 guns under front fuselage; four underwing hardpoints for PL-7 AAMs, pods of eighteen 57-mm or seven 90-mm rockets, or bombs of up to 1,100 lb.

MiG-23

This variable-geometry combat aircraft has had an inauspicious life in the Middle East and North Africa. Egypt was so unimpressed with 16 MiG-23M interceptors and BN light attack aircraft received in 1974 that it was happy to pass on some of them to the US and China for evaluation. Libya has an estimated 130 MiG-23MS interceptors and 35 MiG-23BNs; but their assembly center was bombed by the US in 1986, and two of the MSs were shot down by US Navy F-14s off Tobruk in January 1989. Syria is the other major operator, with 80 MiG-23MF/ML interceptors in five squadrons and about 60 MiG-23BNs in four squadrons. Many were replacements, from Libya, for aircraft destroyed by Israel over the Bekaa Valley in 1982.

Of an estimated 20 MiG-23MFs and 70 BKs (some with in-flight refueling capability) equipping the Iraqi Air Force before Desert Storm, eight were shot down by F-15Cs, 12 fled to Iran (including some two-seaters), and others were destroyed on the ground. They made little use of available weapons, including French Magic AAMs and Russian AS-14 "Kedge" ASMs guided by French Atlas laser-designation pods. Other operators are the Algerian Air Force, with about 50 MiG-23BNs, and the Republic of Yemen Air Force, with about 25 MiG-23BMs.

The MiG-23MF and MS interceptors are single-seat aircraft with a 22,045 lb thrust Tumansky R-27F2M-300 afterburning turbojet, Sapfir-21 (NATO "Jay Bird") radar with an 18-mile search range and 12-mile tracking range, no infrared sensor or Doppler, and armament of R-3R/S ("Atoll") AAMs and 23-mm GSh-23 gun. The lighter-weight MiG-23ML, identified by a much smaller dorsal fin, has a 28,660 lb thrust Khachaturov R-35-300 afterburning turbojet, no rear fuselage fuel tank, Sapfir-23ML ("High Lark") radar with search range of 43 miles and tracking range of 34 miles, undernose pod for TP-23M IRST, and armament of R-23R/T ("Apex") and R-60T ("Aphid") AAMs.

The single-seat light attack MiG-23BM and BN differ from the MF/MS in having the front fuselage tapered in side elevation to house a nav/attack system (slaved to a computer in the BM), a 25,350 lb thrust Khachaturov R-29B-300 afterburning turbojet, armored sides to cockpit, low-pressure tires, explosion-resistant fuel tanks, active and passive ECM, and six pylons under wings and fuselage for R-3S or R-13M AAMs, Kh-23 ("Kerry") or Kh-29 ("Kedge") ASMs, up to 6,600 lb of bombs, or napalm. The MiG-23BK has equipment changes, including RWR fairings on the bottom of the fuselage. (*Data for MiG-23MF.*)

Contractor: Mikoyan OKB, Russia.

Power Plant: one Tumansky R-27F2M-300 turbojet; 22,045 lb thrust with afterburning.

Dimensions: span 45 ft 10 in (18° 40' min sweep), 25 ft 6¼ in (74° 40' max sweep), length excl probe 51 ft 7¼ in, height 15 ft 9¾ in.

Weights: normal gross 40,565 lb, max gross 45,570 lb.

Performance: max speed at height Mach 2.35. [*See "Gallery of Aircraft of the Commonwealth," March 1992, p. 52, for MiG-23ML data.*]

Accommodation: pilot only (two seats in tandem in MiG-23UB trainer).

Armament: one 23-mm GSh-23L twin-barrel gun in belly pack; two pylons under fuselage and two under fixed wing panels for R-13M, R-23R/T ("Apex"), or R-60 ("Aphid") AAMs. For other roles, packs of twenty 80-mm or thirty-two 57-mm rockets, bombs, container weapons, or 240-mm S-24 rockets.

MiG-25

This being the fastest operational combat aircraft yet identified, it was surprising to discover MiG-25s flying in the insignia of four Middle Eastern and North African air forces by the early 1980s. Libya appears to have

been the first recipient, with about five MiG-25R Mach 3 reconnaissance aircraft based at Okba ibn Nafa by 1978. Like the first deliveries to other countries, they appear to have had Soviet crews initially, and they were followed within three years by 60 MiG-25P/PD single-seat interceptors to equip three air defense squadrons. The MiG-25P had a Smertch-A (NATO "Fox Fire") radar, with a search range of 62 miles and tracking range of 31 miles; its 22,500 lb thrust Tumansky R-15B-300 afterburning turbojet had a service life of only 150 hours. The MiG-25PD, built in 1978–82, switched to 24,700 lb thrust R-15BD-300 engines, with a 1,000-hour life, and a Sapfir-25 radar and IRST providing look-down/shoot-down capability comparable with the MiG-23MF.

MiG-25R reconnaissance aircraft were observed in Algeria in 1979, followed by enough MiG-25Ps and MiG-25PU two-seat trainers to equip a single squadron. Iraq's Air Force was flying both the interceptor and reconnaissance variants by 1982. Two were shot down by F-15Cs of the 58th TFS, 33d TFW (Eglin AFB, Fla.), on January 19, 1991; none joined the exodus of first-line combat aircraft to Iran. The fourth operator in the region is Syria, with about 30 MiG-25P/PDs. (*Data for MiG-25P.*)

Contractor: Mikoyan OKB, Russia.

Power Plant: two Tumansky R-15B-300 turbojets, each 22,500 lb thrust with afterburning.

Dimensions: span 45 ft 11¼ in, length 78 ft 1¼ in, height 20 ft 0¼ in.

Weight: gross 76,985–80,950 lb.

Performance: max speed at height Mach 2.83, service ceiling 67,900 ft, T-O run 4,100 ft, landing run with brake-chute 2,625 ft, range 776 miles supersonic, 1,075 miles subsonic.

Accommodation: pilot only (two seats in tandem in MiG-25PU trainer).

Armament: four underwing pylons for R-40R/T ("Acrid"), R-23 ("Apex"), R-60T ("Aphid"), or R-73A ("Archer") AAMs; no gun.

MiG-29

Although far more sophisticated and formidable than the MiG-21, and therefore more costly to buy and to operate, the MiG-29 is its natural replacement. More than 600 have been delivered to CIS air forces; the eleven export customers identified to date include



MiG-23MS, Libyan Arab Jamahiriya Air Force (US Navy)



MiG-25PD, Libyan Arab Jamahiriya Air Force (US Navy)



MiG-29, Iraqi Air Force (SIPA Press)

Iran, Iraq, and Syria. The Iraqi Air Force had 35 single-seat counterair/attack MiG-29s and six two-seat MiG-29UB combat trainers before the Persian Gulf War. Five were shot down by USAF F-15Cs; four were among the 148 Iraqi aircraft that sought refuge in Iran and were not returned; many more were lost on the ground. Such a dismal record, with no successes, does not reflect the true capability of the MiG. Syria is negotiating for more, to supplement an initial purchase of 48 for its Air Defense Command. Iran had a single squadron of 14 before the unintended "gift" from Iraq.

The integrated weapon system of the MiG-29 includes an RP-29 coherent pulse-Doppler look-down/shoot-down radar (NATO "Slot Back") with a search range of 62 miles and tracking range of 43 miles, collimated with a laser rangefinder, and an IRST with a fighter detection range of 9¼ miles. It operates in conjunction with the pilot's helmet-mounted target designator for off-axis aiming of AAMs. During takeoff and landing, hinged doors shield the engine air intakes against foreign object ingestion; engine air is then taken in through louvers in the upper surface of the wingroot extensions. "Fences" forward of the dorsal tailfins house flare dispensers.

Contractor: Mikoyan OKB, Russia.

Power Plant: two Klimov/Sarkisov RD-33 turbofans; each 18,300 lb thrust with afterburning.

Dimensions: span 37 ft 3¼ in, length 56 ft 10 in, height 15 ft 6¼ in.

Weights: empty 24,030 lb, gross 33,600–40,785 lb.

Performance: max speed at height Mach 2.3, at S/L Mach 1.06, service ceiling 55,775 ft, T-O run 820 ft, landing run with brake-chute 1,970 ft, range 932–1,800 miles.

Accommodation: pilot only (two seats in tandem in MiG-29UB).

Armament: one 30-mm GSh-301 gun in port wingroot extension; six underwing pylons for R-27R ("Alamo-A"), R-60T ("Aphid"), or R-73A ("Archer") AAMs. Able to carry bombs, submunitions dispensers, and 57-mm, 80-mm, and 240-mm rockets in attack role.

MiG-31

Discussions under way in Moscow as this Gallery closed for press could have a major influence on the balance of airpower in the Middle East. Iran is reported to be negotiating a \$2 billion arms package that will include delivery of 12 Tu-22M supersonic medium-range bombers, 48 more MiG-29 fighters, and 24 MiG-31 long-range interceptors. Two A-50 AEW&C derivatives of the Il-76 plus 24 MiG-27 light attack aircraft are also likely to be covered by the deal, plus spares for existing Soviet-built aircraft in Iran, including possibly those flown there for refuge by Iraqi pilots during the 1991 war in the Persian Gulf.

If the order is confirmed, it will represent the first export of Tu-22Ms, MiG-31s, and A-50s. Although the MiG-31 bears an external resemblance to the MiG-25, it is largely redesigned, with the emphasis on greater range rather than higher speed. Its more powerful engines and strengthened airframe permit supersonic speed at low altitude. Construction is 50 percent nickel steel, 16 percent titanium, and 33 percent light alloy (80, 8, and 11 percent, respectively, in MiG-25). A two-man crew is carried. The Zaslon radar was the first electronically scanned, phased-array type to enter service, enabling up to ten targets to be tracked, and four of them engaged, simultaneously, including aircraft below and behind the MiG's own location. Equipment includes an undernose retractable IRST, RWR, and active IR and electronic countermeasures. Enhancements on the latest MiG-31M version include R-77 AMRAAM-class missiles and wingtip ECM jammer pods. Both versions can be refueled in flight.

Contractor: Mikoyan OKB, Russia.

Power Plant: two Perm/Soloviev D-30F6 turbofans; each 34,170 lb thrust with afterburning.

Dimensions: span 44 ft 2 in, length 74 ft 5¼ in, height 20 ft 2¼ in.

Weight: gross 90,390–101,850 lb.

Performance: max speed at height Mach 2.83, at S/L Mach 1.23, econ cruising speed Mach 0.85, service ceiling 67,585 ft, T-O run at max gross weight 3,940 ft, landing run 2,625 ft, combat radius at Mach 2.35 on internal fuel 447 miles, at Mach 0.85 745–870 miles.

Accommodation: crew of two in tandem.

Armament: one GSh-6-23 six-barrel 23-mm gun on starboard side of center fuselage; four R-33 (NATO "Amos") AAMs in pairs under fuselage, one R-40T ("Acrid") or two R-60 ("Aphid") AAMs under each wing.

Mirage F1

With the exception of its more recent imports from the former Soviet Union, the Iraqi Air Force aircraft perhaps expected to offer the coalition forces the most serious opposition during the campaign to liberate Kuwait in early 1991 was the Mirage F1. The Iraqi fleet was large—the last of 116 F1-EQs and BQ trainers had

been delivered only as recently as the end of 1989—and was equipped with Thomson-CSF Agave fire-control radar and Exocet ASMs. In the event, confrontation was minimal. No fewer than 24 Iraqi Mirages, their pilots displaying a well-developed instinct for self-preservation, fled to Iran; a further eight were lost in air combat with USAF and Saudi F-15Cs, and five others were captured on the ground in Kuwait. Given that Kuwait itself, and Qatar among the other coalition forces, were also flying Mirage F1s, the lack of opposition from the Iraqi examples was perhaps just as well in the fast and furious air war of Operation Desert Storm. The 15 "Free Kuwait" aircraft (14 F1-CKs and a single BK) of Nos. 18 and 61 Squadrons operated from the Saudi air base at Dhahran, while No. 7 Squadron of



Mirage 2000EAD, Abu Dhabi Air Force (SIPA Press)



Strikemaster Mk 82, Royal Air Force of Oman

the Qatar Emiri Air Force, with 12 F1-EDAs and a pair of DDAs, operated out of Doha AB.

The basic Mirage F1-C is an all-weather, all-altitude interceptor with capability for VFR ground attack, while the F1-E is a multirole fighter/ground-attack/reconnaissance version; their tandem seat, combat-capable trainer equivalents are the F1-B and F1-D, respectively. Jordan, which sat precariously and uncomfortably on the fence during the 1990-91 Persian Gulf crisis, has one squadron (No. 25) of 16 F1-CJs and one (No. 1) of 17 EJs, plus a pair of BJ trainers. Two North African air forces, unconnected with the Gulf crisis, also fly a mix of F1s. Libya has 16 early F1-AD interceptors, about 36 ED multiroles, and half a dozen BD trainers; Morocco has about 19 F1-CHs (down from an original 30 due to frequent clashes with Polisario guerrillas) and 18 (from 20) F1-EHs, plus a pair of F1-Bs. Most export Mirage F1s, except those of Iraq, have one or another version of the French Cyrano IV fire-control radar. Some pre- or postdelivery variations have also been noted. For example, some Moroccan aircraft have been equipped with chaff/flare dispensers, and Iraq is reported to have adapted the AS-14 "Kedge" ASM for carriage by its remaining F1s. (Data for F1-C.)

Contractor: Dassault Aviation, France.
Power Plant: one SNECMA Atar 9K50 turbojet; 15,873 lb thrust with afterburning.

Dimensions: span 27 ft 6 3/4 in, length 49 ft 11 3/4 in, height 14 ft 9 in.

Weights: empty 16,314 lb, gross 24,030-35,715 lb.

Performance: max speed at high altitude Mach 2.2, at low altitude Mach 1.2, service ceiling 65,600 ft, T-O run 1,970 ft, landing run 2,200 ft, combat radius 265-435 miles.

Accommodation: pilot only (two seats in F1-B/D.)

Armament: two ventral internal 30-mm DEFA guns; one centerline, four underwing, and two wingtip stations for typical practical max load of 8,818 lb, including Matra Super 530 AAMs, single Armat ARM or Exocet antiship missile, ASMs, conventional or anti-runway bombs, rocket launchers, Atis laser designator pod with laser-guided bombs or AS-30L missiles, alternative sensor pods, drop fuel tanks, and (at wingtips) Magic or Sidewinder AAMs.

Mirage 5

It is one of the ironies of defense politics that Dassault originally developed the Mirage 5 as a clear-weather, low-level, ground-attack derivative of its Mirage III interceptor, to meet the requirements of the Israeli Air Force. When an order for 50 was embargoed (leading Israel to develop the Kfir, which see), no fewer than four Arab states became involved in subsequent export sales of the Mirage 5.

With no need of the Mirage III's bulky AI radar, the

Mirage 5 was able to afford a much slimmer nose profile, which nevertheless was roomy enough to accommodate both a range-only radar and the transfer of some avionics equipment from a bay behind the cockpit, the latter space being taken up instead by an additional fuel tank that increased internal capacity by 15 percent. Initial Middle Eastern/North African orders, including batches of two-seat 5D trainers, emanated from Libya (53 5Ds and 15 5DDs) and Abu Dhabi (12 5ADs and three 5DADs). Both countries also later ordered the 5E strike version (Libya 32 5DEs, Abu Dhabi 14 5EADs), as did Egypt (29 5SDEs, 22 5SSEs, plus six 5SDD trainers, with funding assistance from Saudi Arabia). Egypt's final batch, consisting of 16 5SDE2s, were of an upgraded version equipped with the same inertial nav/attack system as that fitted to its MS2 Alpha Jets; its earlier Mirage 5s have also recently undergone a midlife update program. Approximate numbers now in service are: Egypt 68, Libya 75, Abu Dhabi 26. All three nations also operate small numbers of the Mirage 5R photoreconnaissance version (which see).

Contractor: Avions Marcel Dassault-Breguet Aviation, France.

Power Plant: one SNECMA Atar 9C turbojet; 13,670 lb thrust with afterburning.

Dimensions: span 27 ft 0 in, length 51 ft 0 1/2 in, height 13 ft 11 1/2 in.

Weights: empty 15,212 lb, gross 20,500-29,760 lb.

Performance: max speed at 40,000 ft Mach 2.1, a: S/L 864 mph, service ceiling 55,775 ft, T-O run 2,625 ft clean, 5,250 ft at max gross weight, landing run 2,295 ft, combat radius with 2,000 lb weapon load 404 miles lo-lo-lo, 808 miles hi-lo-hi.

Accommodation: pilot only (two seats in 5D).

Armament: one 30-mm DEFA 552A gun in lower lip of each air intake duct; one or three underfuselage and four underwing stations, with multiple launchers, for more than 8,818 lb of stores including single or cluster bombs, rocket pods, ASMs, two self-defense AAMs, or two drop tanks.

Mirage 2000

Now nearing the completion of its first decade in French service, the Mirage 2000 has already collected a series of designation suffixes (not to mention "alternative" designations) that promise to become as bewildering to the uninitiated as those of earlier Mirage families. The basic models, and their primary differences, were outlined in some detail in the "Gallery of NATO Airpower" in the July issue of AIR FORCE Magazine; so far as the Middle East is concerned, it is necessary to consider only the Mirage 2000E, essentially a single-seat multirole version of the 2000C interceptor, which has been chosen by both present opera-

tors in that area. (Originally three, but Jordan's 1988 order for ten 2000EJs and two EDJ trainers, to have been funded by Saudi Arabia, was canceled in August 1991.)

Egypt was in fact the first export customer for the Mirage 2000, ordering 16 single-seat 2000EMs and four 2000BMs, which were delivered between 1986 and 1988; one of each is since believed to have been lost. Abu Dhabi's order was somewhat larger, comprising not only 22 single-seat 2000EADs and six 2000EDAD trainers but also eight examples of the 2000RAD reconnaissance model; after some initial delay, they were delivered between November 1989 and October 1990. The RAD aircraft are equipped to carry either a COR 2 multicamera pod, a SLAR 2000 side-looking airborne radar pod, or a HAROLD long-range optical sensor pod. The EADs carry a 2,205-lb standoff ground-attack weapon and are fitted with an Italian Elettronica ELT/158 radar warning receiver and ELT/558 jamming equipment. (Data for 2000C; 2000E generally similar.)

Contractor: Dassault Aviation, France.
Power Plant: one SNECMA M53-P2 turbofan; 21,385 lb thrust with afterburning.

Dimensions: span 29 ft 11 1/2 in, length 47 ft 1 1/4 in, height 17 ft 0 3/4 in.

Weights: empty 16,534 lb, gross 23,940-37,480 lb.

Performance: max speed at high altitude Mach 2.2, at low altitude 690 mph, service ceiling 59,000 ft, range with four 550-lb bombs more than 920 miles.

Accommodation: pilot only (two seats in 2000B and ED).

Armament: two 30-mm DEFA 554 guns. Five underfuselage and four underwing stations for up to 13,890 lb of external stores, which can include Matra Super 530, Magic, or Magic 2 AAMs; free-fall, retarded, cluster, antirunway, or laser-guided bombs; 68-mm or 100-mm rocket launchers; Armat ARM or Exocet antiship missile(s); or a centerline 30-mm twin-gun pod.

Strikemaster

A direct descendant, via the BAC 145, of the Jet Provost basic jet trainer built for the Royal Air Force, the BAC 167 Strikemaster inherited a robust airframe and docile handling qualities, which, with its ability to operate from unprepared airstrips, made it an inexpensive but effective light ground-attack aircraft attractive to several of the world's smaller air forces in the late 1960s and early 1970s. It flew for the first time in October 1967. Not counting three Mk 90s and five BAC 145s for Sudan, Middle Eastern customers accounted for 88 of the 151 export sales: Kuwait 12, Oman 25, Saudi Arabia 47, and South Yemen four. The Yemeni Strikemasters are no longer in service, and nine surviving Kuwaiti aircraft were repurchased and resold a few years ago to Botswana. Oman's Mk 82/82As, serving with No. 1 Squadron at Masirah, now number little more than a dozen; the Mk 80/80As of the Royal Saudi Air Force, which originally equipped three counterinsurgency squadrons (Nos. 9, 11, and 16), have reduced to about 36 and are in service at Riyadh, possibly now in a training capacity only, as part of the King Faisal Air Academy.

Contractor: British Aircraft Corporation, UK.
Power Plant: one Rolls-Royce Bristol Viper Mk 535 turbojet; 3,410 lb thrust.

Dimensions: span over tip tanks 36 ft 10 in, length 33 ft 8 1/2 in, height 10 ft 11 1/2 in.

Weights: empty 6,195 lb, gross 9,303-11,500 lb.

Performance: max speed at 18,000 ft 481 mph, service ceiling 40,000 ft, T-O to 50 ft 3,500 ft, landing from 50 ft 2,400 ft, combat radius lo-lo-lo with 3,000 lb weapons load 145 miles, hi-lo-hi with 1,000 lb load 575 miles.

Accommodation: crew of two, side by side (pilot only in ground-attack role).

Armament: one 7.62-mm FN Herstal machine gun in lower lip of each air intake duct, two weapon stations under each wing for maximum 3,000 lb (single-seat) of bombs, rocket pods, napalm tanks, or 7.62-mm or 20-mm gun pods.

Su-7/20/22

Vintage fixed-wing Su-7BM single-seat attack aircraft can still be seen in the markings of the air forces of Algeria, Iraq, Syria, and Yemen. These same air forces, plus that of Libya, also operate the variable-geometry derivatives of the Su-7. The first of these to enter service was the Su-20, an export version of the Su-17M operated by CIS air forces, with the same 24,800 lb thrust Saturn/Lyulka AL-21F-3 afterburning turbojet. Algeria is thought to have received 20; Iraq had a few before the Persian Gulf War; Yemen had 30.

When the Su-22M-3 became available, with internal Doppler nav radar, a laser rangefinder in the intake centerbody, and a more powerful Tumansky R-29BS-300 afterburning turbojet, 40+ were supplied to Iraq, 90 to Libya, 40 to Syria, and 20 to Yemen. Like USAF's unforgettable F-105 "Thud" of similar size, speed, and engine power, these are mighty Mach 2+ attack fight-

ers, bristling with guns, external weaponry, and sensor pods. With an ancestry dating back to the first sighting of an Su-7 in 1956, and only the outboard 13 ft 9 in of each wing pivoted, their age shows; but they remain formidable assets. Four of Iraq's Su-20s and 40 Su-22s flew to Iran during Operation Desert Storm and are still there. Six others were shot down by F-15s. (Data for Su-22M-3.)

Contractor: Sukhoi OKB, Russia.
Power Plant: one Tumansky R-29BS-300 turbojet; 25,350 lb thrust with afterburning.
Dimensions: span 45 ft 3 in (30° min sweep), 32 ft 10 in (63° max sweep), length 61 ft 6¼ in, height 16 ft 5 in.
Weight: gross 36,155–42,990 lb.
Performance: max speed at height Mach 2.09, at S/L Mach 1.14, service ceiling 49,865 ft, T-O run 2,955 ft, landing run 3,120 ft, range 870 miles at low altitude, 1,430 miles at high altitude.
Accommodation: pilot only (two seats in tandem in Su-7U/22U trainers).
Armament: two 30-mm NR-30 guns in wingroots; nine pylons under wings and fuselage for up to 9,370 lb of bombs, rocket packs, SPPU-22 twin-barrel 23-mm gun pods, R-60 ("Aphid") AAMs, and Kh-23 ("Kerry") or Kh-25ML ("Karen") ASMs.

Su-25

This 1970s counterpart of the Soviet Air Force's World War II Ilyushin Il-2 Sturmovik ground-attack aircraft found little favor in the Middle East and North Africa. Of 21 air forces whose equipment is listed in this Gallery, only Iraq placed a firm order for Su-25s. How many of the 45 aircraft were delivered before Operation Desert Storm began is not known; nine were dispatched from Iraq to take refuge in Iran, of which two were shot down en route by F-15Cs on February 6, 1991.

Su-25 design emphasis was on survivability features that would enable it to attack ground targets at treetop height in the face of intense opposition. The pilot is seated high above the sharply sloping nose, in an all-welded cockpit of titanium armor. A total of 256 IRCM flares are packed into dispensers above the engine nacelles and tailcone for protection against ground-fired SAMs during eight attack runs. Ten underwing pylons carry a wide variety of weapons, including bombs that, it is claimed, can be placed within 16 ft of an aiming point over a standoff range of 12.5 miles by the aircraft's laser guidance system. To enhance combat readiness, the turbojets will run on any fuel likely to be found in forward areas, including MT gasoline and diesel oil.

Contractor: Sukhoi OKB, Russia.
Power Plant: two Soyuz/Tumansky R-195 turbojets; each 9,921 lb thrust.
Dimensions: span 47 ft 1½ in, length 50 ft 11½ in, height 15 ft 9 in.
Weights: empty 20,950 lb, gross 32,187–38,800 lb.
Performance: max speed at S/L Mach 0.8, max attack speed, airbrakes open, 428 mph, service ceiling 22,965 ft, range 466 miles at S/L, 776 miles at height.
Accommodation: pilot only (two seats in tandem in Su-25UBK trainer).
Armament: one twin-barrel 30-mm gun in port side of nose; eight underwing pylons for 9,700 lb of air-to-surface weapons, including SPPU-22 pods for 23-mm guns with twin barrels that pivot downward, 57-mm to 370-mm rockets, laser-guided rocket-boosted bombs up to 1,450 lb, and 1,100 lb incendiary, anti-personnel, and chemical cluster bombs; two small outboard pylons for R-3S (NATO "Atoll") or R-60 ("Aphid") self-defense AAMs.

Tornado

In its IDS (interdictor/strike) form, the Tornado was one of the stars of the Persian Gulf War. Eleven Royal Air Force squadrons contributed to Tornado detachments based at Dhahran and Tabuk, Saudi Arabia, and Muharraq, Bahrain. They were supplemented by other IDS aircraft of No. 7 squadron, RSAF, and from No. 66 Squadron, then forming. Primary targets were Iraqi airfields, which were attacked first with JP 233 cluster weapons, from low altitude, later with Paveway laser-guided bombs, from medium heights.

The original RSAF order for 48 Tornado IDSs was part of the Al Yamamah agreement signed with the UK in 1985. One of these aircraft was lost in the war with Iraq, but another 12 IDSs are expected to be delivered under the follow-up Al Yamamah II. Equipment of this version includes a Texas Instruments multimode terrain-following and ground-mapping radar, digital INS, electronic HUD, laser rangefinder and marked target seeker, IFF, RWR, and active ECM. Six aircraft of each Saudi squadron are configured for reconnaissance, and 14 of the original batch have dual controls.

Under Al Yamamah, the RSAF also ordered 24 Tornado ADV (air defense variant) interceptors, with more to follow under Al Yamamah II. Those of Nos. 29 and 34 Squadrons flew CAPs with USAF and RSAF F-15s and

RAF Tornado ADVs during Desert Storm without seeing action. Generally similar to the IDS, the ADV has a slightly longer fuselage to house Foxhunter pulse-Doppler radar and to allow four Sky Flash AAMs to be carried in tandem underbelly pairs. The lengthening reduced drag, especially at supersonic speed, and provided a 10 percent increase in internal fuel capacity. The ADV's RB199 Mk 104 engines are each rated at 16,520 lb thrust. (Data for Tornado IDS.)

Contractor: Panavia Aircraft GmbH, a UK/German/Italian consortium.
Power Plant: two Turbo-Union RB199 Mk 103 turbofans; each 16,075 lb thrust with afterburning.
Dimensions: span 45 ft 7½ in (25° min sweep), 28 ft 2½ in (67° max sweep), length 54 ft 10¼ in, height 19 ft 6¼ in.
Weights: empty 31,065 lb, gross 45,000–61,620 lb.
Performance: max speed at height Mach 2.2, max speed with external stores Mach 0.92, balanced runway length 2,950 ft, combat radius 863 miles.
Accommodation: crew of two in tandem.
Armament: two 27-mm LWKA-Mausers guns in fuselage; seven hardpoints under fuselage and wings for 19,840 lb of external stores, including Sidewinder AAMs; AGM-65 Maverick, AGM-88 HARM, ALARM, Kormoran, and Sea Eagle ASMs; cluster bombs; napalm; "smart," retarded, and conventional bombs up to 1,000 lb; rockets; incendiary and flare bombs.



Su-22M-3, Libyan Arab Jamahiriya Air Force (US Navy)



Su-24Mk, Islamic Republic of Iran Air Force



Tornado ADV, Royal Saudi Air Force



Tu-16 with "Kelt" ASMs, Egyptian Air Force (Denis Hughes)

Bombers

Su-24

Instead of making the expected heavy attacks on coalition troops during last year's war in the Persian Gulf, all 24 of Iraq's new variable-geometry Su-24MKs sought sanctuary in Iran. If they have been taken into that nation's Air Force, and if they are supplemented, as suggested, by 12 Tu-22M long-range bombers, 24 MiG-31 long-range interceptors, another 48 MiG-29s, and 24 MiG-27s, there will be a highly formidable combat force on the borders of Iraq, the southern CIS, and other unstable nations. Of more than 900 Su-24s delivered from the Komsomolsk plant, Libya is believed to have 15, although deliveries have been slow. Syria has between 12 and 16.

Export Su-24MKs are generally similar to the standard Su-24Ms of the CIS air forces. They are said to be capable of penetrating hostile airspace at night or in poor weather with great precision and then delivering ordnance within 180 ft of their target. Terrain-following radar, a laser ranger/designator, active and passive ECM, and a missile warning receiver are standard. An in-flight refueling probe and buddy refueling capability are optional.

Contractor: Sukhoi OKB, Russia.
Power Plant: two Saturn/Lyulka AL-21F-3A turbojets; each 24,800 lb thrust with afterburning.
Dimensions: span 57 ft 10 in (16° min sweep), 34 ft 0 in (68° max sweep), length 80 ft 5¼ in, height 16 ft 3¾ in.
Weights: empty 41,885 lb, gross 79,365–87,520 lb.
Performance: max speed at height Mach 2.18, at S/L Mach 1.15, service ceiling 57,400 ft, T-O run 4,265 ft, landing run 3,120 ft, combat radius 200–650 miles.
Accommodation: pilot and weapon systems officer side by side.
Armament: one GSh-6-23M six-barrel 23-mm Gatling-type gun on starboard side of belly; no internal weapon bay; nine pylons under fuselage, wingroot gloves, and outer wings (pivoting) for 17,635 lb of weapons, including up to four TV- or laser-guided bombs, conventional bombs (typically 38 x 220-lb FAB-100), 57-mm to 370-mm rockets, 23-mm gun pods, and such missiles as Kh-23 (NATO "Kerry"), Kh-25ML ("Karen"), Kh-58 ("Kilter"), Kh-25MP ("Kegler"), Kh-59 ("Kingpost"), Kh-29 ("Kedge"), and Kh-31 ("Krypton"). Two R-60 ("Aphid") AAMs can be carried for self-defense.

Tu-16

The Egyptian Air Force has about 12 Soviet-supplied Tu-16 intermediate-range strategic bombers, based at Cairo West, for attack and maritime patrol missions. When used operationally during the Arab-Israeli War of October 1973, they launched some 25 rocket-powered missiles of the kind known to NATO as AS-5 "Kelt" against Israeli targets. Twenty of the missiles were claimed as destroyed by air and ground defenses; the others hit two radar sites and a supply center in Sinai. Nineteen years later, the Tu-16s cannot be regarded as a very formidable force. The same must be true of the similar number that Iraq possessed before the start of Operation Desert Storm, including, it is reported, four Chinese-built Xian B-6D updated versions. It was feared that these might be used to drop chemical weapons on coalition troops, and three of the bombers were destroyed on the ground by F-117As at Al Taqaddum airfield on January 18. There are no reports of Tu-16s being used in action during Desert Storm, but they did launch Chinese C601 antishipping missiles over the Persian Gulf during the war with Iran, in April 1988, and are believed to carry also the Soviet Mach 3 AS-6 "Kingfish." (Data for Tu-16K carrier for AS-6 "Kingfish.")

Contractor: Tupolev OKB, Russia.
Power Plant: two Mikulin RD-3M-500 turbojets; each 20,920 lb thrust.
Dimensions: span 108 ft 3 in, length 114 ft 2 in, height 34 ft 0 in.
Weights: empty 82,000 lb, normal gross weight 165,350 lb.
Performance: max speed at 19,700 ft 652 mph, service ceiling 49,200 ft, range with 6,600 lb weapon load 4,475 miles.
Accommodation: crew of six, including two pilots side by side, navigator/bombardier in nose, and rear gunner in tail turret.
Armament: seven 23-mm AM-23 guns, in twin-gun turrets above front fuselage, under rear fuselage, and in tail, with seventh gun on starboard side of nose; two "Kingfish" missiles underwing, or up to 19,800 lb of bombs in internal weapons bay.

Tu-22

As well as Tu-16s, Iraq had nine Tu-22 supersonic bombers, some able to carry an AS-4 "Kitchen" ASM

with a speed of Mach 4.6 and range of 185 miles at low altitude or 285 miles at height. Versions of Kitchen exist with a 2,200 lb high-explosive warhead for antishipping use and with an antiradiation warhead. Although used against Iran, the Tu-22s appear to have played no part in the Persian Gulf War.

Libya acquired Tu-22s in the early 1970s, operated initially by Soviet aircrews. After operations in Uganda in early 1979 and against the forces of Chad in the 1980s, about seven are thought to continue in service, primarily for surveillance over the Mediterranean.

Contractor: Tupolev OKB, Russia.

Power Plant: two Kolesov VD-7M turbojets in pods above rear fuselage, on each side of tailfin; each 35,275 lb thrust with afterburning.

Dimensions: span 78 ft 0 in, length 132 ft 11½ in, height 35 ft 0 in.

Weight: gross 185,000 lb.

Performance: max speed at 40,000 ft Mach 1.4, service ceiling 60,000 ft, max unrefueled combat radius 1,490 miles.

Accommodation: crew of three, in tandem.

Armament: single 23-mm NR-23 gun in radar-directed tail mounting; conventional bombs in weapons bay or Kitchen ASM recessed in bay.

Tu-22M

First export order for this variable-geometry medium bomber is likely to involve 12 of the latest Tu-22M-3 version for the Air Force of Iran. Manufacture of an average 30 aircraft a year, at a plant near Kazan, built up a total of more than 200 in the Smolensk and Irkutsk air arms of the former Soviet Union, plus more than 160 in Naval Aviation. The Tu-22M-3, distinguished by its wedge-type engine air intakes and upturned nosecone with no vestigial fairing for an in-flight refueling probe, outnumbers the earlier Tu-22M-2, which has slightly inclined rectangular intakes, with large boundary layer splitter plates, and a symmetrical nosecone. In CIS service, the Tu-22Ms are deployed for nuclear strike, conventional attack, and antishipping missions, and are capable of either high-altitude or low-level penetration missions. It can be assumed that any ASMs supplied to Iran for carriage by Tu-22Ms will have conventional or antiradiation warheads. (Estimated data for Tu-22M-3.)

Contractor: Tupolev OKB, Russia.

Power Plant: two unidentified turbofans; each more than 45,000 lb thrust with afterburning.

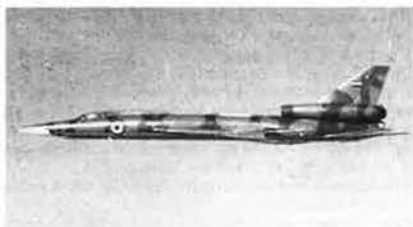
Dimensions: span 112 ft 6½ in (min 20° sweep), 76 ft 9¼ in (max 65° sweep), length 129 ft 11 in, height 35 ft 5¼ in.

Weight: gross 286,600 lb.

Performance: max speed at height Mach 2.0, at S/L Mach 0.9, service ceiling 59,000 ft, max combat radius 2,485 miles.

Accommodation: crew of four, in pairs.

Armament: in CIS service, carries two Kh-22N ASMs (NATO "Kitchen") under fixed center-section wing panels, or one semirecessed in belly; provision for twelve or eighteen 1,100-lb bombs on multiple racks under air intake trunks, or 26,450 lb of bombs in internal weapons bay, or rotary launcher for six Kh-15P ("Kickback") short-range attack missiles; one GSh-23 twin-barrel 23-mm gun in radar-directed tail mounting.



Tu-22, Libyian Arab Jamahiriya Air Force (US Navy)



E-2C Hawkeye, Egyptian Air Force



Mirage 5SDR, Egyptian Air Force (Denis Hughes)

outer tailfins, can locate hostile radar emitters over a range twice that of the AEW radar, helping the unarmed E-2C to evade enemy defenses. An ATDS (airborne tactical data system) compartment in the center-fuselage receives and displays incoming intelligence to the combat information center officer, air control officer, and radar operator.

Neither the Egyptian nor the Israeli Hawkeyes were employed operationally during the 1991 Persian Gulf War, but the type was nevertheless very much a part of the prevailing AEW/AWACS scene in that conflict, no fewer than 29 US Navy examples from six carrier detachments (VAW-115, 116, 123, 124, 125, and 126) taking part in Operation Desert Storm, preceded by VAW-113 and 121 aircraft during Operation Desert Shield.

Contractor: Grumman Aircraft Systems Division, US.

Power Plant: two Allison T56-A-427 turboprops; each 5,250 ehp.

Dimensions: span 80 ft 7 in, length 57 ft 6¾ in, height 18 ft 3¾ in.

Weights: empty 38,063 lb, gross 51,933 lb.

Performance: max speed 374 mph, cruising speed for max range 310 mph, service ceiling 37,000 ft, min T-O run 1,850 ft, min landing run 1,440 ft, on-station endurance 200 miles from base 4 h 24 min, max endurance 6 h 15 min.

Accommodation: flight crew of two; three mission personnel.

Armament: none.

E-3A Sentry

Under the program name Peace Sentinel, the Reagan Administration approved in 1981 the sale of five Boeing E-3A AWACS aircraft to the Saudi Arabian government. The first of these was handed over at Seattle in June 1986 and the fifth delivered in September 1987. The sale also included eight aerial refueling tankers, designated KE-3A (see entry for Boeing 707), and all 13 aircraft are operated by No. 18 Squadron of the Royal Saudi Air Force. Operat ng from Riyadh Military Airfield, they combined with USAF E-3B/Cs to provide 24-hour "eyes and ears" surveillance and intelligence for the coalition forces during the 1991 Gulf War. Carrying one or more relief crews, each E-3 could stay aloft for an average mission time of 16-18 hours,

with two or more orbiting aircraft providing a constant radar picture of the region from the Red Sea to the Arabian Sea.

Contractor: Boeing Aerospace Company, US.

Power Plant: four CFM International CFM56-2A-2 turbofans; each 24,000 lb thrust.

Dimensions: span 145 ft 9 in, length 152 ft 11 in, height 41 ft 9 in.

Weights: empty (estimated) 160,000 lb, gross 325,000 lb.

Performance: max speed at 40,000 ft 530 mph, service ceiling approx 40,000 ft, T-O run approx 5,200 ft, landing run approx 2,500 ft, on-station endurance 1,000 miles from base 6 h, max endurance (unrefueled) 11 h.

Accommodation: flight crew of four; up to 13 specialist AWACS personnel.

Armament: none.

MiG-25R

The four Middle Eastern and North African air forces that operate fighter versions of the MiG-25 also have small numbers of the reconnaissance MiG-25R. All are believed to be of the original RB series, with a nose-mounted pack of cameras and electronic intelligence (elint) sensors. Like their counterparts in the CIS air forces, they have no guns but can be assumed to offer the same capability of making precision automatic attacks with bombs in all weather, day and night, at supersonic speed, and from heights above 65,000 ft, against targets whose geographic coordinates are known. Equipment includes an inertial navigation system, updated by Doppler. Range can be extended to nearly 1,500 miles by attaching a 1,400-gallon conformal underbelly fuel tank. Supersonic cruising speed is Mach 2.35.

Contractor: Mikoyan OKB, Russia.

Power Plant: two Tumansky R-15BD-300 turbojets, each 24,700 lb thrust with afterburning.

Dimensions: span 44 ft 0¼ in, length excl probe 70 ft 8½ in, height 21 ft 4 in.

Weight: gross 81,570-90,830 lb.

Performance: max speed at height Mach 2.83, at S/L Mach 0.98, service ceiling 68,900 ft, range at supersonic speed on internal fuel 1,015 miles, subsonic with underbelly tank 1,490 miles.

Armament: provision for six 1,100-lb bombs on two underfuselage and four underwing pylons.

Mirage 5R

The 5R is a tactical reconnaissance version of the Mirage 5 fighter/ground-attack aircraft, recognizable by the different profile of a nose adapted to accept a pallet housing five (three oblique and two vertical) Omera 31 film cameras for all-altitude day and night photographic missions. It is operated by the air forces of Abu Dhabi (five 5RADs), Egypt (six 5SDRs), and Libya (eight 5DRs). (Data generally as for Mirage 5.)

RC-12D and EU-21A

The RC-12D is a sigint/elint aircraft using the airframe of the Beechcraft Super King Air 200. It is operated by the US Army for battlefield intelligence-gathering in Improved Guardrail V configuration. It is characterized by numerous large dipole antennas sprouting above and below the wings. Five RC-12Ds were supplied to the Israeli Defense Force under Foreign Military Sales. Israel also has three much older aircraft for similar duties, in the form of ex-US Army EU-21As (converted U-21As); these combine the unpressurized fuselage of the Beech Queen Air 65-80 with the wings of the King Air 90. (Data for RC-12D.)

Contractor: Beech Aircraft Corporation, US.

Power Plant: two Pratt & Whitney Canada PT6A-41 turboprops; each 850 shp.

Dimensions: span over wingtip pods 57 ft 10 in, length 43 ft 10 in, height 15 ft 5 in.

Weights: empty 8,143 lb, gross 14,200 lb.

Performance: max speed at 14,000 ft 299 mph, service ceiling 31,000 ft, T-O run approx 1,850 ft, landing run approx 1,750 ft, range approx 1,750 miles.

Accommodation: flight crew of two; up to eight other personnel.

Armament: none.

RF-4 Phantom II

All 16 of the RF-4E day/night, all-weather tactical reconnaissance aircraft supplied to Iran's Air Force in the early 1970s were reported lost by 1986, but a handful may have been restored to an airworthy state. The only undisputed operator of such aircraft in the Middle East is Israel, which began with 18 RF-4Es, delivered in 1971-78 with the standard pack of oblique/panoramic cameras and SLAR/IR sensors in a modified nose. This equipment was soon supplemented by a unique 22-ft-long underbelly pod for the huge General Dynamics HIAC-1 high-altitude, high-resolution camera. This reduced the aircraft's maximum speed to below Mach 1.5 and its ceiling to around 50,000 ft. Agility also suffered, and a way was sought to reduce

Reconnaissance and Special Mission Aircraft

E-2C Hawkeye

Although developed for USN carrier-borne deployment, the E-2 Hawkeye has been exported to four non-carrier-operating air forces, two of them (Egypt and Israel) in the Middle East. Israel's four E-2Cs were delivered in 1977-78; Egypt ordered two in 1983, three in 1984 (all five now in service), and a sixth in 1989. Although their AN/APS-125 radar systems are less advanced than the later types fitted to current US Navy Hawkeyes, they still represent a highly effective AEW watchdog that is an order of magnitude more capable than smaller surveillance aircraft while being smaller and less expensive than a full-scale E-3 AWACS. Like the E-3, the Hawkeye carries its radar antennas in a rotating disc-shaped housing above the center-fuselage, the four vertical tail surfaces to the rear being manufactured from glassfiber to avoid compromising the radar's efficiency. An on-board Litton AN/ALR-73 passive detection system, with receiver antennas in the nose and tailcone and looking out laterally from the

the resulting combat vulnerability. Three F-4Es were sent to the US in 1975-76 for conversion to F-4E(S) standard. This involved fitting the HIAC camera, a normal vertical KS-87 camera, and equipment into a new nose with a volume of 70 cu ft, which increased the Phantoms' length by 12 in. Still in use, the three F-4E(S)s offer a reconnaissance capability as good as any similar system in the world. Also deployed in the Israeli tactical reconnaissance force of around 14 Phantoms is the F-4P variant, with General Dynamics electronic sensors in a standard F-4E airframe. (Data similar to those for F-4E, except as follows.)

Weights: empty 31,110 lb, gross 52,835 lb.
Performance: max speed at 40,000 ft Mach 2.25, at S/L Mach 1.2, service ceiling 62,250 ft, ferry range 2,170 miles.
Armament: none.

RF-5E TigerEye

The RF-5E is the only specialized photographic reconnaissance aircraft used by the Royal Saudi Air Force, which has a single squadron of ten aircraft. Capable of 24-hour, round-the-clock operation, the single-seat TigerEye differs from the standard F-5E Tiger II fighter in having a longer nose of modified shape. A KS-87D oblique camera is installed as standard, with which can be combined one of three interchangeable nose pallets: one with a single LOROP (long-range oblique) camera, one with one medium- and one low-altitude pan camera, and a third that adds a Texas Instruments RS-700 series infrared linescanner to the two pan cameras. The Royal Moroccan Air Force is thought to have one remaining example of the earlier RF-5A. (RF-5E data generally as for F-5E, except as follows.)

Dimensions: length 48 ft 0 3/4 in.
Performance: combat radius with three drop tanks and two AIM-9 Sidewinder AAMs 403 miles (lo-lo-lo), 610 miles (hi-lo-hi).

Transports and Tankers

An-12

Although the prototype An-12 flew four years after that of the C-130, it has proved a far less durable type. Only a dozen or so remain in service with air forces in this region, with an estimated five in Algeria, six in Iraq, and one in Yemen. New information, made available since the "Gallery of Aircraft of the Commonwealth" was compiled for the March 1992 issue, reveals that the power plant was updated at some period, leading to revised specification data; but the lack of an integral rear loading ramp/door has been a constant shortcoming. Instead, the bottom of the rear fuselage is made up of two longitudinal doors that hinge upward inside the cabin to permit direct loading from trucks or airdropping of supplies and equipment. Sixty paratroops can be dispatched via this exit in under one minute.

Contractor: Antonov OKB, Ukraine.
Power Plant: four Ivchenko AI-20M turboprops; each 4,250 ehp.

Dimensions: span 124 ft 8 in, length 108 ft 7 1/4 in, height 34 ft 6 1/2 in.

Weights: empty 76,235 lb, gross 134,480 lb.
Performance: max speed 385 mph, normal cruising speed 354 mph, service ceiling 33,500 ft, T-O run 2,575 ft, landing run 2,756 ft, range with 39,680 lb payload 900 miles, with max fuel 4,225 miles.

Accommodation: crew of six; 44,090 lb of freight, 90 troops or 60 parachute troops. Built-in freight-handling gantry with capacity of 5,070 lb.

Armament: two 23-mm NR-23 guns in manned tail turret.

An-24/26

These short-range, twin-turboprop transports are counterparts of western Europe's F27s. The An-24 was first to fly, in April 1960. When production ended in 1978, about 1,100 had been built, the final versions with 2,550 ehp AI-24A engines, an optional Type RU-19-300 auxiliary turbojet in the rear of the starboard nacelle, and a payload of up to 50 passengers or 10,168 lb of freight. The freighter had a belly cargo door at the rear of the cabin, with an electrically powered winch and conveyor to facilitate loading. Not content with this makeshift arrangement, Oleg Antonov designed a unique rear-loading ramp that forms the underside of the fuselage when retracted but can slide forward under the rear of the cabin for direct loading onto the floor of the hold, or when the cargo is to be airdropped. He then swept up the rear fuselage to provide much-improved access, and the An-26 was

born. With uprated turboprops, it offered increased performance and payload. More than 1,000 were built, and derivatives are still in production in China.

Iraq had a squadron of An-24s and two An-26s before the Persian Gulf War, of which eight aircraft may survive. Libya has ten of the 13 An-26s that it bought in 1983, when Italy embargoed a second batch of G222s. Somalia had three An-24s and one An-26 before one was shot down in January 1990. Syria's single An-24 and five An-26s operate in civil guise but are shared with the military. Yemen is thought to have about six An-24s and eight An-26s. (Data for An-26.)

Contractor: Antonov OKB, Ukraine.
Power Plant: two Ivchenko AI-24VT turboprops; each 2,820 ehp. One 1,765 lb thrust RU-19A-300 auxiliary turbojet for turboprop starting and to provide additional power for takeoff, climb, and cruising flight, as required.

Dimensions: span 95 ft 9 1/2 in, length 78 ft 1 in, height 28 ft 1 1/2 in.



An-12BP, Algerian Air Force (Ivo Sturzenegger)



An-26, Libyan Arab Jamahiriya Air Force (Ivo Sturzenegger)



Boeing 707 probe-drogue/flying boom tanker, Israeli Air Force



C-130H Hercules, Republic of Tunisia Air Force (Ivo Sturzenegger)

Weights: empty 32,518 lb, gross 52,911 lb.

Performance: cruising speed at 19,685 ft 270 mph, service ceiling 24,600 ft, T-O run 2,855 ft, landing run 2,135 ft, range with max payload 770 miles, with max fuel 1,652 miles.

Accommodation: crew of five, plus station for load supervisor or dispatcher. Electrically powered mobile hoist, capacity 4,409 lb, and conveyor. Provision for carrying 40 paratroops or 24 litters. Improved An-26B version has roll-gangs and mechanical handling system, enabling two men to load or unload three 8-ft-long standard freight pallets in 30 minutes.

Armament: provision for bomb rack on fuselage below each wingroot trailing-edge.

Boeing Model 707-320

Tanker/transport, elint, and other versions of this veteran airliner serve with half a dozen air forces in the Middle East and North Africa. The largest fleets are those of Iran and Israel, each with about ten in general transport configuration plus four (Iran) or six (Israel) converted to flight refueling tankers; eight tankers, illogically designated KE-3A, serve with the Royal Saudi Air Force. The tanker version can transfer up to 123,190 lb of fuel to fighters or other aircraft 1,150 miles from its base. The Saudi and Iranian conversions were undertaken by Boeing, those of Israel by IAI's Bedek Aviation Division, which has also converted at least one other 707 as a dedicated sigint aircraft and one as a test-bed for Elta's Phalcon AEW detection system. The Royal Moroccan Air Force has a short-fuselage 707-138 tanker, converted in-country by AMIN. Other 707-320s serve in the region as VIP transports with the air forces of Egypt, Iran, Israel, Libya, and Morocco (one each) and Saudi Arabia (two). (Data for basic 707-320, except where indicated.)

Contractor: Boeing Company, US.
Power Plant: four Pratt & Whitney JT3D-7 turbofans; each 19,000 lb thrust.

Dimensions: span 145 ft 9 in, length 152 ft 11 in, height 42 ft 5 in.

Weights (IAI tanker/transport): empty 145,000 lb, gross 335,000 lb.

Performance: max cruising speed at 25,000 ft 605 mph, service ceiling 39,000 ft, T-O to 35 ft 10,020 ft, landing run 2,575 ft, range with 88,000 lb payload 3,625 miles, with max fuel 5,755 miles.

Accommodation: flight crew of three; standard airliner seats up to 219 passengers; elint/tanker variants carry appropriate mission personnel; VIP transports individually customized.

Armament: none.

C-130 Hercules

Inevitably, as in every other part of the world, the ubiquitous C-130 and its commercial L-100 counterpart are distributed widely throughout this region, in an assortment of roles that include border surveillance, electronic warfare, aeromedical, aerial refueling tanker, and other duties besides that of medium-lift transport of troops and equipment. By far the oldest are two C-130Bs still serving with the Royal Jordanian Air Force; slightly younger are nine C-130Es of the Royal Saudi Air Force, and a few of this vintage also remain with the Iranian Islamic Air Force.

Most of the main Hercules fleets, however, are to current-production C-130H/L-100 standard, with "regular" C-130Hs equipping the air forces of Algeria (ten), Egypt (19), Iran (about six), Israel (nine), Jordan (four), Libya (seven, plus two L-100-20s), Morocco (15, including two border patrol aircraft mounting a SLAR in

the starboard landing gear fairing), Oman (three), Saudi Arabia (22), Tunisia (two), UAE (Abu Dhabi, four), and Yemen (two). Stretched Hercules are operated by Algeria (seven H-30), Egypt (three H-30), Kuwait (two L-100-30), Libya (one L-100-30), Saudi Arabia (six L-100-30), and Dubai (two L-100-30). Saudi Arabia, whose No. 4 and No. 16 Squadrons formed part of the coalition forces during the 1991 Persian Gulf War, has fitted out three of its C-130Hs and all six L-100-30s in AEH (airborne emergency hospital) configuration; its 40-strong Hercules fleet is completed by two VC-130H VIP transports and eight KC-130H tankers. Israel (two) and Morocco (three) also have the KC-130H, and Egypt's fleet is completed by two EC-130H electronic warfare examples. (Data for current basic C-130H.)

Contractor: Lockheed Corporation, US.
Power Plant: four Allison T56-A-15 turboprops; each 4,506 ehp.

Dimensions: span 132 ft 7 in, length 97 ft 9 in, height 38 ft 3 in.

Weights: empty 76,469 lb, gross 155,000–175,000 lb.
Performance (at 155,000 lb gross weight): max cruising speed at 20,000 ft 374 mph, service ceiling 33,000 ft, T-O run 3,580 ft, landing run 1,700 ft, range with max payload 2,356 miles, with max fuel incl external tanks 4,894 miles.

Accommodation: flight crew of four, plus optional loadmaster/jumpmaster; up to 64 paratroops, 92 troops, or 74 litters plus two medical attendants standard (92/128/97 in H-30), or light armored vehicles/artillery, supply pallets, or equivalent cargo.

Armament: none.

CN-235M

Military sales of this twin-turboprop, general-purpose transport have exceeded those of the civil version by nearly four to one, and the initial export customer for the military version was Saudi Arabia, whose first two aircraft were in fact the first production CN-235s off the Spanish production line. Configured as VIP transports, they were delivered in February 1987 and followed two months later by two more in standard transport configuration. These early aircraft were Series 10 CN-235s, with 1,700 shp CT7-7A engines; current production aircraft, with Dash 9C engines, are designated Series 100. The Royal Moroccan Air Force has seven Series 100s, including one to VIP standard. Others have been ordered by the air forces of Jordan (two) and the United Arab Emirates (seven) and by the Omani Police Force (two).

Contractor: Aircraft Technology Industries (Airtech), a Spanish-Indonesian company.

Power Plant: two General Electric CT7-9C turboprops; each 1,750 shp (1,870 shp with automatic power reserve).

Dimensions: span 84 ft 8 in, length 70 ft 0 1/4 in, height 26 ft 10 in.

Weights: empty 19,400 lb, gross 36,376 lb.

Performance: max cruising speed at 15,000 ft 286 mph, service ceiling 26,600 ft, T-O to 50 ft 4,235 ft, landing run with propeller reversal 1,306 ft, range with 13,227 lb max payload 932 miles, with 7,936 lb payload 2,706 miles.

Accommodation: flight crew of two; up to 46 paratroops, 48 troops, 24 litters and four medical personnel, or equivalent cargo, plus jumpmaster/loadmaster when appropriate.

Armament: provision for six underwing stations for up to 7,716 lb of ASMs, bombs, or other weapons or stores.

F27 Friendship/Troopship

The Algerian Air Force transferred most of its fleet of 11 F27 Friendship twin-turboprop short-haul transports to the nation's civil airlines in the early 1980s. A single Mk 400M dedicated military transport version is believed to be retained in Air Force use, primarily for maritime surveillance on behalf of the Navy. The current serviceability of Iran's Friendships is unknown. Of 19 delivered to the Air Force, two were lost, leaving 13 Mk 400Ms, as described below, and four Mk 600s, which embody the same large cargo door as the 400M but lack its reinforced and watertight cabin floor. Standard airline-type seating for 44 passengers contrasts with the Mk 400M's folding sidewall canvas seats for up to 46 troops, or 24 litters in an ambulance role. Both versions can be used in alternative all-cargo or combi form. Four of the Iranian Mk 400Ms were modified by Fokker in 1977 for target-towing duties.

Contractor: Royal Netherlands Aircraft Factories NV Fokker, Netherlands.

Power Plant: two Rolls-Royce Dart Mk 532-7R turboprops; each 2,140 ehp.

Dimensions: span 95 ft 2 in, length 77 ft 3 1/2 in, height 27 ft 11 in.

Weights: empty 25,696 lb, gross 45,000 lb.

Performance: normal cruising speed at 20,000 ft 298 mph, service ceiling 30,000 ft, T-O run 3,200 ft, landing run 2,000 ft, range (all-cargo) with standard fuel 1,375 miles, max fuel 2,727 miles.

Accommodation: crew of two or three; 13,283 lb of freight, up to 46 troops, or 24 litter patients and nine attendants or sitting casualties.

Armament: none.

G222

Adoption of this twin-turboprop, general-purpose transport by African air forces has been fraught with problems. Libya's decision to purchase a large number was frustrated initially by a US embargo on the aircraft's standard General Electric T64 turboprops and US avionics. Aeritalia engineered a revised version, designated G222T, with Rolls-Royce Tyne turboprops and UK/French equipment. Twenty were delivered, from 1981. Within five years, these were spending long periods on the ground because of an Italian embargo on spares. Libya was not permitted to take up its option on further G222Ts and decided to buy An-26s from the Soviet Union instead. When the Soviets left Somalia, six G222s were ordered for the Somali Aeronautical Corps. Two were delivered in 1980; the other four fell victim to financial constraints. (Data for G222T.)

Contractor: Aeritalia SpA, Italy.

Power Plant: two Rolls-Royce Tyne RTy.20 Mk 801 turboprops; each 4,860 shp.

Dimensions: span 94 ft 2 in, length 74 ft 5 1/2 in, height 32 ft 1 1/4 in.

Weights: empty 39,685 lb, gross 63,935 lb.

Performance: long-range cruising speed at 30,000 ft 345 mph, T-O run 2,130 ft, landing run 1,240 ft, range with max payload 1,174 miles, with max fuel (ferry) 3,166 miles.

Accommodation: crew of three; 53 troops on folding and stowable seats; 42 paratroops; 36 litters, two seated casualties, and four attendants; or 19,840 lb of freight, vehicles, and guns.

Armament: none.

IAI 201/202 Arava

Although sold to a number of Central and South American nations, the Arava was not one of Israel Aircraft Industries' success stories, mainly due to its limited payload/range capabilities. This is further evidenced by the modest number acquired by Israel's own Air Force, which has only about a dozen in service. Standard version is the IAI 201; the IAI 202 variant has

a 3-ft-longer fuselage pod, winglets, PT6A-36 engines (of the same rating as the -34), and 1,600 lb more fuel.

Of more interest than the standard transports are the elint conversions, of which at least two configurations have appeared. One of these has a number of blade antennas located on the wings, tailbooms, flight deck roof, and elsewhere. Another, equipped with an Elta EL/L-8310 elint system, features a canister-shaped antenna slung against the lower fuselage on the port side, just aft of the propeller plane; in operation this is lowered to an underfuselage location to allow it to scan through a full 360°. Some Aravas are also used for multiengine pilot training. (Data for IAI 201.)

Contractor: Israel Aircraft Industries, Israel.

Power Plant: two Pratt & Whitney Canada PT6A-34 turboprops; each 750 shp.

Dimensions: span 68 ft 9 in, length 42 ft 9 in, height 17 ft 1 in.

Weights: empty 8,816 lb, gross 15,000 lb.

Performance: max cruising speed at 10,000 ft 198 mph, service ceiling 25,000 ft, T-O run 960 ft, landing run 820 ft, range with max payload 174 miles, with max fuel 656 miles.

Accommodation: flight crew of one or two; 16 paratroops plus two dispatchers, 24 troops, 12 litters plus two medical personnel, small wheeled vehicles (loaded via rear fuselage swing-tail), or equivalent cargo.

Armament (optional): 0.50-in Browning machine gun pack and/or six-round 82-mm rocket pod on each side of fuselage.

Il-76 and Adnan 1

Russia's sturdy counterpart to USAF's C-141 StarLifter has become the workhorse of at least seven foreign air forces. This is not always apparent. As in Russia itself, the Il-76s often spend their time in the insignia of national airlines that make aircraft and crews available to the military when they are needed. To add to the confusion, Il-76Ms, with a rear gun turret but no weapons installed, arrive without concern at civil airports on commercial business, while turretless Il-76Ts may be called in to haul military cargoes. Typically, Jamahiriya Libyan Arab Airlines has a mix of 21 Il-76Ts and Ms; Syrianair has two of each version. Iraqi Airways has operated a fleet of around 30 Il-76Ts and Ms, mainly for military duties, of which 15 were flown to sanctuary in Iran during Desert Storm. This total may include two of the three AEW&C conversions produced in Iraq under the name Adnan 1; the third was put out of commission during an attack on Al Taqaddum Airfield. With a dorsal rotodome, Adnan 1 closely resembles the Russian A-50 AEW&C derivative of the Il-76 but can be identified by two large strakes under the rear fuselage. Iraq also developed an in-flight refueling tanker version of the Il-76, with a single hose/drogue pack at the base of the rear loading ramp. A further Il-76 operator in this region is the Algerian Air Force, which took delivery of four standard transports in 1989. (Data for Il-76M.)

Contractor: Ilyushin OKB, Russia.
Power Plant: four Perm/Soloviev D-30KP turbofans; each 26,455 lb thrust.

Dimensions: span 165 ft 8 in, length 152 ft 10 1/4 in, height 48 ft 5 in.

Weight: gross 374,785 lb.

Performance: cruising speed at 29,500–39,350 ft 466–497 mph, ceiling 50,850 ft, T-O run 2,790 ft, landing run 1,475 ft, nominal range with 88,185 lb payload 3,100 miles, max range 4,163 miles.

Accommodation: crew of seven, incl two freight handlers; 88,185 lb of freight, or 140 troops, or 125 paratroops.

Armament: two 23-mm twin-barrel GSh-23L guns in tail turret.

Skyvan 3M

The Skyvan's dumpy appearance belies its usefulness. Although the fuselage is short, its 6 ft 6 in square interior cross-section enables it to handle a surprisingly wide variety of awkwardly shaped loads or cabin installations. There have been three Middle Eastern customers for this adaptable aircraft, although the two operated by the now-unified Yemen Air Force are believed to have been withdrawn from use. The Sharjah Emiri Guard Air Wing of the UAE has a single example, plus a Shorts 330 UTT (essentially a stretched Skyvan), but the largest operator remains the Royal Air Force of Oman, 15 of whose original 16, delivered many years ago, remain in service. Eight of these are standard transports, the other seven being equipped with Racal ASR 360 surveillance radar for maritime patrol and search and rescue.

Contractor: Short Brothers plc, UK.

Power Plant: two Garrett TPE331-2-201A turboprops; each 715 shp.

Dimensions: span 64 ft 11 in, length 41 ft 4 in, height 15 ft 1 in.

Weights: empty 7,400 lb, gross 13,700–14,500 lb.
Performance (at 13,700 lb gross weight): max cruising



CN-235Ms, Royal Air Force of Morocco



F27 Friendship Mk 400M, Algerian Air Force (Paul Jackson)



Arava in electronic warfare configuration, Israeli Air Force

speed at 10,000 ft 202 mph, service ceiling 22,000 ft, T-O run 780 ft, landing run 695 ft, range with 5,000 lb payload 240 miles, with max fuel 670 miles.

Accommodation: flight crew of one or two; 16 paratroops plus dispatcher, 22 troops, 12 litters plus two medical personnel, or 5,200 lb of cargo.

Armament: none.

Helicopters

AH-1 HueyCobra/SeaCobra

While armed forces favorable to the former USSR received Mi-24 combat helicopters, those of Iran, Israel, and Jordan were able to equip with US-built HueyCobras and SeaCobras. An estimated 159 of the 202 twin-engine AH-1J SeaCobras, armed with TOW antitank missiles, that were delivered to Iran survive, but they are operated by the Army and are therefore outside the scope of this Gallery. In any event, few are likely to be serviceable, and the TOW inventory is probably exhausted, despite the "Irangate" top-up. The 24 single-engine HueyCobras received by Jordan, and an estimated 40 in Israel, are all believed to be broadly similar to the US Army's AH-1F fully upgraded TOW version. This embodies lessons learned in combat, from Vietnam to Soviet experience in Afghanistan, including an IR jammer, hot metal and plume IR suppressor, RWR, a low-air-speed sensor probe, a 20-mm three-barrel gun in an electrically powered undernose turret, automatic compensation for off-axis firing, a laser rangefinder and tracker, HUD, Doppler, and IFF transponder. Israeli HueyCobras also have a US-funded Rafael night targeting system. (Data for AH-1F.)

Contractor: Bell Helicopter Textron, US.

Power Plant: one Textron Lycoming T53-L-703 turboshaft; 1,800 shp.

Dimensions: rotor diameter 44 ft 0 in, fuselage length 44 ft 7 in, height 13 ft 5 in.

Weights: empty 6,598 lb, gross 10,000 lb.

Performance: max speed 141 mph, service ceiling 12,200 ft, range 315 miles.

Accommodation: pilot and copilot/gunner in tandem armored cockpits.

Armament: one 20-mm three-barrel M197 gun in GE turret; outer of two weapon pylons under each stubwing can carry four TOW ASMs; inner pylon can carry a pack of seven to nineteen 2.75-in rockets.

AH-64 Apache

Since deliveries began in January 1984, more than 700 of these formidable attack helicopters have been delivered to the US Army and ARNG, achieving IOC (initial operational capability) in July 1986 and executing their first operational deployment, in Operation Just Cause in Panama, in December 1989. Their participation in Operations Desert Shield and Desert Storm was massive—nearly 300 deployed, their activities including the conflict's first air strike. In mid-1996 the Army will start to receive the first of 227 conversions to AH-64D with Longbow mast-mounted millimeter-wave radar, RF Hellfire missiles, more powerful Dash 701C engines, and other improvements; they will be preceded by nearer-term but lesser upgrading of 562 AH-64As to AH-64B (254) and AH-64C (308) standard.

With production completion of the total US requirement of 807 Apaches within sight, exploration of its export potential got under way in January 1990 with a joint offer to Israel and Egypt. Both accepted readily, Israel placing an order for 18 two months later, the first two of which were delivered that September. All are now in service with the IDF/AF's "Wasp" squadron. Egypt's 24 will not start being delivered until 1994, by which time at least three other Middle East air arms will possess the AH-64A. The sale of eight, with Hellfire missiles, to Bahrain was approved in October 1990; 12, with Hellfires, were ordered for the Royal Saudi Land Forces in April 1991 and begin delivery this year; and Abu Dhabi of the UAE ordered 20, with Hellfires and Hydra-70 rocket armament, in December last year. The first six of these will be delivered next year and the balance of 14 in 1994.

Contractor: McDonnell Douglas Helicopter Company, US.

Power Plant: two General Electric T700-GE-701C turboshafts; each 1,800 shp.

Dimensions: rotor diameter 48 ft 0 in, fuselage length, tail rotor turning 48 ft 2 in, height 14 ft 1/4 in.

Weights: empty 11,387 lb, gross 14,445–21,000 lb.

Performance: max speed at S/L 182 mph, service ceiling 21,000 ft, typical mission endurance 1 h 50 min.

Accommodation: crew of two, in tandem (gunner in front seat).

Armament: turreted 30-mm M230 Chain Gun under front fuselage; four underwing stations, each for four AGM-114 Hellfire antitank missiles or 2.75-in FFAR

rockets in seven-round M200 or 19-round M260 launchers.

AS 365 Dauphin/AS 565 Panther

Discounting two ex-US search-and-rescue HH-65As purchased by Israel only for evaluation, the sole Middle Eastern customer for this most versatile twin-turbine French helicopter is Saudi Arabia, whose armed forces have a total of 30. Six of these are AS 365N2 Dauphins used as medevac helicopters by the Royal Saudi Land Forces, with outward-opening (instead of sliding) rear cabin doors permitting the side-loading of two to four casualty litters, accompanied, respectively, by four to two medical attendants. Four of the Royal Saudi Navy's 24 are AS 565MA Panthers, equipped for surveillance, search, and rescue; the other 20 are frigate-based AS 565SA Panthers, equipped with search radar and AS-15TT missiles for the antishipping role. They made their combat debut during the 1991 Persian Gulf War when one AS 565SA sank two Iraqi patrol boats with its missiles on January 30 and three more four days later. (Data for AS 565SA.)

Contractor: Eurocopter SA, a Franco-German company.

Power Plant: two Turbomeca Arriel 1M1 turboshafts; each 749 shp.

Dimensions: rotor diameter 35 ft 0 1/2 in, fuselage length 35 ft 10 1/2 in, height 10 ft 11 1/2 in.

Weights: empty 4,938 lb, gross 9,370 lb.

Performance: max cruising speed at S/L 170 mph, hovering ceiling IGE 8,530 ft, combat radius 155–173 miles, max range 544 miles.

Accommodation: crew of two, plus systems operators.

Armament: four Aerospatiale AS-15TT radar-guided antiship missiles or (in ASW role) two homing torpedoes, mounted on cabin sides.

Bell Model 205 and UH-1 Iroquois

About 150 examples of this workhorse helicopter are in service with the air arms of half a dozen Middle Eastern and North African nations: Iran (Army 20 or more, Navy 15), Morocco (Air Force 45), Oman (Air Force 20), Saudi Arabia (Air Force 20), Tunisia (Air Force 24), and Dubai (Air Force six). One is also operated by the Bahrain Police. Most of these are Agusta-built Model 205/205A/205A-1s, although Tunisia's inventory includes six ex-US UH-1Hs. They undertake a broad range of utility and general transport duties. (Data for Agusta-Bell 205.)

Contractors: Bell Helicopter Textron, US; Agusta SpA, Italy.

Power Plant: one Textron Lycoming T53-L-13B turboshaft; 1,400 shp.

Dimensions: rotor diameter 48 ft 0 in, fuselage length 41 ft 10 1/4 in, height 14 ft 5 1/2 in.

Weights: empty 4,800 lb, gross 9,500 lb.

Performance: max speed at S/L 138 mph, max cruising speed 127 mph, service ceiling 15,000 ft, max range 360 miles.

Accommodation: one pilot; up to 14 troops, six litters plus one medical attendant, or 3,880 lb of cargo.

Armament: none.

Bell Model 212

Like the Model 214, the Bell 212 was a direct outgrowth of the ubiquitous 205/UH-1 Huey. Intended originally for the commercial executive, cargo, and utility market, its chief new features were the ability to carry useful loads of 4,000 lb internally or 4,500 lb externally, and the adoption of the compact Canadian Twin Pac engine for enhanced reliability, especially in hot and high environments. Its military counterpart was the UH-1H.

Nearly a dozen air forces in the region fly the 212, though comparatively few were built in the US, most of them emanating from Bell's Italian licensee, Agusta, which also developed its own antisubmarine version, the AB 212 ASW. Bell supplied four to Dubai, 12 or more to Iran, and an unspecified number to Israel. Agusta is notoriously coy about releasing export details, but the air forces now operating AB 212s, with approximate quantities in service at the beginning of this year, are as follows: Iran (Army 12 or more, Navy six or more ASW), Iraq (eight ASW/SAR), Lebanon (eight), Libya (two VIP), Morocco (five), Oman (two VIP), Saudi Arabia (30 SAR and VIP, with Nos. 1 and 14 Squadrons), Somalia (four), and Yemen (five, plus one VIP).

The Agusta ASW version is equipped with Tacan, ECM, and a Bendix AN/AQS-13 sonar; for antiship missions, the sonar can be replaced by a Ferranti Seaspray search radar. (Data for Agusta-Bell 212 ASW.)

Contractor: Agusta SpA, Italy.

Power Plant: one Pratt & Whitney Canada PT6T-6 Turbo Twin Pac turboshaft; 1,875 shp.

Dimensions: rotor diameter 48 ft 0 in, fuselage length 42 ft 4 1/4 in, height 14 ft 10 1/4 in.

Weights: empty 5,621 lb, gross 10,692 lb.

Performance: max speed at S/L 122 mph, max cruising speed 115 mph, service ceiling 13,000 ft, search

range with 10 percent fuel reserves 382 miles, max range with auxiliary fuel and 15 percent reserves 414 miles.

Accommodation: flight crew of one or two; one or two ASW/ASV systems operators, or seven/eight passengers, or four litters plus medical attendant.

Armament: two Motofides 244 AS or Mk 44/46 homing torpedoes, or depth charges, for ASW; two Marte Mk 2, Sea Skua, or similar antiship missiles for ASV operations.

Bell Model 214

As its original name of HueyPlus indicated, the Model 214 began life as an attempt to increase both the power and the carrying capacity of the widely used Model 205/UH-1. It made its first flight in October 1970 and was rewarded just over two years later by a huge order, placed by Iran, for 287 production Model 214As. Deliveries, which began in April 1975, were completed by the end of that year. Additional orders followed for six more 214As and 39 of a search-and-rescue version designated 214C, and plans were initiated for a new Iranian factory at Isfahan to produce a further 400 examples of the 214A and a new, enlarged version known as the 214ST (Stretched Twin), but these were negated by the overthrow of the Shah in early 1979. Bell built a relatively small number of a commercial version of the 214A as the 214B BigLifter and decided also to continue with the stretched model. The latter, with ST now standing for SuperTransport, made its first flight in July 1979; it had a new power plant and an 8 ft longer fuselage, seating four more passengers.

More than 300 of these workhorse helicopters still operate in the Middle East, more than 250 of them with Iranian Islamic Army Aviation, plus a VIP model 214B and a few 214Cs with the Air Force. Iraq is believed to retain most of an original 45 214STs. Dubai has four 214Bs, and Oman has a mixed fleet of about ten Bs and STs. Operating from Salaiah Air Base, the Omani 214s were a component of the coalition forces in the 1991 Persian Gulf War. (Data for Bell 214A.)

Contractor: Bell Helicopter Textron, US.

Power Plant: one Textron Lycoming LTC4B-8D turboshaft; 2,930 shp.

Dimensions: rotor diameter 52 ft 0 in, fuselage length 49 ft 3 1/2 in, height 15 ft 0 in.

Weights: empty 7,460 lb, gross 11,460 lb.

Performance: max cruising speed at S/L 161 mph, service ceiling 20,000 ft, max range 215 miles.

Accommodation: crew of two; up to 14 passengers or equivalent cargo.

Armament: none.

Bell Model 406 CS Combat Scout

First flown in June 1984, the Model 406 CS is basically a simplified scout/attack export version of the US Army's OH-58D Kiowa Warrior, with a different (but similarly rated) version of the same engine and a slightly downrated transmission. Empty weight is about 550 lb lighter than that of the OH-58D. In the eight years since it first flew, only one customer has emerged: the Royal Saudi Land Forces, which placed an order for 15 in 1987. Deliveries of these, which are designated MH-58D, began in mid-1990. They have folding rotor blades and tailplanes, "squatting" landing skids, a roof-mounted Saab-Emerson HellTOW sight, and a nonstandard instrument panel combining conventional instruments with electronic displays for TOW missile and communications control.

Contractor: Bell Helicopter Textron, US.

Power Plant: one Allison 250-C30U turboshaft; 650 shp.

Dimensions: rotor diameter 35 ft 0 in, fuselage length 34 ft 4 1/4 in, height 12 ft 10 1/2 in.

Weights: empty 2,271 lb, gross 5,000 lb.

Performance: max speed at 4,000 ft 144 mph, max cruising speed 138 mph, service ceiling 12,000 ft, range with max fuel 251 miles.

Accommodation: crew of two, side by side.

Armament: cabin-side outriggers for two GIAT 20-mm M621 gun pods, four TOW 2 or Hellfire antitank missiles, or combinations of Stinger AAMs, seven-round 70-mm rocket launchers, and 7.62-mm or 0.50-in machine-gun pods. RSLF aircraft have TOW 2s, 0.30- and 0.50-in machine-gun pods, and 2.75-in FFAR rocket pods.

CH-47 Chinook

Except for two Boeing-built Chinooks of the Air Force of Iran, the CH-47Cs serving with air forces in the Middle East and North Africa were license-manufactured by Meridionali of Italy. The Egyptian Air Force has 14, the Libyan Air Force about 15, and the Royal Air Force of Morocco eight. Many more are used by the region's armies, and most of the Libyan CH-47Cs are, in fact, used to support army missile and radar sites from the bases of el-Kufra and Sebha.

In its standard transport role, the CH-47C carries a payload of 33 to 44 troops, litters on casualty evacuation flights, or internal or slung cargo. The cabin is

loaded via a rear ramp/door. Typical loads include a complete artillery section, with personnel and ammunition. Optional equipment includes RWR, missile approach warning equipment, IR jammers, chaff/flare dispensers, and INS with GPS.

Contractor: Elicotteri Meridionali SpA, Italy.
Power Plant: two Textron Lycoming T55-L-11A turboshafts; each 3,750 shp.

Dimensions: rotor diameter (each) 60 ft 0 in, fuselage length 51 ft 0 in, height 18 ft 7 $\frac{3}{4}$ in.

Weights: empty 21,464 lb, gross 33,000–46,000 lb.
Performance: max speed at S/L 189 mph, average cruising speed 131–160 mph, service ceiling 15,000 ft, mission radius with 11,650 lb internal payload 115 miles, with 21,700 lb slung payload 23 miles.

Accommodation: crew of two or three; up to 44 troops, or 24 litter patients and two attendants, vehicles, or freight.

Armament: provision for one machine gun in forward hatchway.

CH/RH-53D Sea Stallion

In 1976, before the fall of the Shah, the Imperial Iranian Navy took delivery of six RH-53D mine-sweeping helicopters from Sikorsky, which were based at Kharg. Information regarding the numbers and condition of prerevolution aircraft in that country is not easily obtainable, but it is thought that two or more of these helicopters may still be in service.

The Israeli Defense Force/Air Force relies for its heavy-lift rotorcraft requirement mainly on a recently augmented fleet of about 40 CH-53D-standard helicopters (Sikorsky designation S-65C-3). A program known as Yas'ur 2000 is now under way by Israel Aircraft Industries to upgrade the CH-53D fleet. Among the scheduled improvements are armored cockpits with crashworthy seats, external sponson fuel tanks, an in-flight refueling probe, rescue hoist, and a new Elbit-led avionics suite that includes a mission computer, multifunction displays, a moving map display, and a new autopilot. (Data for CH-53D.)

Contractor: Sikorsky Aircraft, US.
Power Plant: two General Electric T64-GE-413 turboshafts; each 3,925 shp.

Dimensions: rotor diameter 72 ft 3 in, fuselage length 67 ft 2 in, height 24 ft 11 in.

Weights: empty 23,485 lb, gross 42,000 lb.
Performance: max speed at S/L 196 mph, max cruising speed 173 mph, service ceiling 21,000 ft, max range at 173 mph, with reserves, 257 miles.

Accommodation: flight crew of three; up to 55 troops, 24 litters plus four medical personnel, or equivalent cargo.

Armament: none in CH-53D; RH-53D, provision for two 0.50-in machine guns to detonate surfaced mines.

Ka-25

Although Syria has 12 Mi-14 maritime helicopters, it has retained in service five veteran Ka-25s, which fly coastal patrols from shore bases, under naval direction. The compactness of the Ka-25's typical Kamov contrarotating coaxial rotor design and its other qualities are offset to some extent by a lack of autohover capability that prevents use of the aircraft's dipping sonar at night or in bad weather. Standard equipment includes search radar in a large flat-bottomed undernose radome, ECM, sonobuoys on a rack on the starboard side of the fuselage, and a cylindrical canister on each side for markers, smoke generators, or beacons. The cabin is roomy enough to carry 12 persons on folding seats in a search-and-rescue mission.

Contractor: Kamov OKB, Russia.
Power Plant: two Glushenkov GTD-38M turboshafts; each 990 shp.

Dimensions: rotor diameter (each) 51 ft 7 $\frac{3}{4}$ in, fuselage length 32 ft 0 in, height 17 ft 7 $\frac{1}{2}$ in.

Weights: empty 10,505 lb, gross 16,535 lb.
Performance: max speed 130 mph, service ceiling 11,000 ft, range 250–405 miles.

Accommodation: crew of two, side by side on flight deck two or three systems operators in main cabin.

Armament: ASW torpedoes, depth charges, and other stores in underfuselage weapons bay.

McDonnell Douglas 500MD Defender

Although these military export versions of the (originally Hughes) OH-6A have sold successfully in many parts of the world, comparatively few of the sales have been in the Middle East. No. 5 Squadron of the Royal Jordanian Air Force at Mafraq has eight unarmed 500MDs for training, and six others are used by the Israeli Defense Force/Air Force in a liaison capacity, but the only combat-equipped Defenders are Israel's 30 antitank 500MD/TOWs, delivered from mid-1979. They carry a stabilized telescopic sight in a prominent turret on the port side of the nose. (Data for 500MD/TOW.)

Contractor: McDonnell Douglas Helicopter Company, US.

Power Plant: one Allison 250-C20B turboshaft; 375 shp.



AH-1J SeaCobra in Iranian prerevolution insignia



500MD/TOW Defender, Israeli Air Force



Mi-8, Egyptian Air Force (Denis Hughes)

Dimensions: rotor diameter 26 ft 4 in, fuselage length 25 ft 0 in, height 8 ft 10 $\frac{1}{2}$ in.

Weights: empty 1,976 lb, gross 3,000 lb.
Performance: max speed at S/L 150 mph, max cruising speed at 5,000 ft 132 mph, service ceiling 13,800 ft, range with standard fuel 242 miles at S/L, 266 miles at 5,000 ft.

Accommodation: crew of two, side by side.
Armament: four Hughes TOW antitank missiles, in twin pod at each end of tubular beam through cabin.

Mi-6

When first flown, on June 5, 1957, the Mi-6 was by far the largest helicopter of its time. More than 800 were built, and current military operators include four air forces in the Middle East and North Africa. Algeria has about four, Egypt six, and Syria ten. Iraq is said to have received 15 for the construction and support of missile and radar sites, and one source has claimed that these were supplemented by three of the Mi-10 heavy-lift flying cranes derived from the Mi-6. There has been no confirmation of this or news of how many of Iraq's more than 450 military helicopters survived the Persian Gulf War.

Contractor: Mil OKB, Russia.
Power Plant: two Soloviev D-25V turboshafts; each 5,500 shp.

Dimensions: rotor diameter 114 ft 10 in, fuselage length 108 ft 10 $\frac{1}{2}$ in, height 32 ft 4 in.

Weights: empty 60,055 lb, gross 84,657–93,700 lb.
Performance: max speed 186 mph, max cruising speed 155 mph, service ceiling 14,750 ft, range with 17,637 lb payload 385 miles, with 9,920 lb payload and external tanks 621 miles, ferry range 900 miles.

Accommodation: crew of five (two pilots, navigator, flight engineer, and radio operator); 70 combat-equipped troops, or 41 litter patients and two attendants; rear ramps, 1,765 lb capacity winch, and pulley block system for handling max internal freight payload of 26,450 lb; and sling for max external freight load of 17,637 lb (normally with stub-wings removed).

Armament: provision for 12.7-mm machine gun in nose.

Mi-8/17

Over the past 30 years, more than 10,000 Mi-8s and updated Mi-17s have been delivered to at least 40 air forces, and to civil operators worldwide, from plants at Kazan and Ulan Ude. Air forces operating these medium-lift helicopters in the region covered by this Gallery are those of Algeria (estimated at anything from 12 to 35), Egypt (about 50), Iraq (possibly 75 since Operation Desert Storm), Libya (seven), Syria (at least 100), and Yemen (about 50). Virtually all were delivered as Mi-8s, but a few may be Mi-17s, or Mi-8s updated as Mi-8T/TB/TBK to Mi-17 standard, with 1,950 shp TV3-117MT engines in shorter nacelles and with the tail rotor transferred to the port side. Basic military tasks are assault, troop transport, and general-purpose duties, with a sliding, jettisonable passenger door at the front of the cabin on the port side, clamshell rear freight loading doors, hook-on ramps for vehicle entry, cargo tie-downs in the floor, a 330 lb capacity winch and pulley block system for cargo handling, and 6,614 lb capacity cargo sling. All versions can be used for casualty evacuation, carrying 12 litter patients and an attendant. Ten of the Syrian Mi-8s are equipped for ECM (NATO "Hip-J" standard) with small equipment boxes on each side of the cabin, or as communications jammers ("Hip-K") with a large antenna array on each side. (Data for standard Mi-8.)

Contractor: Mil OKB, Russia.
Power Plant: two Klimov (Isotov) TV2-117A turboshafts; each 1,700 shp.

Dimensions: rotor diameter 69 ft 10 $\frac{1}{4}$ in, fuselage length 59 ft 7 $\frac{1}{2}$ in, height 18 ft 6 $\frac{1}{2}$ in.

Weights: empty 16,007 lb, gross 24,470–26,455 lb.
Performance: max speed at S/L 161 mph, max cruising speed 137 mph, service ceiling 14,765 ft, range with 24 troops 311 miles, cargo version 280–596 miles.

Accommodation: crew of two or three; 24 combat-equipped troops on tip-up seats along cabin side walls; 8,820 lb of freight internally, 6,614 lb externally; or up to 12 litter patients and attendant.

Armament: provision for 12.7-mm machine gun in nose; twin rack each side for total of four 32-round packs of 57-mm rockets or other stores ("Hip-C" standard), or triple stores rack each side for six similar rocket packs, and four antitank missiles (AT-2 "Swatter") on rails above packs ("Hip-E" standard).

Mi-14

Developed in parallel with the Mi-17, this shore-based amphibious helicopter has a basic Mi-8 airframe combined with the updated power plant and dynamic components of the Mi-17. It has a boat-type planing bottom of the kind designed by Sikorsky for the S-61 and S-62, a sponson carrying an inflatable flotation bag on each side and a small float under the tail, and fully retractable landing gear. Of at least 230 Mi-14s delivered to date, Libya and Syria each have 12 of the basic Mi-14PL ASW version, with a large undernose radome, retractable sonar, sonobuoys and signal flares, towed MAD bird stowed against the rear of the fuselage, and life raft. An autopilot/autohover system and autocontrol system are standard. The Libyan and Syrian Mi-14s are under Navy direction for coastal surveillance.

Contractor: Mil OKB, Russia.
Power Plant: two Klimov (Isotov) TV3-117MT turboshafts; each 1,950 shp.

Dimensions: rotor diameter 69 ft 10 $\frac{1}{4}$ in, fuselage length 60 ft 3 $\frac{1}{2}$ in, height 22 ft 9 in.

Weights: empty 25,900 lb, gross 30,865 lb.
Performance: max speed 143 mph, normal cruising speed 127 mph, service ceiling 11,500 ft, range with max fuel 705 miles.

Accommodation: crew of four.
Armament: torpedoes, bombs, depth charges, and other stores in weapons bay in bottom of hull.

Mi-24/25

More than 100 Mi-24 helicopter gunships, some probably known by the export designation Mi-25, are scattered around the Middle East and North Africa. Those in Iraq continued to slip through the uninspired terms of the cease-fire agreement that brought the Persian Gulf War to an abrupt end, by attacking the ethnic communities deemed hostile to Saddam Hussein. About 40 were delivered and first saw action against Iran in 1982. Little was seen of them during the Persian Gulf War, but maybe 30 or more remain available. Algeria is estimated to have at least 24, Libya 14, Syria more than 35, and Yemen about a dozen. When delivered to the former People's Democratic Republic of Yemen (the South), in the early 1980s, the helicopters were almost certainly flown by Soviet or Cuban crews. They now form part of the unified Republic of Yemen Air Force.

Most of the Mi-24s in this region appear to be of the original Mi-24D gunship version, although Iraq seems to have some Mi-24Ws. During the war with Iran, an F-4 Phantom II was destroyed by one of the 12 radio-

guided, tube-launched antitank missiles (NATO "Spiral") introduced on this version in place of the less effective "Swatters" on the Mi-24D. The W also has a HUD instead of the D's reflector sight. Both models have a heavily armored airframe; an undernose missile guidance pod (port) and electro-optical sight (starboard); and pilot's Doppler-fed mechanical map display, IFF, RWR, IR jammer, and chaff/flare dispensers. Engine exhaust IR suppression mixer boxes are optional. (Data for Mi-24D.)

Contractor: Mil OKB, Russia.

Power Plant: two Klimov (Isotov) TV3-117 turboshafts; each 2,225 shp.

Dimensions: rotor diameter 56 ft 9 in, fuselage length excl gun 57 ft 5½ in, height 21 ft 4 in.

Weights: empty 18,520 lb, gross 24,250 lb.

Performance: max speed 192 mph, max cruising speed 183 mph, service ceiling 14,750 ft, combat radius with max military load 99 miles, with four external fuel tanks 179 miles.

Accommodation: crew of two in tandem; flight mechanic, and provisions for eight troops or four litters in main cabin.

Armament: one four-barrel Gatling-type 12.7-mm machine gun in nose turret, slaved to electro-optical sight; four underwing hardpoints for 32-round packs of 57-mm rockets, 20-round packs of 80-mm rockets, twin-barrel 23-mm gun pods, 3,300 lb of chemical or conventional bombs, or PFM-1 mine dispensers. Provisions for firing AK-47 guns from cabin windows.

S-70/UH-60 Black Hawk

Major operator of this family of infantry squad transport and general-purpose helicopters in the Middle East is Saudi Arabia. Twelve S-70A-1s were delivered under FMS in 1990 in Desert Hawk configuration, each with 15 troop seats, Jaguar 5 frequency-hopping radio, blade-erosion protection by polyurethane tape and sprayed coating, and provision for an external hoist, searchlights, and internal auxiliary fuel tanks. One additional S-70A-1 was purchased with a VIP interior. Based at King Khalid Military City, these helicopters are not strictly eligible for inclusion in this Gallery, being operated by Royal Saudi Land Forces Army Aviation Command. Eight medical evacuation S-70A-1s have also been delivered, each with fittings for six litters, air-conditioning, an IR-filtered searchlight, rescue hoist, and improved avionics. Eight more are required, and an order for up to 88 Westland-built WS-70 Black Hawks is envisaged as part of the Al Yamamah II program.

Two US Army standard UH-60Ls were transferred to the Bahrain Emiri Air Force in 1991. The Egyptian Air Force purchased two VIP S-70A-21s in 1990. The Royal Jordanian Air Force acquired three S-70A-11s in 1987. (Data for current production UH-60L standard.)

Contractor: Sikorsky Aircraft, US.

Power Plant: two General Electric T700-GE-701C turboshafts; each 1,800 shp (1,723 shp T700-GE-701A optional for export).

Dimensions: rotor diameter 53 ft 8 in, fuselage length 50 ft 0¾ in, height 16 ft 10 in.

Weights: empty 11,500 lb, gross 22,000 lb.

Performance: max speed 184 mph, max cruising speed 173 mph, service ceiling 19,000 ft, range with internal fuel 363 miles, with four external tanks 1,380 miles.

Accommodation: crew of three; 11-14 troops, or up to six litters and 1-3 attendants, or cargo, in cabin. VIP configurations for 7-12 persons. Up to 8,000 lb load on external cargo sling.

Armament: provision for up to 10,000 lb of external stores, including 16 Hellfire laser-guided antiarmor or other missiles, gun pods, mine dispensers, rockets, or ECM pods. Two pintle mounts in cabin for a 0.50-in or 7.62-mm machine gun.

SA 321 Super Frelon

As part of a large order for French helicopters in the 1970s, Iraq acquired ten SA 321GV Super Frelons equipped with ORB-31D radar in a large nose radome and armed with two Exocet antiship missiles. Six more Super Frelons followed in the early 1980s. One is known to have been destroyed on the ground on February 13, 1991, during Operation Desert Storm, leaving an estimated ten still in service. The other operator included in this Gallery is Libya, which ordered eight SA 321Ms for search and rescue and logistical support in the early 1970s, followed in the 1980s by six maritime SA 321GMs with ORB-32WAS search radar. About six of each batch are thought to be still in service.

The Super Frelon is a three-engine, heavy-duty helicopter with a boat hull and, in its maritime versions, a stabilizing float on each side at the rear of the fuselage pod. IFF and dipping sonar are standard in versions used for ASW missions. (Data for SA 321G.)

Contractor: Aerospatiale, France.

Power Plant: three Turbomeca Turmo III_C turboshafts; each 1,550 shp.

Dimensions: rotor diameter 62 ft 0 in, fuselage length 65 ft 10¾ in, height 21 ft 10¾ in.

Weights: empty 15,130 lb, gross 28,660 lb.

Performance: cruising speed 155 mph, service ceiling 10,325 ft, range 509-633 miles.

Accommodation: crew of five, including equipment operators; provision for 27 passengers.

Armament: two Exocet ASMs or four homing torpedoes carried on sides of hull.

SA 330 Puma and AS 332 Super Puma/AS 532 Cougar

The prototype of the original SA 330 Puma, developed by Aerospatiale, flew on April 15, 1965. From it evolved a family of military assault and civilian transport helicopters of which 697 had been built for delivery to 46 countries by 1989, from assembly lines in France, the UK, Indonesia, and Romania. Manufacture by IAR SA in Romania continues. The typical SA 330H military export Puma is powered by two 1,400 shp Turmo IVB engines and carries 16 fully equipped troops, six litter patients and six seated casualties, or internal or external freight. The SA 330L differs in having 1,575 shp Turmo IVCs. Current inventory estimates include Iraq (20), Kuwait (six 330H), Lebanon (nine 330L), Morocco (25 330F), and Abu Dhabi (nine early 330C/Fs with Turmo IVB/A engines). The Kuwaiti Pumas escaped to Saudi Arabia when their country was invaded by Iraq, and they were in action during Operation Desert Storm.

The AS 332 Super Puma, first flown on September 13, 1978, differs from the Puma in having a new power plant, uprated transmission, and airframe changes to improve crew survivability, payload, performance, and ease of maintenance. No. 9 Squadron of the Qatar Emiri Air Force has a mix of Westland Commandos and Aerospatiale-built AS 332F Super Pumas with a folding tail rotor pylon, deck landing assist device, and pylons for Exocet missiles, for naval antiship and SAR missions. The basic Super Puma transport carries up to 21 troops. The 11 AS 332M_s of Jordan's No. 7 Squadron have a lengthened cabin accommodating 25 troops and increased fuel capacity. Kuwait's four AS 532SC Cougars are generally similar to the 332Fs, the change of designation and name indicating production by



S-70A-11, Royal Jordanian Air Force (Ivo Sturzenegger)



SA 330C Puma, Royal Air Force of Morocco (Ivo Sturzenegger)



AS 532SC Cougar, Kuwaiti Air Force (Paul Jackson)

Eurocopter SA, which combines the former Aerospatiale (French) and MBB (German) helicopter divisions. Like Kuwait's SA 330Hs, these helicopters operated from Saudi Arabia during the Persian Gulf War. (Data for AS 532SC.)

Contractor: Eurocopter SA, a Franco-German company.

Power Plant: two Turbomeca Makila 1A1 turboshafts; each 1,877 shp.

Dimensions: rotor diameter 51 ft 2¼ in, fuselage length 50 ft 11½ in, height 16 ft 1¾ in.

Weights: empty 9,920 lb, gross with internal load 19,841 lb, with slung load 20,615 lb.

Performance: cruising speed at S/L 149 mph, service ceiling 13,450 ft, range 540 miles.

Accommodation: crew of two or three; optionally, 21 passengers, nine litters and three seated persons, or freight.

Armament: options include two Exocet missiles or two lightweight torpedoes.

SA 342 Gazelle

French-designed and Anglo-French-built, this light helicopter has exhibited considerable versatility since it first appeared in the late 1960s, and a high percentage of those produced have been for export. Of nearly 40 countries that have bought Gazelles, more than a quarter have been in the Middle East and North Africa, and most of those now serving are models armed for antitank or antiship roles. Egypt imported 60 SA 342Ls and assembled another 30 locally, 12 of these serving with its Navy as antiship helicopters and most of the remainder as an Air Force antitank element. Iraq and Syria are both thought to have fleets of more than 50, Libya about 40, Morocco 24, Kuwait 20, Qatar 16, Abu Dhabi 11, with single-figure units operated by Jordan, Lebanon, and Tunisia; predominant model is the SA 342L. Small numbers in some of these fleets may be allocated to such nonbelligerent tasks as AOP or liaison, but the great majority are equipped for antitank or counterinsurgency duties. (Data for SA 342L.)

Contractor: Aerospatiale, France.

Power Plant: one Turbomeca Astazou XIVM turboshaft; 858 shp.

Dimensions: rotor diameter 34 ft 5½ in, fuselage length 31 ft 3¾ in, height 10 ft 5½ in.

Weights: empty 2,202 lb, gross 4,410 lb.

Performance: max cruising speed at S/L 161 mph, service ceiling 13,450 ft, range with standard fuel 440 miles.

Accommodation: crew of one or two; up to three other persons.

Armament: outriggers on fuselage sides for variety of weapons which can include up to six HOT wire-guided antitank missiles, two launchers for 68-mm or 2.75-in rockets, two 7.62-mm machine guns, or a single 20-mm gun.

Sea King, Commando, and AS-61

All of the S-61/SH-3-type helicopters operated by the air arms of six Middle Eastern nations were manufactured by Sikorsky's two European licensees: Westland of the UK and Agusta of Italy. Westland's score is the higher of the two, with 33 aircraft for Egypt and 12 for Qatar. Five of the Egyptian aircraft are ASW/ASV Sea King Mk 47s for that country's Navy, but the remaining British-built aircraft are of a model exclusive to Westland, the land-based Commando tactical transport. An initial Egyptian order for 24 Commandos, partly funded by Saudi Arabia, comprised five Mk 1s, minimally modified from the Sea King airframe, 17 tactical transport Mk 2s, and two VIP transport Mk 2Bs. A later acquisition was a quartet of electronic warfare Mk 2Es, equipped with Elettronica ECM and ESM. Qatar's Commandos are an equally varied mixture of three Mk 2A transports, one VIP Mk 2C, and eight Exocet-equipped antiship Mk 3s; the four transports serve with No. 9 (Multirole) Squadron and the Mk 3s with No. 8 (ASV) Squadron.

Agusta's contribution in the area includes two VIP AS-61s supplied to Egypt, two VIP AS-61As and ten or more antisubmarine ASH-3Ds for Iran, one VIP and four utility AS-61TSs for Iraq, a single VIP AS-61A for Libya, and three similar aircraft for Saudi Arabia. (Data for Commando Mk 2.)

Contractor: Westland Helicopters Ltd, UK.

Power Plant: two Rolls-Royce Gnome H.1400-1 turboshafts; each 1,660 shp.

Dimensions: rotor diameter 62 ft 0 in, fuselage length 55 ft 10 in, height 16 ft 10 in.

Weights: empty 12,390 lb, gross 21,500 lb.

Performance: max speed at S/L 140 mph, cruising speed at S/L 126 mph, hovering ceiling IGE 6,500 ft, range 246 miles with max payload and fuel reserves, 920 miles with max fuel.

Accommodation: crew of two; up to 28 troops (21 in Mk 1).

Armament: provision for guns, missiles, rocket pods, bombs, torpedoes, depth charges, or other weapons according to mission requirements. ■

Japan is slowly but unmistakably mapping an independent and assertive international course.

The Risen Sun?

By David J. Lynch

In the wake of the collapse of the Soviet threat that once bound them in a military embrace, the US and Japan have begun to weigh seriously the prospect for fundamental shifts in Asian security arrangements.

Thus far, the kind of dramatic changes that have characterized American military relationships in Europe since the fall of the Berlin Wall have been conspicuous by their absence in Asia. That, however, may be about to end, say many longtime analysts of the Pacific military scene.

One is Chalmers Johnson, author of *Japan in Search of a Normal Role* and a professor at the University of California, San Diego. "Over the next five to ten years, Japan will reemerge on the world's stage as a significant political actor," he predicts. "It will shed the client status it has occupied under the Japanese-American Security Treaty, and, by the late 1990s, it will become a fully fledged major power."

Robert Trice of the Center for Strategic and International Studies in Washington, D. C., says Asia is enjoying a "cold war thaw" and that the region faces neither a single, hegemonic power nor a tense standoff between superpowers. In this new envi-

ronment, Japan is slowly staking out a more independent course. "Yes, we're seeing Japan assume more of an independent foreign policy," says Mr. Trice, "and that's going to be problematic for US policy."

The next years are "going to mark a significant change in the relationship," adds a former US diplomat with long experience in Tokyo. "Japan is going to find itself placed in a role of prominence—economically at first, subsequently politically, and finally on the security side."

Several factors will help force the change in the US-Japan relationship. As Japan is increasingly expected to

The first postwar fighter designed by the Japanese aerospace industry, the Mitsubishi F-1 was developed with strong support from the US when tensions with the Soviets were high. Now that the threat has abated, the Japanese are beginning to seek their own way in matters of defense.



subsidize peacekeeping efforts and economic development around the globe, Tokyo will demand a greater say in the decisions that precede those commitments. Earlier this year, in a historic step, the Japanese government authorized, for the first time since the end of World War II, the overseas dispatch of Japanese troops. Finally, the relative shift in the economic strength of the two nations has left the US with a sense of grievance and Tokyo with a sense of distrust.

An Inevitable Clash?

Against a backdrop of major trade disputes between the two economic powerhouses, Japan's tentative steps to assert a larger role on the international stage have already sparked a backlash in the US. In popular books and academic studies, some analysts and political partisans talk of an inevitable national clash. Some go so far as to predict war.

Many, including US government officials, criticize these claims as alarmist. They insist relations with Japan are better than ever, especially in matters of defense.

They admit that Japan's defense budget of \$32 billion is sizable. Though

the rate of annual increases in arms outlays has been cut, spending on the so-called Self-Defense Forces (SDF) is expected to continue rising, making Japan the only major democratic power that is expanding its military might.

Even so, the traditional practice of limiting defense spending to one percent of Japan's Gross National Product is still observed more or less faithfully. Less tangible obstacles to Japan's reacquiring traditional great power status remain. Constraints on the military were the key to the postwar Japanese constitution imposed by Gen. Douglas MacArthur in the occupation of Japan. While there have been shifts in Tokyo's stance on these questions—notably, the new law allowing overseas missions—the Japanese public remains deeply pacifist.

"That constitution took hold," says James Auer, a former Japan expert at the Department of Defense and now a professor of Japanese studies at Vanderbilt University. "The greatest fear of Japanese militarism is in Japan."

Moreover, any overt steps by Japan to assume what Mr. Johnson calls a more "normal" national role would set off alarms and corresponding rearmament programs in South Korea,

China, Singapore, Taiwan, and other Pacific nations. In these countries, memories of Japan's brutal occupation fifty years ago remain fresh. Tokyo's failure to offer more than token apologies for its wartime actions has left many foreign leaders deeply skeptical of Japan's declarations of peaceful intent.

The most significant recent step toward a more assertive international role came when the Japanese Diet passed a law authorizing the overseas participation of SDF troops in UN peacekeeping operations. In substance, the legislation represents an incremental shift in Japanese policy. The move had heavy symbolic meaning, however, even though the legislation is far from a straightforward embrace of overseas deployments. (Deployments are limited to 2,000 soldiers on UN transports.) The change reflects Japan's adaptation to the emerging new world order. It would not have been possible a decade ago, analysts said.

The dissolution of the Soviet Union has erased the principal justification for the 1960 US-Japan Mutual Security Treaty. US officials, however, increasingly point to other rationales

for the treaty that took a back seat during the cold war.

"Cork in the Bottle"

Chief among them is reliance on US military forces in Japan to serve as a "cork in the bottle," the expression used by a top Marine Corps general not long ago to describe the function served by the 47,000 US soldiers and sailors in Japan. He meant that US Marine units, US Air Force units, and the Navy's Seventh Fleet are there to reassure other Asian countries that Japan will not be permitted to rearm and resume its aggression.

Observes Ellen Frost, former deputy assistant secretary of defense and now a private analyst of the Pacific region, "Our presence [in Japan] is a stabilizing role. Everyone, including China, wants us there. The mission is a political one."

Under the Pentagon's East Asia Strategy Initiative, only modest reductions in US troop levels are foreseen. Phase II of the initiative calls for a mere 700 servicemen and -women to return to the US.

Some lawmakers have begun arguing that, with the cold war over and a world economic war raging, the US can no longer afford its presence in Japan. Whether those arguments will translate anytime soon into a substantial US retrenchment is uncertain, but since Japan already picks up about seventy percent of the cost of stationing US forces in its country, it is cheaper to base the Seventh Fleet in Japan than in Long Beach, Calif.



Photo by Koku Fan / Arms Communications

Japan's history as a naval power has its neighbors worried about its new assertiveness. Japan is committed to developing a defense of its sea-lanes to 1,000 miles and has been purchasing modern ships and aircraft.

Despite official reassurances, a growing number of people are puzzling over the impact of the cold war's end on Japanese ambitions in the Pacific and beyond.

Some prominent Japan-watchers report that military power is not likely to be Tokyo's prime weapon for exerting international influence. Rather, they say, Japan is more apt to use a variety of long-term economic stratagems, gradually restricting US freedom of action in the Pacific.

Other analysts challenge the official US government view that the se-

curity alliance with Japan will survive the death of the cold war more or less unchanged. They point to Tokyo's efforts to develop its own military industry and craft a foreign policy that, however tentatively and gradually, moves away from US positions.

"Japan is more or less rearmed," says former State Department official Kevin Kearnes, who played a key role in harsh congressional opposition to the 1989 FSX fighter codevelopment program between Japan and the US. "Change in Japan is so gradual, [but] it's all happening. It's not like somebody's going to throw a switch in Tokyo and Japan will be the new superpower."

Even Mr. Kearnes, who worries that Japan's growing economic might will give it tremendous international leverage, doesn't think Japan wants to usurp the American military role in the Pacific. The sheer financial cost of replacing the US military umbrella with a home-grown alternative, coupled with the Japanese people's distaste for militarism, means that a massive Japanese rearmament is no sure thing. Tokyo might prefer to see its forces remain permanently stunted than to launch a full-scale buildup. "Japan would rather not spend a lot on defense if it doesn't have to," says Mr. Kearnes.

Limiting US Maneuvers

If Japan is unlikely to pose an outright military challenge to the US, it is taking steps on the economic front



Photo by Koku Fan / Arms Communications

Recent legislation allowing Japanese troops to be deployed overseas (up to 2,000 soldiers under UN command) can hardly be seen as militaristic, but it is a break in the decades-long history of keeping the Army within Japan's borders.

that may limit future American presidents' ability to take decisive action in a crisis. These include efforts by Japan to develop indigenous military production capabilities, eradicate competitors in the lucrative and militarily important computer chip industries, and exercise independence on critical foreign policy questions involving China and Vietnam.

A series of Defense Science Board studies in the late 1980s detailed the erosion of the market share of major US makers of semiconductor chips with military applications and the rise of Japanese producers. To date, Japan has been a reliable supplier of the critical electronic components needed to keep US weapons "smart." At the political fringes in Japan, there are voices calling for a more nationalistic approach.

"There's no question that the US and Japan are on a collision course,"



In recent years, Japan has bought its military top-flight equipment like the Mitsubishi-built F-15 above. It can also afford to cover about seventy percent of the cost of US units (below, a Misawa-based F-16C) deployed there.

Staff photo by Guy Aceto



claims Mr. Johnson. "It's not armed conflict, but Japan has a strategy for dealing with the US. It's techno-nationalism—to make the US increasingly dependent upon Japan."

Mr. Johnson's is by no means a universal assessment. Some Japan experts say common interests shared by the world's two largest economies, which grow more interdependent each day, will be enough to forestall the worst effects of growing nationalism.

"These are the two largest *status quo* nations in the world," says Mr. Auer, who served as special assistant for Japan in the Office of the Secretary of Defense from 1979 to 1988.

"The US and Japan are the two rich guys. Each one has a hell of a lot to protect." He says that defense cooperation between the two countries has been largely immune to the tensions that have bedeviled US-Japan trade relations.

The one area that has been a disappointment for the US is technology transfer. To smooth the flow to the US of Japanese technology with military potential, the US and Japan signed a broad memorandum of agreement in 1983. The accord was a departure for Japan, which had previously forbidden technology exports for weapons programs.

Initial high hopes in the US have been dashed in the nine years since the signing of the accord. Little technology has been approved for transfer to the US. Japanese companies are generally reluctant to make available their best technology for military programs because this causes subsequent restrictions on commercial exports. "The United States has been interested in acquiring Japanese technology for a number of years, but the results, according to DoD and Commerce officials, have been disappointing," the General Accounting Office reports.

The US is at fault, too, say observers. US military services have been slow to identify the specific technologies they want, have failed to approach individual Japanese companies, and have often left unfilled key Pentagon slots responsible for promoting such transfers.

Fallout From FSX

Additional technology cooperation has been dampened by the fallout from protracted political squabbles over the FSX codevelopment project. The program began in 1985 and culminated three years later in an agreement to develop jointly a new fighter aircraft based on General Dynamics Corp.'s venerable F-16 design. After serious objections to the deal were raised in Congress, the US negotiated a forty percent workshare of Japan's FSX spending. The US also was granted access to any technologies derived



Though Japan is the only major democratic power expanding its military, US Japan-watchers see Japan's postwar tradition of pacifism and its interest in maintaining the status quo as signs that renewed militarism is not on the horizon.

from the F-16 at no cost and the opportunity to buy any independent Japanese breakthroughs in the FSX radar, mission computer, inertial reference system, and integrated electronic warfare system applied to the aircraft.

The FSX program faces rising costs, schedule delays, and persistent speculation that the program will conclude after the production of only six prototype aircraft. That does not augur well for future joint ventures. A June 1992 GAO report indicates that program costs have increased seventy percent to \$1.9 billion because of design changes.

To date, the record on FSX technology transfer has been mixed, GAO says. General Dynamics has gotten important data on Japan's composite materials technology, but US access to advances in the four main areas the Japanese are pursuing independently has been limited. GAO reports that "Japan has not always been forthcoming about permitting access" to its FSX technologies.

Under plans made when the US-Soviet standoff defined international security, the US expects Japan to provide the first line of its own territorial defense, field more capable air defenses, and develop the capability for defense of its sea-lanes to a distance of 1,000 miles. These requirements were laid down when the notion of a Soviet offensive somehow plunging Asia into a general war was not inconceivable. That prospect seems to have evaporated.

However, other potential threats continue to worry the Japanese. Tokyo's concerns include the prospect of instability on the territory of the former Soviet Union, China's growing role as an Asian military power, Korea's evolution toward unification, and a series of disputes between a large number of nations over islands in the South China Sea.

"The balance of uncertainty is at an all-time high," says Mr. Auer.

Two Wild Cards

With the Soviet Union no longer the center of attention or interest in Asia, two countries hold the potential to highlight a divergence of US and Japanese interests: China and Vietnam.

Japan is far less willing than the United States to punish Chinese human rights violations with trade embargoes, economic sanctions, or political ostracism, mainly because Japan has too much to lose should Beijing suddenly become belligerent. Japanese leaders see economic development of China as the best long-term guarantor of human rights, according to Ms. Frost.

At the same time, Japan has been spooked by recent saber-rattling by the Chinese over the Senkaku and

Spratly Islands. Beijing's assertion of a willingness to use force on Senkaku and the development of an air refueling capability that would permit attacks on the Spratlys have caught Tokyo's attention. "The Japanese are scared out of their wits by rising Chinese influence in the region," reports Mr. Trice.

When it comes to Vietnam, the situation is different. Japanese companies are itching to exploit Hanoi's potentially vast market for Japanese goods and equipment. To date, they have held off in deference to US policy against doing business with the Communist regime. How long they will restrain themselves is anybody's guess.

Officially, Washington takes a rather sanguine view of Japanese aspirations on the international stage. Policymakers say Japan has yet to decide exactly what role it will play with the end of the cold war. US officials expect that Japan will be far more active politically but will stop short of asserting a full military profile.

"The Japanese are still feeling their way as to what role they want to play internationally," says a senior State Department official. "They understand the present security framework serves regional stability very well."


The first signs of change in Japan's approach to world affairs have appeared. The irony is that many of the changes about which some in the US are so ambivalent have come as the result of intense US prodding.

Partly in response to US criticism, for example, Japan now increasingly considers recipient nations' human rights practices, military budgets, and commitment to democracy in doling out its foreign aid (China is the notable exception). Japanese diplomats have weighed in on Cambodian disputes, insisted that North Korea forswear nuclear weapons in return for Japanese assent to the unification of the peninsula, and pressed Russian officials to curb arms sales to China.

"A decade from now, Japan will be a fully fledged major power defending itself," says Mr. Johnson. "If we're still allied, it will be a much different alliance. There's a good chance we won't be allied." ■

David J. Lynch covers the aerospace industry and national defense topics for the Orange County Register in California. He is a former editor of Defense Week Magazine in Washington, D. C. His most recent article for AIR FORCE Magazine was "Angst at Olympic Arena" in the August 1992 issue.

The US Air Force and Tomorrow

October 29-30, 1992 

Los Angeles Airport Marriott Hotel • (310) 641-5700

Now in its seventeenth year, this in-depth update on our US Air Force, its new commands, and its future aerospace requirements is one you won't want to miss. The focus will be on how USAF's capabilities and requirements will affect national security and the defense industry in the years ahead.

Invited participants include:

- The Hon. Donald B. Rice, Secretary of the Air Force
- Gen. Merrill A. McPeak, Chief of Staff, USAF
- Gen. Ronald W. Yates, Commander, Air Force Materiel Command
- Gen. Robert C. Oaks, Commander in Chief, USAFE
- Gen. George L. Butler, USCINCSTRAT
- Gen. Jimmie V. Adams, Commander in Chief, PACAF
- Gen. Charles A. Horner, USCINCSpace
- Gen. Ronald R. Fogleman, USCINCTrans
- Lt. Gen. (selectee) Stephen B. Croker, Vice Commander, Air Combat Command

For information and registration for all symposia, call Dottie Flanagan at (703) 247-5805.

Registration for all Los Angeles Symposium events is \$330 (\$355 for non-AFA members).

Coming in 1993: A comprehensive review of air warfare capabilities, a major AFA National Symposium in Orlando, Fla., February 4-5, 1993.

R E G I S T R A T I O N F O R M

1992 AFA National Symposium
The US Air Force—Today and Tomorrow

Los Angeles Airport Marriott
Los Angeles, Calif.
October 29-30, 1992

Registration closes Tuesday, October 20, 1992. No refunds can be made for cancellations after that date.

Mail this form to:
Air Force Association
Attn: Miss Flanagan
1501 Lee Highway
Arlington VA 22209-1198

(703) 247-5805

Name (print)

Title

Address

City, State, Zip

Telephone (with area code)

My check covering the Symposium fee for AFA individual or Industrial Associate member of \$330, payable to the Air Force Association, is enclosed. The fee includes one (1) Reception/Buffer ticket. (Note: fee for nonmember is \$355.)

Mark here for an extra guest Reception/Buffer ticket and enclose an additional \$85.

A Checklist of Air Force Armament and Ordnance

Edited by Tamar A. Mehuron, Associate Editor

Work in progress at the Air Force's major program offices, Aeronautical Systems Center's armament offices at Eglin AFB, Fla., and Wright Laboratory's Armament Directorate, Eglin AFB

Advanced Medium-Range Air-to-Air Missile Joint System Program Office

AIM-120 Advanced Medium-Range Air-to-Air Missile

Program to develop and deploy the Air Force's and Navy's next-generation, tactical air combat missile, replacing the AIM-7 Sparrow radar-guided weapon. AMRAAM is a fire-and-forget missile that enables pilots to aim and fire several missiles at multiple targets while maneuvering. AMRAAM is to have all-weather, all-environment, radar-guided capabilities and be compatible with F-14, F-15, F-16, F/A-18, British Tornado F. Mk. 2, Royal Navy Sea Harrier, and German F-4F. **Contractors:** Hughes, Raytheon. **Status:** Production.

AMRAAM Preplanned Product Improvement

Program to ensure that AMRAAM retains superiority against a changing threat, that it takes advantage of opportunities to use emerging technologies, and that it is compatible with future as well as current fighters. Focus on electronically erasable/programmable read-only memory chip insertion, ECCM, propulsion options, and ordnance enhancements. **Contractors:** Hughes, Raytheon. **Status:** Preplanned product improvement (P³).

AMRAAM Producibility Enhancement Program

Comprehensive value engineering program designed to introduce less expensive, alternative designs and high technology into AMRAAM and to expand the competitive vendor base. **Contractors:** Hughes, Raytheon. **Status:** Production.

Advanced Tactical Fighter Weaponization

Initiative to ensure resolution of weapon issues, weapon integration, and weapon research and development activities concerning the F-22. **Contractor:** None. **Status:** Ongoing.

Missile Rail Launcher

Program to provide AMRAAM and Sidewinder rail launch capability on F-15, F-16, and F/A-18, maximizing use of common components. **Contractors:** Hughes, United Telecontrol Electronics. **Status:** Production.

Air-to-Surface Weapon System Program Office

Advanced Attack Weapon

Program to integrate a millimeter-wave seeker with the AGM-65 Maverick missile. The millimeter-wave Maverick uses the target radar return for detection, discrimination, prioritization, and acquisition and track of air defense units (primary), tanks, and other targets within battlefield and deployment arrays. This will provide a true, totally autonomous, all-weather, day/night, lock-on-after-launch, standoff weapon to attack mobile ground forces. Continuing effort funded to refine and develop algorithms for application in suppression of enemy air defense and against high-value targets. **Contractors:** Boeing, Hercules, Hughes. **Status:** Demonstration/validation completed.

Advanced Guidance Evaluation Program

Navy-USAF technical assessment of autonomous imaging sensor technologies and associated mission planning. Assessment included engineering evaluation, algorithm analysis, target materials specification, and captive flight testing of imaging infrared (IIR), synthetic aperture radar (SAR), and laser radar (LADAR) seekers during Fiscal 1991 and Fiscal 1992. Program terminated Fiscal 1992 with recommendation regarding maturity of guidance and mission planning technology for current and future cruise missile applications. **Contractors:** General Dynamics (GD)/Convair, Hughes, McDonnell Douglas (MD), Loral, Raytheon, Texas Instruments (TI). **Status:** Concept exploration.

Advanced Support Equipment

Effort to develop portable Modular Automatic Test Equipment-qualified tester to replace the existing AN/GJM-55 Test Set. It will operate with the AN/GJM-37A optical simulator, the infrared target simulator, and the RF coupler currently used in conjunction with the AN/GJM-55 test set. It will provide tactical air forces with a reliable capability to test and expedite repair of these air-to-surface weapon systems. **Contractor:** GD. **Status:** Engineering and manufacturing development (EMD).

AGM-130A

Production of a rocket-powered, unitary (2,000-pound Mk. 84) version of the GBU-15 glide bomb, initiated through a product improvement program. The weapon provides a flexible, precision, standoff attack capability for the F-111F and the F-15E aircraft that increases the tactical air forces' capability to destroy high-value targets. Upgrades include a new solid-state TV seeker and improved IR seeker. **Contractor:** Rockwell. **Status:** Production.

AGM-142 Have Nap

Development of an air-to-ground, precision guided, conventional standoff missile system. The system has been in production in Israel since 1983. A Foreign Weapon Evaluation program was conducted at Eglin AFB in Fiscal 1987. A streamlined development program was completed to implement minor adjustments identified during the FWE program. Provides standoff capability to ACC B-52s against fixed and mobile, high-value, soft targets. The USAF version uses either an electro-optical or IIR seeker and either a blast-fragmentation or a penetrating warhead. **Contractor:** Rafael Industries. **Status:** Production.

Autonomous Guidance for Conventional Weapons

Technology program to demonstrate capability of an IIR seeker to autonomously detect, acquire, track, and guide to a predetermined aimpoint on a prebriefed, high-value target. The seeker is being designed in modular fashion to expand its application to a wide variety of weapons. **Contractor:** TI. **Status:** Technology demonstration completed. Future applications to be determined.

BSU-93 Air Inflatable Retarder

Program to procure new AIR for use with the M117 bomb for carriage on

the B-52. The BSU-93 is a modified Navy BSU-85 used with the 1,000-pound Mk. 83 bomb. The BSU-85 ring was modified to mate with the 750-pound M117 bomb. This effort will satisfy ACC's requirement for M117 bomb retarders. Production begins in Fiscal 1992. **Contractor:** To be determined (TBD). **Status:** Production.

Depot Automatic Test System

Program to provide long-term depot diagnostic test support for the AGM-130/GBU-15 family of weapons. A primary objective is to procure modern equipment qualified in accordance with Modular Automatic Test Equipment program guidelines. Equipment selected will be configured to meet these objectives and, with associated equipment, will have a growth capability for future updates/modifications of the AGM-130/GBU-15 systems, including the improved data link and advanced support equipment. **Contractor:** Hughes. **Status:** Production.

GBU-15/BLU-109 Integration

Program to enhance tactical air forces' ability to attack hardened vertical targets with precision guided standoff weapons. The GBU-15 (2,000-pound Mk. 84) warhead can be replaced with the BLU-109, a penetrating 2,000-pound warhead. This increased-capability weapon can be delivered from the F-4, F-111F, and F-15E. **Contractor:** Teledyne Brown. **Status:** Production.

GBU-28/B Hardened Target-Penetrating Munition

Program that developed new bunker-busting weapon for use in Operation Desert Storm against deeply buried, hardened command-and-control facilities. Under USAF's rapid response program, the service developed a body design based on the BLU-109/B penetrator, extending the length by 54 inches (to 152 inches) and doubling the wall thickness to 2.25 inches. The bomb, flight tested on the F-15E and F-111F, demonstrated the capability to penetrate more than 100 feet of dirt or 20 feet of concrete. **Contractor:** Lockheed Missiles & Space Systems. **Status:** Production.

Improved Data Link

Program to replace the present AN/AXQ-14 data link used on the GBU-15. The new data link will provide the capability to counter current and projected electronic warfare threats using advanced antijam techniques. The new pod is compatible with the F-4E, F-111F, and F-15E aircraft and can be used with the GBU-15 and the AGM-130. **Contractor:** Team of Harris and Magnavox. **Status:** EMD.

Improved 2,000-Pound Bomb (BLU-109/B) and FMU-143 Fuze

Development of BLU-109/B and FMU-143 fuze to defeat targets too hard to destroy with existing inventory bombs. The BLU-109/B retains interface modularity with Mk. 84 conical tail and guidance kits. Principal uses would be against reinforced concrete bunkers, caves, bridge piers, and landing surfaces, among others. **Contractor:** Lockheed. **Status:** Production.

INS/GPS Operational Concept Demonstration

Program to demonstrate the concept of an INS/GPS guided, 2,000-pound direct attack weapon in an operational environment. A government team will build and integrate six modified GBU-15s to launch from Block 40 F-16C test aircraft. OCD is an AFMC/ACC High Gear program. **Contractor:** Honeywell. **Status:** Demonstration.

Joint Direct Attack Munitions

Multiphase program that, in Phase I, will develop an accurate, all-weather inertial navigation system/Global Positioning System guidance kit for integration on 2,000-pound bombs for Air Force and Navy use. Data from the aircraft navigation system will be used to calibrate and align the weapon's inertial unit prior to release. After release, the bomb will guide itself to designated target coordinates with no aircrew interface. Phase II will develop a Joint Programmable Fuze to meet Air Force and Navy requirements for a safe and effective, cockpit selectable, multifunction, programmable fuze. Under Phase III, a precision adverse weather capability will be incorporated. **Contractor:** TBD. **Status:** Concept exploration and definition.

Joint Tactical System Program Office

AGM-88 High-Speed Antiradiation Missile

Production of defense-suppression weapons that locate, guide on, and destroy enemy radar sites that control surface-to-air missiles. HARM is deployed on the F-4G Wild Weasel and the F-16 and is being considered for the F-15E. The Navy also uses HARM. The HARM-B Block III is currently in production. Block III retrofit was completed in March 1991. A hardware and software upgrade, HARM-C-1 (Block IV), recently completed operational test and evaluation and has been approved for production with delivery beginning in May 1993. **Contractors:** TI, Thiokol, Hercules. **Status:** Production.

F-16 HARM/Shrike Integration Program

Three-phase, quick-reaction-capability program to satisfy the tactical air forces' need to increase defense suppression capability by using the F-16 to augment the F-4G Wild Weasel force. No modification to the F-16 aircraft or the HARM/Shrike missile was permitted during Phases I and II. Phase III will provide HARM Block IV capability. **Contractor:** TI. **Status:** Production.

Sensor-Fuzed Weapons and Airfield Attack System Program Office

Sensor-Fuzed Weapon

Program to produce the first wide-area cluster munition with "smart" warheads capable of multiple kills per pass against armored targets. The SFW is a 1,000-pound-class cluster weapon containing ten BLU-108/B submunitions, each of which contains four "smart" armor-piercing warheads. Each warhead uses an infrared sensor to independently detect and fire on enemy vehicles. SFW will be compatible with all tactical aircraft. **Contractor:** Textron Defense Systems. **Status:** Low-rate initial production.

Wright Laboratory: Armament Directorate

Advanced Technology LADAR System

Program to develop and demonstrate an affordable, high-resolution, LADAR guidance system for medium- and long-range air-launched attack of high-value, fixed, ground targets. Applies to cruise missiles and medium-range air-to-ground missiles. **Contractors:** MD, GD. **Status:** Advanced development.

Autonomous Synthetic Aperture Radar Guidance

Program to develop and demonstrate an affordable, all-weather, midcourse and terminal guidance system for medium- and long-range air-launched attack of high-value relocatable and fixed ground targets. Applies to conventional cruise missiles and medium-range air-to-ground missiles. **Contractors:** Loral, Raytheon. **Status:** Advanced development.

Boosted Penetrator

Program to develop a large (2,000-pound-class) penetrator to defeat heavily hardened underground C³I facilities. **Contractor:** TBD. **Status:** Advanced development.

Electromagnetic Launcher Technology

Program to design and develop component and subsystem technologies for rapid-fire hypervelocity gun systems. **Contractors:** Sparta, PKD. **Status:** Exploratory and advanced development.

Guided Interceptor Technology

Technology program to develop sensors, seekers, processors, and integrated guidance systems for space-based conventional weapons. **Contractors:** Rockwell, TI, Ball Aerospace, Hughes, Nichols Research, Martin Marietta. **Status:** Exploratory and advanced development.

Hard-Target Ordnance Technology

Program to develop and demonstrate warhead, fuze, rocket motor, and integration technologies for a boosted penetrator weapon to defeat heavily hardened targets, such as underground C³I sites. **Contractors:** Lockheed, Motorola, AAI. **Status:** Advanced development.

Have Dash II

Program of experiments to develop bank-to-turn steering technology for medium-range air-to-air missiles. Flight test of this all-composite missile airframe will be the first time a nonaxisymmetric, air-to-air missile airframe has flown with bank-to-turn steering logic. This technology is critical to the development of air-breathing propulsion systems where inlet flow must be maintained over the flight environment. **Contractor:** Loral. **Status:** Exploratory development.

Insensitive Munitions Fuze Technology

Program will identify design concepts, critical technologies, and test techniques applicable to the development of an all-up round with insensitive munition fuzing. **Contractor:** AAI. **Status:** Exploratory development.

Insensitive Munitions Technology

Program to develop, qualify, and introduce into the Air Force inventory an insensitive high explosive that is safe to handle, store, and transport. Several explosives developed in-house, by the Navy, and by a contractor are being evaluated. **Contractor:** Atlantic Research Corp. **Status:** Advanced development.

Multispectral Air-to-Air Seeker

Technology program to develop a follow-on seeker for the AMRAAM (AIM-120) missile. **Contractor:** TBD. **Status:** Advanced development.

Programmable Ordnance Technology

Technology program to design and demonstrate an AIM-120 AMRAAM ordnance package to defeat the post-1995 air threat. The ordnance package will include an improved target detection device; a more lethal warhead; and an electronic safe, arm, and fire device. **Contractor:** Motorola. **Status:** Advanced development.

Space Target Vulnerability/Lethality Assessments

Technology program to develop threat descriptions, kill criteria, and test conditions to evaluate the effectiveness of SDI conventional weapons concepts. **Contractors:** GRC, SAIC. **Status:** Exploratory development, advanced development. ■

By John L. Frisbee, Contributing Editor

A Distinguished Crew

Maj. George Glober and his crew volunteered for a perilous mission to photograph enemy forces at Wake Island.

AFTER the Japanese Navy was defeated at Midway in early June 1942, Japan's easternmost base in the central Pacific was Wake Island, where many fighters were believed to be stationed. Because of Wake's great distance from the closest US base at Midway—about 1,300 miles—the only immediately feasible means of attack was by carrier aircraft. The Navy did not want to risk one of its two remaining Pacific Fleet carriers without detailed knowledge of enemy forces at Wake. Twice aircraft had been dispatched from Midway to photograph the island. Neither returned.

In mid-July, headquarters at Honolulu called for volunteers to make a third attempt. Maj. George Glober, commander of the 31st Bomb Squadron on Oahu, and his crew were selected from among eight volunteers. Before staging forward to Midway, bomb bay tanks, a nose gun, and a camera hatch were added to Major Glober's early model B-17E.

Early in the morning of July 31, Major Glober's B-17 broke ground at Midway and headed southwest toward Wake Island. South of Midway they penetrated a violent front. When 150 miles from the island, Major Glober descended to the wave tops to avoid enemy radar. When the tiny island appeared on the horizon, he climbed to 2,000 feet for the first photo run. From his ball turret, Cpl. Robert Holliday reported enemy AA opening fire and six fighters taking off. Four were Zeros, and two were unfamiliar "Me-109" types. As the fighters climbed to attack, Major Glober made two more passes at 4,000 and 6,000 feet while SSgt. Edward Caton photographed the island, then manned the right waist gun.

Major Glober knew that their salvation lay in altitude, where his supercharged B-17 could outperform the enemy fighters. A forty-minute battle

was joined as Glober flew the B-17 in a twisting, jinking climb to 25,000 feet. With his two .50-caliber guns, ball turret gunner Holliday disintegrated the first "Me-109" to open fire. The second was destroyed by tail-gunner Sgt. James Sanford. One Zero was demolished by bombardier TSgt. Claude Phillips with the recently installed nose gun and a second Zero by the left waist gunner, Cpl. Robert Fries. Sergeant Caton scored a probable as he sent a Zero spinning toward the sea. One damaged fighter followed the B-17 until it was too far at sea to return to Wake.

During the violent evasive maneuvers of the air battle, the B-17's navigation instruments were useless. Navigator 2d Lt. Harry Smith had to plot a course to Midway by dead reckoning from an unknown point with a compass damaged by enemy fire. Since they were either in weather or under a high overcast, celestial navigation was not possible. At their estimated time of arrival, blacked-out Midway was nowhere in sight. Major Glober broke radio silence to contact Midway radar. The fuel gauges were bouncing off the peg. After the excruciatingly long period that primitive radar required to locate and identify the B-17, it was cleared to land. As Major Glober touched down, the number two engine died of fuel starvation. They had been in the air for seventeen and a half hours.

After a few hours' rest, the crew flew back to Honolulu with the desperately needed photographs. Gen. "Hap" Arnold sent a message of commendation to the entire crew. Looking back on those years, Ed Caton says that he flew photoreconnaissance missions with thirty-three crews, but none of them came up to the standards of George Glober's.

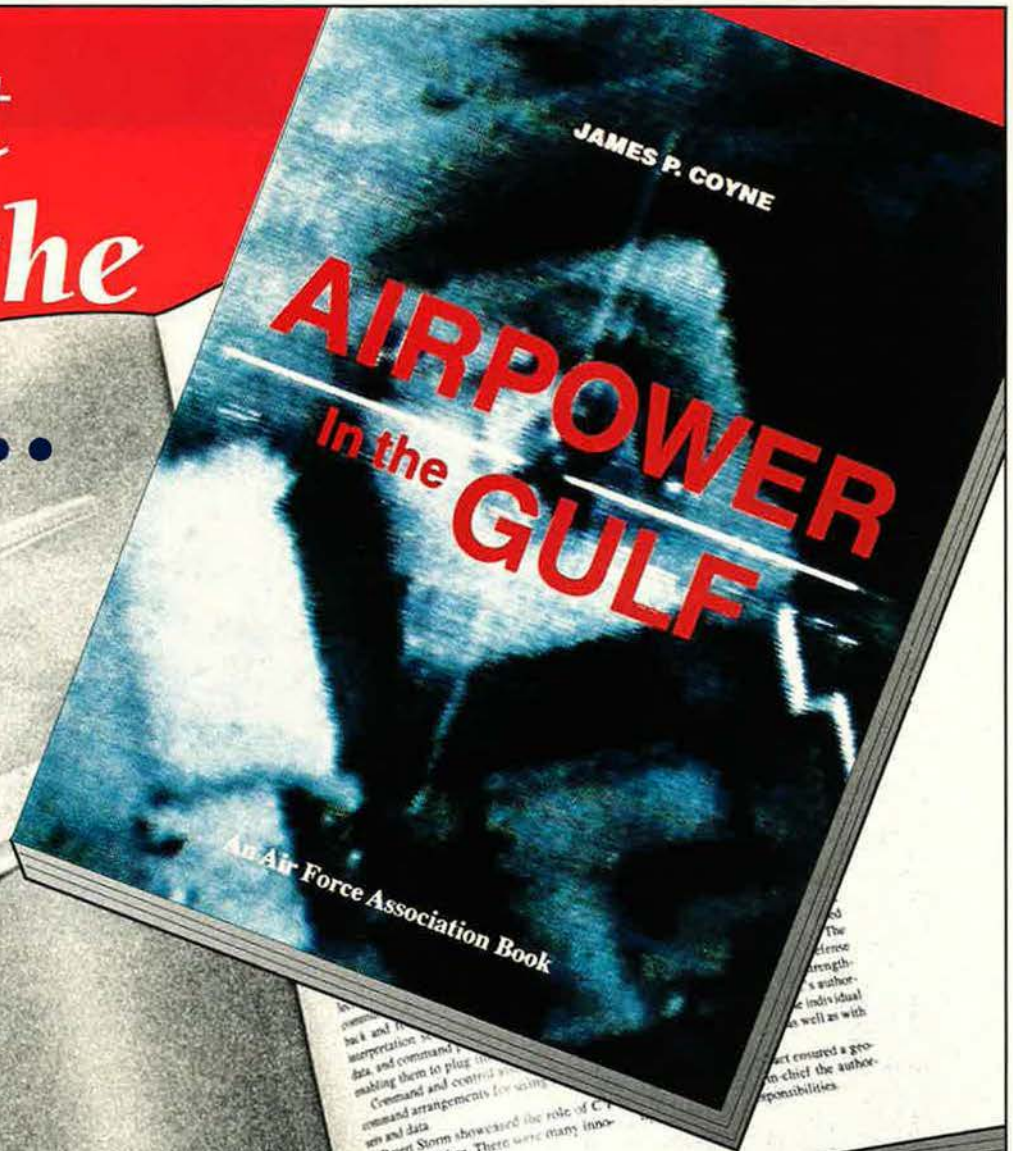
Several days after the Wake Island mission, Major Glober was told that he was to be awarded the Distinguished Service Cross. He declined to accept unless all members of the crew received the same award. All were volunteers who knew the odds against them, and all shared equally in the hazards of the mission, he said. On September 17, 1942 in a ceremony at Hickam Field, all ten members of the crew were presented the DSC—one of the few instances when an entire crew was so honored. That crew went on to achieve an outstanding combat record in the southwest Pacific. Robert Holliday and Claude Phillips became two of the most decorated airmen of the war.

Today, four members of the crew, all retired from the Air Force, survive: Col. George Glober, CMSgt. Robert Holliday, Col. Edward Caton, and Maj. Claude Phillips. They will always be George Glober's crew. ■

Thanks to Col. Albert James, USAF (Ret.), for calling this mission to our attention.



A Bolt from the Blue...



Cloaked by darkness and stealth, more than 400 allied aircraft crossed the border into Saddam Hussein's Iraq in the early morning hours of January 17, 1991, and struck a blow from which the Iraqi armed forces never recovered. It was the beginning of the most impressive air campaign in history.

Here is the *real* story of Operation Desert Storm. You may have read other books on the Gulf War, but this is the one you'll turn to again and again over the years. Veteran fighter pilot Jim Coyne draws on a year's research and almost 200 interviews with participants—the sergeants and the airmen as well as the generals and the captains—to explain how the air campaign was planned, fought, and won. It's loaded with eyewitness reports and first-person accounts.

Airpower in the Gulf

by James P. Coyne

An Air Force Association Book Published by the Aerospace Education Foundation

- 232 pages, large format
- Dozens of photos, maps, and charts
- Chronology of the air war

Special discount to AFA members

Aerospace Education Foundation/Airpower in the Gulf
1501 Lee Highway, Arlington, VA 22209-1198

Send me _____ copies of *Airpower in the Gulf*. \$21 per copy (\$18.90 for AFA members) enclosed. Add \$2.95 per book for shipping and handling. A total of \$ _____ is enclosed.

Name _____

Address _____

City _____ State _____ Zip _____

Check enclosed (Make payable to AEF) Visa MasterCard

Account Number _____ Exp. Date _____

Signature _____ Date _____

By Daniel M. Sheehan, Assistant Managing Editor

A Tradition in Transition

For forty-six years, Tactical Air Command stood ready with highly trained pilots and superb aircraft to accomplish its varied and important missions. For the last twenty-seven of those years, the **Langley (Va.) Chapter** has helped celebrate TAC's accomplishments with its annual Salute to TAC. The final such salute took place last spring, but, in the words of Gen. John Michael Loh, TAC's last commander, it was "not a farewell" but rather "an evolutionary step in this great thing called 'airpower.'"

T. J. Ehrenberger, a member of the Langley Chapter's Communications Committee, reports that more than 1,100 people turned out at the gala reception and banquet at the Virginia Air and Space Center in downtown Hampton to hear remarks by General Loh and three former TAC commanders, Gens. Robert D. Russ, W. L. Creech, and Robert J. Dixon. The audience, which included James L. Eason, mayor of Hampton; Barry DuVal, mayor of Newport News; and Rep. Herb Bateman (R-Va.), whose district includes Langley AFB, was also treated to a multimedia history of the command, "The TAC Years," and music by the USAF Strolling Strings and the Tactical Air Command Band.

Before the banquet, 450 industry representatives from across the country were briefed by General Loh and his staff, who discussed the needs and priorities of Air Combat Command. ACC enfolded TAC's assets along with many of those from Strategic Air Command when it was activated June 1.

General Russ praised TAC's performance in Operation Desert Storm: "The training and the teamwork and the dedication of the men and women of TAC really paid off, and paid off for the world to see." General Creech, who could not attend due to a family illness, sent written remarks, read by General Loh, praising those who contributed to "the enviable record inherent in TAC over the years." General Dixon also had plaudits for the people of TAC: "The key . . . is Air Force troops. They are the people who will work the change. They did it for TAC; they will do it for ACC."



Langley Chapter President George Golden stands ready to present a historical marker to TAC's last commander, Gen. John Michael Loh. In his speech, General Loh said that all of the assets of his new command, Air Combat Command, would be "dedicated to building the world's most respected air and space force."

After the speeches, Langley Chapter President George D. Golden presented a bronze historical marker to General Loh, "commemorating the forty-six-year glorious history of Tactical Air Command." It will be permanently displayed in Memorial Park at Langley. General Loh closed the ceremonies by declaring, "This has been a great day for our industry partners, and, with the briefings that we had, we continue to make this a better and better day every year in association with the AFA chapter."

Clarinda 6-5000

Army Air Forces Maj. Glenn Miller disappeared in 1944, but his big band music is played and beloved today. Two AFA chapters seek to preserve his memory by supporting the Glenn Miller Birthplace Society in Clarinda, Iowa. The **Ak-Sar-Ben (Neb.) Chapter** and the **Lincoln (Neb.) Chapter** teamed up to raise enough money to purchase an authentic World War II officer's uniform, a mannequin to mount it on, and the appropriate ribbons and patches for display in the society's museum.

Lincoln Chapter Secretary SMSgt. Larry Brooks, Nebraska ANG, and National Vice President (Midwest Region)

Jim McCoy presented the uniform to Society President Marvin Negley at the sixteenth annual Glenn Miller Festival. With the aid of both AFA chapters, the society is gearing up to commemorate the fiftieth anniversary of Major Miller's disappearance in 1994.

The Benefits of Membership

Vice President McCoy, who also serves as national membership chairman, grasped a recent opportunity to expand AFA's influence overseas. At SAC's final Bombing and Navigation Competition at Barksdale AFB, La., he took the time to explain the advantages of joining AFA to a Russian visitor, Olegovich Skornyakov, a captain of the guard who serves as flight engineer aboard a Tu-95 "Bear" bomber. Though Mr. McCoy couldn't convince the captain to join, he did present a USA/AFA flag pin to the Russian officer in a gesture of camaraderie.

A Tribute to Vosler

One of AFA's founding fathers, the late Forrest L. Vosler [see "Aerospace World," April 1992, p. 27], a member of AFA's first Board of Directors who served as a permanent national direc-

tor until his death last February, was recently honored by Air Force Space Command. The command's new NCO Professional Military Education Center at Peterson AFB, Colo., will bear his name [see photo below]. Technical Sergeant Vosler was one of four USAAF enlisted men to receive the Medal of Honor during World War II.

State Conventions

Colorado is home to the US Air Force Academy, some breathtaking scenery, and almost 6,000 AFA members. The **Mile High (Colo.) Chapter** hosted a gathering of a good percentage of those members at the state's thirty-second annual convention last summer. All six chapters were represented at the two-day event, which State President John Scott deemed a great success.

Air Force Assistant Secretary for Financial Management and Comptroller Michael B. Donley, a timely choice in these days of cutbacks and financial constraints, addressed the convention, describing the impact of tight budgets on Air Force programs. Maj. Gen. Fred D. Nelson, commander of Lowry Technical Training Center, also spoke. General Nelson, who as senior active-duty pilot is honored as the Gray Eagle, updated the audience on the impending closure of Lowry AFB.

Mile High Chapter President Mark Worrick organized a welter of activities around the convention, including a golf tournament, a bridge tournament, a fashion show, and a tour of the Lowry Heritage Museum. Joy Demmler of the **General Robert E. Huyser Chapter** received the State President's Special Citation from Mr. Donley.

Hanscom AFB, Mass., was the site for the Massachusetts State Convention and a Regional Workshop and Awards Banquet. National President O. R. Crawford was the featured speaker to an audience that included members from all nine Massachusetts Chapters. National Vice President (New England Region) Robert N. McChes-

ney presided over the workshop, which sought to clarify AFA's role in influencing legislation.

Also at the convention, State President David R. Cummock saw the election of his successor, Carol Chrest, currently state vice president, who takes over October 1. Capt. John B. Steele, currently vice president for Aerospace Education, was elected to assume Ms. Chrest's post.

Brig. Gen. Raymond Shulstad, vice commander of Electronic Systems Division (since renamed Electronic Systems Center), was the featured speaker for the evening program and assisted in the presentation of awards. Captain Steele accepted one of those awards on behalf of the **Major John S. Southrey Chapter** for its outstanding work on the Wright Flight aerospace education program. President Crawford righted an omission by presenting **Paul Revere Chapter** stalwart Alan Shoemaker with his delayed Medal of Merit, earned for his work in 1991.

The **Lake Superior-Northland Chapter** in Michigan's scenic Upper Peninsula hosted its first convention, and by all accounts it was a rousing success. Michigan also saw a changing of the guard, with State President Art Tesner passing his leadership role to the host chapter's own George Copher, former chapter president. **Mid-Michigan Chapter** President James Greshel, current Lake Superior-Northland Chapter President Dave Allie, and National Vice President (Great Lakes Region) Cecil Hopper attended the convention, which featured two speakers.

Lt. Gen. Robert D. Beckel, USAF (Ret.), who retired as commander of 15th Air Force, is no stranger to the region, having served as commander of the 410th Bomb Wing at nearby K. I. Sawyer AFB. He told the audience, which included the current commander, Col. John Frisby, of his active-duty experience there and as a Thunderbird pilot in the mid-1960s. Host

chapter member Frances Jo Curnell Curtis related the experiences of her trip through eastern Europe and the former USSR [see "AFA/AEF Report," May 1992, p. 160].

John A. Gilpin of the **Lt. Gen. Frank Maxwell Andrews Chapter** was named Tennessee's Man of the Year at that state's convention last summer in Memphis. Executive Director Monroe W. Hatch was the guest speaker at the session, which saw **Everett R. Cook Chapter** member Everett E. Stevenson elected to succeed Wayne L. Stephenson as state president. Individuals and units from active-duty USAF, Tennessee ANG, Civil Air Patrol, AFROTC, and AFJROTC were singled out for their accomplishments.

Convention-goers later heard talks from a representative of the Tennessee Department of Veterans Affairs and from Col. Nick P. Ardillo, Jr., commander of the 14th Flying Training Wing at Columbus AFB, Miss. Delegates also heard a recap of the individual chapters' active participation in the "Visions of Exploration" program, which, in conjunction with *USA Today*, supports science and aerospace education throughout the state.

National Directors Dan F. Callahan and Frank M. Lugo and National Vice President (South Central Region) H. R. "Bobby" Case were among those who witnessed the installation of Tennessee's other officers for the coming year: Vice President Dick Danoff of the **H. H. Arnold Memorial Chapter**, Secretary Joe Crozier of the Cook Chapter, and Glenn Fuller of the Cook Chapter.

Chapter News

Jim Curl, vice president (Veterans Affairs) of the **Tulsa (Okla.) Chapter**, and Chapter President Harry Burt spearheaded an effort to get two much-needed chemotherapy treatment chairs for the Veterans Administration Outpatient Clinic in Tulsa, Okla. Clinic Director Dr. Laurie Greenburg praised the chapter for its efforts and said the chairs

Colorado Springs/Lance Sijan Chapter President Don Dandurand presents a \$5,000 check to AFSPACECOM Commander Gen. Donald J. Kutyna for a new Learning Resource Center at the command's NCO Academy while members of the academy's staff look on.





Lt. Gen. George H. McKee, USAF (Ret.), president of the 2d Bomb Wing Association (left), and E. F. "Sandy" Faust, permanent National Director, present an AFA plaque to Brig. Gen. George P. Cole, Jr., commander of the 2d Wing, to commemorate the 14,000-mile flight of the wing's B-52s during Desert Storm.

would give a boost to the comfort and morale of chemotherapy patients.

Vietnam War ace Col. Richard S. "Steve" Ritchie, AFRES, was the guest of honor at a luncheon given by the **Greater Rockford (Ill.) Chapter** in conjunction with the local Kiwanis Club. Colonel Ritchie stressed teamwork, preparation, and discipline in his talk, "Leadership that Inspires Excellence," given to an audience of more than 100, including Chapter President James T. Larkins, Treasurer John Bailey, and Secretary Rich Williford.

The **Genesee Valley (N. Y.) Chapter** paid tribute to members of AFROTC and the Civil Air Patrol at its annual Awards Dinner. AFROTC Cadet James Woods was named Outstanding AFROTC Student, and CAP Cadet Theresa Sinopoli was named CAP Cadet of the Year. Professor Lt. Col. Thomas E. Tschorke, who teaches aerospace studies at the Rochester Institute of Technology, discussed the F-111 Avionics Modernization Program. CAP Squadron Commander Capt. William Hughes and Chapter President Gerald I. Loftus led the applause for Colonel Tschorke's speech.

Charles W. Arrington of the **General Russell E. Dougherty (Ky.) Chapter** took a leading role in helping preserve part of the Air Force's heritage. Bowman Field, Ky., training site for bomber, transport, and assault glider crews and the only school for air evacuation in USAAF from 1942 through 1944, now bears a historical marker, with text written by Mr. Arrington, denoting its status. Mr. Arrington worked in conjunction with the World War II Flight Nurses Association and many of the units that

trained at Bowman to put together an impressive dedication ceremony attended by more than 300 people.

The **Thomas W. Anthony (Md.) Chapter** prides itself on its support for aerospace education. Two students from its ten "Visions of Exploration" programs in south central Maryland submitted prize-winning essays and were selected to attend the Space Academy in Houston, Tex. Joy Dowding of Fort Washington, Md., and Deonte Johnson of District Heights, Md., will attend the academy all expenses paid, thanks to their participation in the AEF-sponsored program.

Educating today's youth is also paramount for CAP Lt. Col. Gene Foster, a member of the **Fort Wayne (Ind.) Chapter** Board of Directors. He volunteers five days a week at the local elementary schools and has been recognized with the Fort Wayne PTA Council's Outstanding Service Award. Chapter Vice President (Government Relations) Tom Hissem had high praise for Colonel Foster, as did National President O. R. Crawford, who sent him a letter of congratulations.

The **Morgan S. Tyler (Fla.) Chapter** was an avid participant in Memorial Day Ceremonies held at Cypress Gardens, Fla., which included a stirring address by Desert Storm air boss Gen. Charles A. Horner, who has since been named commander of Air Force Space Command and commander in chief of US Space Command and NORAD. Chapter President Bill Bingham organized the event, which included a presentation of the colors by local AFJROTC units and a flyover by the Florida ANG's 125th Interceptor Group's F-16s.

World War I veteran and pioneer military aviator Lowell C. Allen was able to donate two vintage pieces of military aviation history to the Air Force Museum, thanks to the good offices of the **Florida Highlands Chapter**. Chapter members, led by Secretary Roy P. Whitton, arranged for Mr. Allen to meet Col. Stephen B. Plummer, commander of the 31st Fighter Wing, and present to him Mr. Allen's cross-country aerial strip maps and World War I uniform for transfer to Col. Richard Uppstrom, director of the US Air



The Eifel Chapter welcomed Air Force Secretary Donald B. Rice to Bitburg AB, Germany, for a discussion of Air Force issues. Lt. Col. Robert C. Hall (background) expressed his thanks to Secretary Rice, who also presented an Outstanding Unit Award to 36th Fighter Wing Commander Col. Ronald E. Keys.

Force Museum at Wright-Patterson AFB, Ohio.

Mr. Allen, who numbered Jimmy Doolittle, Amelia Earhart, and Capt. A. Roy Brown—the man credited with shooting down Baron Manfred von Richtofen—among the acquaintances of his long career, has been an active member of the Florida Highlands Chapter Air Council. He drew the maps he donated for the first transcontinental air race. They were later adopted as the first official map of the US Army Air Corps. After making the presentation to Colonel Plummer, Mr. Allen, chapter Man of the Year for 1987, and his fellow chapter members were given a tour of Homestead AFB, including an orientation on the F-16 by Colonel Plummer.

Also in Florida, the **Cape Canaveral Chapter** staged a very successful quarterly meeting, addressed by Lt. Gen. John E. Jaquish, military assistant to the assistant secretary of the Air Force for Acquisition, and Brig. Gen. Jimmy Morrell, commander of the 45th Space Wing at Patrick AFB, Fla. General Jaquish gave a status report on many current programs, and General Morrell warned of the dangers of cutting the military too deeply. National Director Martin H. Harris, State President Jerry Nabors, State Vice President Tommy Harrison, and chapter officers President Jim Marshall and Treasurer Ken Frey were among those in attendance. Mr. Harris succeeds Mr. Nabors October 1.

A golf tournament held in conjunction with the meeting helped raise \$1,600 for the chapter's scholarship fund. National Director Craig McKinley; Maj. Gen. Tom Swalm, USAF (Ret.), former Tactical Air Warfare Center commander; and Maj. Gen. Frederick C. "Boots" Blesse, USAF (Ret.), Korean War ace, joined in the fun.

In another worthwhile effort, the chapter is donating copies of AFA's *Airpower in the Gulf* to the Patrick AFB library, the Civil Air Patrol, and AFJROTC units at four area high schools.

Have AFA/AEF News?

Contributions to "AFA/AEF Report" should be sent to Dave Noerr, AFA National Headquarters, 1501 Lee Highway, Arlington, VA 22209-1198. ■

Unit Reunions

Buckingham/Page AAF

A reunion for former civilian personnel, military personnel, and those who trained at Buckingham/Page Army Airfields, Fla., will be held November 5-8, 1992. **Contact:** Richard T. Beattie, Fort Myers Historical Museum, P. O. Drawer 2217, Fort Myers, FL 33902. Phone: (813) 332-5955.

C-130A Pilots/Navigators

C-130A pilots and navigators of the 1960s who served at Evreux/Fauville AB, France; Lockbourne AFB, Ohio; and Naha AB, Okinawa; including units of the 317th and 374th Troop Carrier Wings, will hold a reunion February 12-13, 1993, in San Diego, Calif. **Contact:** Jerry Luger, 760 Sunset Ln., South Ogden, UT 84403. Phone: (801) 479-6503.

Landsberg AB

Veterans and their dependents who were assigned or lived at Landsberg AB, West Germany, during the 1950s will hold a reunion March 25-28, 1993, at the Holiday Inn North Riverwalk in San Antonio, Tex. **Contact:** Michael P. Hoffman, 415 DeSoto Dr., Universal City, TX 78148. Phone: (512) 658-7399.

Red Pants

REUNION POSTPONED: The Squadron Officer School "Red Pants" reunion originally scheduled for October 17, 1992, has been postponed. The reunion has been rescheduled for next spring.

Shemya Personnel

Personnel who were stationed on Shemya Island during World War II and postwar years (all services) will hold a reunion May 13-17, 1993, in Memphis, Tenn. **Contact:** Maj. James H. Sample, USAF (Ret.), 608 N. Colbert, Sherman, TX 75090. Phone: (903) 893-0180.

2d Bomb Group

Veterans of the 2d Bomb Group and 2d Bomb Wing will hold a reunion September 9-12, 1993, in Houston, Tex. **Contact:** Kemp F. Martin, 8433 Katy Freeway, Suite 102, Houston, TX 77024. Phone: (713) 467-5435.

5th Bomb Group

Veterans of the 5th Bomb Group will hold a reunion May 7-10, 1993, at the Seven Oaks Hotel

in San Antonio, Tex. **Contact:** Lee Benbrooks, 39685 Ramshorn Dr., Murrieta, CA 92563. Phone: (714) 677-3853.

9th Troop Carrier Squadron

The 9th Troop Carrier Squadron (World War II) will hold a reunion June 11-14, 1993, in San Leandro, Calif. **Contact:** Mel Woolcock, 27937 Pueblo Calle, Hayward, CA 94545. Phone: (510) 782-7046.

39th FIS

Veterans of the 39th Fighter-Interceptor Squadron who served at Komaki AB, Japan, between 1954 and 1958 will hold a reunion October 14-17, 1993, at the Ramada Inn Resort in Fort Walton Beach, Fla. **Contact:** Col. De Lair A. Clark, USAF (Ret.), 3369 Fan Palm Blvd., Melbourne, FL 32901. Phone: (407) 952-8298.

Class 40-G

Members of Class 40-G (Kelly/Brooks Fields, Tex.) will hold a reunion October 28-November 1, 1992, in Dayton, Ohio. **Contact:** Col. Richard R. Shoop, USAF (Ret.), 500 Van Tress Dr., Fairborn, OH 45324. Phone: (513) 878-8567.

Class 41-H

Members of Pilot Class 41-H will hold a reunion October 29-31, 1992, in San Antonio, Tex. **Contact:** Bob Sheeks, 145-A Treasure Way, San Antonio, TX 78209. Phone: (512) 826-8842.

43d Bomb Group

Veterans of the 43d Bomb Group will hold a reunion November 9-15, 1992, aboard the *Queen Mary* in Long Beach, Calif. **Contact:** Lloyd Boren, 102 Beechwood, Universal City, TX 78148. Phone: (512) 658-5978.

Class 43-F

Members of Class 43-F (Southeastern Training Command) will hold a fiftieth-anniversary reunion June 17-20, 1993, at the Ramada Inn Golf and Beach Resort in Nassau, the Bahamas. **Contact:** James Frew, P. O. Box 21743, Fort Lauderdale, FL 33335 or P. O. Box N-4354, Nassau, the Bahamas. Phone: (809) 362-4592.

Class 43-K

Members of Pilot Class 43-K will hold a reunion

November 4-7, 1992, in Mesquite, Nev., and Saint George, Utah. **Contact:** Lt. Col. Ralph Kling, USAF (Ret.), 24718 Pappas Rd., Ramona, CA 92065. Phone: (619) 789-3339.

Class 43-K

Members of Cadet Class 43-K (San Antonio, Tex.) will hold a reunion April 14-18, 1993, at the Gunter Hotel in San Antonio, Tex. **Contact:** Lt. Col. Harold A. Jacobs, USAF (Ret.), 17545 Drayton Hall Way, San Diego, CA 92128. Phone: (619) 485-5041.

Class 53-E

Members of Pilot Training Class 53-E of Greenville, Miss., will hold a fortieth-anniversary reunion February 5-7, 1993, in Greenville, Miss. **Contact:** Maj. Gen. William B. Maxson, USAF (Ret.), 5 Chickamauga Ln., Destin, FL 32541-4409. Phone: (904) 837-3644.

Class 63-D

Members of Pilot Training Class 63-D (Craig AFB, Ala.) will hold a thirtieth-anniversary reunion December 4-6, 1992, in Washington, D. C. **Contact:** Col. Joseph M. Syslo, USAF (Ret.), 7913 Quarry Ridge Way, Bethesda, MD 20817. Phone: (301) 365-1929.

Class 63-04

Members of Undergraduate Navigator Training Class 63-04 (James Connally AFB, Tex.) who served in 1961 and 1962 will hold a reunion November 5-9, 1992, at the Orange Lake Country Club in Orlando, Fla. **Contact:** Col. Robert W.

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.

Unit Reunions

Schorr, AFRES (Ret.), 362 Cove Island Way, Marietta, GA 30067. Phone: (404) 977-1047.

Class 69-01

Members of UPT Class 69-01 (Williams AFB, Ariz.) will hold a twenty-fifth-anniversary reunion April 29–May 2, 1993, in Chandler, Ariz. **Contact:** Kathie Totten, 3865 Adams Rd., Cumming, GA 30131. Phone: (404) 887-8296.

388th Fighter-Bomber Wing

Veterans of the 388th Fighter-Bomber Wing stationed at Clovis AFB, N. M., and Etain AB, France, between 1954 and 1957 will hold a reunion Octo-

ber 21–25, 1993, in Phoenix, Ariz. **Contact:** Roy E. McClendon, 2433 E. Del Rio Dr., Tempe, AZ 85282-4132. Phone: (602) 838-5936.

751st AC&W Squadron

Veterans of the 751st Aircraft Control and Warning Squadron based at Mount Laguna, Calif., will hold a reunion April 30–May 2, 1993, in San Antonio, Tex. **Contact:** Lt. Col. Roger D. Scow, USAF (Ret.), 865 W. Coll St., New Braunfels, TX 78130. Phone: (512) 629-4786.

7100th Air Police Squadron

Members of the 7100th Air Police Squadron

(USAF) who served between 1958 and 1962 will hold a reunion in May 1993 in Nashville, Tenn. **Contact:** Rowland D. Garver, 182 E. Fifth St., Peru, IN 46970. Phone: (317) 473-7184.

79th Fighter Squadron

The "Tigers" of the 79th Fighter Squadron at RAF Upper Heyford are seeking contact with former members who are interested in a seventy-fifth-anniversary reunion in February 1993. **Contact:** Lt. Col. Mark A. Hyatt, USAF, Commander, 79th Fighter Squadron/ROAR, APO AE 09466. ■

Bulletin Board

Seeking contact with anyone who knew **1st Lt. Mosby G. Taylor, Jr.**, a B-24 copilot with the 515th Bomb Squadron, 376th Bomb Group, 15th Air Force, stationed in San Pancrazio, Italy, who was shot down over Vienna on October 17, 1944. **Contact:** Michael W. Taylor, 4216A Filbert Ave., Atlantic City, NJ 08401.

Seeking the whereabouts of **Capt. Claude W. Summers** and his crew of the 721st Bomb Squadron, 450th Bomb Group, stationed in Italy from August 1944 through April 1945. **Contact:** W. M. Chaffin, 7301 Winnell Way, North Richland Hills, TX 76180.

I am giving away prints (suitable for framing) of emblems of the **408th Fighter Group** and **322d Fighter-Interceptor Squadron** to those who served with those units at Larson AFB, Wash., and Kingsley Field, Ore. **Contact:** Elmer Ross, P. O. Box 807, Everett, WA 98206.

Seeking retired Air Force **Explosive Ordnance Disposal** personnel interested in joining a new association. **Contact:** EOD MasterBlasters, P. O. Box 204, Valparaiso, FL 32580-0204.

Collector seeks donations of **Topps 1991 baseball cards with gold Desert Storm imprint**, which were distributed to military personnel and available at military bases. Also seeking donations of Desert Shield and Desert Storm nonsports trading cards issued by any company. **Contact:** Joseph C. Caffarelli, 195 Prospect St., #102, East Orange, NJ 07017-2647.

I have Air Force and Army **flight and training manuals** for trade for Air Force patches. **Contact:** Gary Goldblatt, 2125 Wellington Ct., Fairborn, OH 45324.

Collector seeks **full-size wing insignia**, US and foreign, especially gold US World War II flight surgeon and nurse wings. Also seeking a matched set of current issue sterling pilot wings. **Contact:** Gary Smyth, JWK International, 7617 Little River Turnpike, Annandale, VA 22003.

For a book on the **USO during the Vietnam War**, author seeks information, photos, and recollections from Vietnam veterans who came in contact with USO performers. **Contact:** William J. Truax, 7515 Forrester Ln., Manassas, VA 22110.

Seeking information on US bases, units, and personnel in **west Africa during World War II**. I am especially interested in the postal history of Fisherman's Lake, Liberia. Also seeking information on the 899th Engineers, the 1203d Air Base

Unit, and Lieutenant Turansky and Sergeant Wilkens who were in charge of laying the steel landing strip at Bensen Field. **Contact:** William Thomas Lockard, P. O. Box 267, Wellston, OH 45692.

Seeking information on the World War II activities of **John Elroy McCaw** while he was executive assistant to Maj. Gen. H. M. McClelland, the air communications officer in the War Department. Especially seeking contact with his associates at the time, including Lt. Thomas Creamer, Lt. Edward Ragan, Capt. J. B. Dow, Lt. John H. Teeter, Colonel Macrum, and James B. Massey. **Contact:** Bill Smallwood, 323 Clear Lake Ln., Buhl, ID 83316.

The Pima Air & Space Museum seeks donations of memorabilia and information related to the **China-Burma-India theater** of World War II. **Contact:** Stanley W. Miller, 6000 E. Valencia Rd., Tucson, AZ 85706.

Seeking contact with **Col. Carlton "Smokey" Betts**, deputy commander for Operations, 2d Bomb Wing, Barksdale AFB, La., in 1983–84. I am seeking a copy of the poem "Silent Giant," by Laura Packer, which was given to him at his farewell party. **Contacts:** Maj. Howard S. or Laura A. Packer, 6311 Copper Pheasant Dr., Dayton, OH 45424.

Seeking information on the whereabouts of **Peter Irens Wynn** from Borger, Tex., a US Army private and military policeman stationed in Cambridge, England, in 1944. **Contact:** Peter I. Cosens, 11 Callander Close, Cambridge, CB4 2XJ, England.

Seeking contact with members of the **100th Bomb Squadron**, especially the crew of the B-17 *Piccadilly Lily*, stationed at Ipswich, England, during World War II. **Contact:** Winfred LeRoy Tee, P. O. Box 25, Latah, WA 99018.

Seeking **invasion money and military scrip** from World War II and other wars. **Contact:** Bill R. Fead, 7445 Idledale Ln., Omaha, NE 68112-2805.

Seeking contact with contractor and government personnel involved with the design and flight testing of the **Hughes D-2**. Also seeking photos, drawings, and technical reports on the aircraft. **Contact:** Michael M. Swick, 603 S. Prospect Ave., Apt. 302, Redondo Beach, CA 90277.

For a history, the **44th Missile Wing** is seeking photos, anecdotes, and addresses of personnel who served with the wing since its activation in

January 1962. **Contact:** 44th Missile Wing Historian, Suite 1, E. LeMay Blvd., Ellsworth AFB, SD 57706.

Seeking information on **A. P. Fauman**, an American citizen who served with 550 Squadron of the RAF at North Killingholme, England, from May through August 1944, before being commissioned in the USAAF and serving with 8th Air Force. Also seeking contact with "**Cincinnati**," an American ground mechanic who served with the RAF before America's involvement in the war but did not join 8th Air Force. **Contact:** Frank Pritchard, 4 The Lawns, Benfleet, Essex SS7 4LD, England.

Seeking contact with veterans of the **2d Bomb Group** or 2d Bomb Wing who are not already members of the Second Bombardment Association. **Contact:** Kemp F. Martin, 8433 Katy Freeway, Suite 102, Houston, TX 77024.

Seeking contact with personnel who were stationed at **RAF Birchington**, England, in 1955–56. **Contact:** S. Murdy, 12A Elmfield House, King St., London N2 8ES, England.

For an archive of the **Gulf War**, I am seeking information on the ground offensive, particularly Iraqi military paperwork found on the battlefields of Kuwait or Iraq (including mapping and trace overlays), and photos or videos showing captured or destroyed Iraqi vehicles or positions, especially Iraqi tac-signs and markings. **Contact:** Maj. Rodnick de Normann, Officers Mess, 14/20 King's Hussars, York Barracks, BFPO 17, Germany.

Seeking contact with anyone from 77th Bomb Squadron who knew **TSgt. Delbert L. Bartz**, a B-24 flight engineer. The plane and crew were lost in November 1943 from either Alaska or the Aleutians. **Contact:** Jerry Strong, 1307 Carol Ln., Oklahoma City, OK 73127.

Seeking the whereabouts of and contact with crew members of the 15th Air Force B-17 **Portland Rose**, including pilot 1st Lt. Bill Hicks, copilot 1st Lt. Bob Ward, and navigator Eugene Fox. This crew was transferred from 772d Bomb Squadron, 463d Bomb Group, to the 1st Air Sea Rescue Squadron, stationed at Foggia, Italy, from January to March 1945; at Argatala, India, March through August 1945; and on Okinawa. **Contact:** TSgt. Francis W. Seiler, USAF (Ret.), 14851 Jeffrey Rd., Sp. 343, Irvine, CA 92720.

Seeking a list of acronyms used by the Navy, Army, and Air Force, especially **Falcon codes** used in Vietnam between 1968 and 1976. **Con-**

fact: Col. Nat Pollack, USAF (Ret.), 110-45 71 Rd., #7P, Forest Hills, NY 11375.

For model-building and -painting, I am seeking two color photos of **Ohio ANG F-84 Thunderstreak** and **F-100D Super Sabre** aircraft that served with the 164th Fighter Squadron, 179th Tactical Fighter Group. **Contact:** William Miller, 17301 Keelson Ln., #19, Huntington Beach, CA 92647.

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

Collector has **US wings from 1918 through 1945** for trade. Also has patches, uniform parts, and insignia. **Contact:** Jerry Keohane, 16 St. Margaret's Ct., Buffalo, NY 14216.

Seeking information on the whereabouts of **Michael Petry**, retired USAF, last known address Indianapolis, Ind., and **Richard H. Solem**, former

commander of the 4950th Test Wing. **Contact:** Warren Kostelny, 204 N. Wille St., Mount Prospect, IL 60056.

Seeking correspondence with USAF personnel and donations of Air Force collectibles, especially relating to **Operations Desert Shield and Desert Storm**. **Contact:** M. L. Koepfel, 75 Strauss Dr., Suite 104, Winnipeg, Manitoba R3J 3R6, Canada.

Collector and historian seeks **Army Air Corps and AAF memorabilia** from World War I through World War II. Interested in leather flight jackets, uniforms, flight equipment, and photo albums. **Contact:** John Cerar, 425 John St., Carlinville, IL 62626.

Seeking information on **Lt. Noel Williams**, who was assigned to New Castle County Airport, Del., in 1952, possibly with the 916th Air Base Group. **Contact:** Claire W. Cresswell, 30-4 Round Tree Dr., Naugatuck, CT 06770.

Seeking contact with a **B-17 gunner** from the north side of Kansas City who was in the bed next to Henry McAnelly at Friesing Hospital, Stalag 7A, in the fall and winter of 1944-45. **Contacts:** Hugh G. Caudill, 16729 Spinnaker Ln., Huntersville, NC 28078. Henry McAnelly, Graaf Ottolaan 23, 6861 BS Oosterbeek, Holland.

Former Luftwaffe pilot seeks contact with the **P-51 pilot who shot down his Ju-88 on May 4, 1945**, at about 10:30 a.m. over Austria, between the Danube River and the Czech border. Another Ju-88 was shot down in the same area about an hour earlier. **Contact:** Milton Radovsky, 10710 Lockridge Dr., Silver Spring, MD 20901.

The recently formed **Sabre Jet Historical Society** is dedicated to the past, present, and future activities of the North American Aviation F-86

Sabre and its foreign-built variants. **Contact:** Rick Mitchell, 428 Madingley Rd., Linthicum, MD 21090.

Seeking contact with **Captain Pierce**, an oral surgeon from Iowa, who was stationed at Misawa AB, Japan, in 1954-55. **Contact:** Scott W. Tyree, P. O. Box 3, Aladdin, WY 82710.

The B-26 Marauder Historical Society is seeking files, records, photos, and memorabilia from **personnel who were connected with the B-26**. Also seeking contact with those who would like to share their recollections in a videotaped interview. **Contact:** Frank G. Brewer, Jr., P. O. Box 59273, Birmingham, AL 35259.

Seeking contact with **8th Air Force veterans who served in East Anglia**, England, who would be interested in photos of how the villages and towns they knew fifty years ago look today. **Contact:** Alec C. Dawe, 4 Iris Close, Attleborough, Norfolk NR17 2PR, England.

Collector seeks **envelopes mailed from civil and military post offices** in Thailand. **Contact:** Maj. Gary A. Van Cott, USAF (Ret.), P. O. Box 9569, Las Vegas, NV 89191.

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 the whereabouts of **John Brazil**, from Piedmont, S. C., who was stationed at Yokota AB, Japan, as a member of Troop #6161, 5th Air Force Motor Vehicle Squadron, PACAF, in the late 1940s and early 1950s. He was friendly to Toru "Tommy" Taga, who was raised at the Roman Catholic orphanage there.

Clip-out and save with Hertz!

You can enjoy year-round savings at Hertz! Just mention your Air Force Association/Hertz CDP# 83080 when making your reservation. Then at the time of rental, present your membership card or Hertz Discount Card for identification. It's that easy!

To order Hertz Discount Cards and upgrade coupons, please complete and return the information attached.

Call 1-800-654-6511 for reservations.

Hertz Discount Materials Order Form

Name _____

Address _____

City/State _____

Zip _____

Quantity _____

Hertz CDP# 83080

Hertz rents Fords and other fine cars.

RETURN TO:

The Hertz Corporation
3800 Jefferson Davis Hwy.
Alexandria, VA 22305
ATT: John Fulginiti

Seeking information on **Capt. Raymond Janeczek**, USAF, who flew P-38s in FEAF in 1945; was with the 4th Fighter Group at Andrews AFB, Md., and in Korea in 1948-50; 71st Fighter Squadron, Pittsburgh, in 1951-52; 13th FS, Selfridge AFB, Mich., in 1953; and at Stewart AFB, N. Y., in 1956. **Contact:** Col. William E. Burr II, USA (Ret.), 4735 Brookwood St., Eugene, OR 97045-4832.

Seeking former **B-52 crew members** who are interested in forming an association. **Contact:** Col. Wayne Pittman, USAF (Ret.), 498 Carthage Dr., Beavercreek, OH 45434-5865.

Editor and photographer seeks to **trade 35-mm slides** of current modern military aircraft (1980-92) for reference purposes. **Contact:** Renato E. F. Jones, P. O. Box 73403, Puyallup, WA 98373.

Seeking contact with veterans who were in the **5th Transport Squadron**, later known as the 5th Troop Carrier Squadron, from January 1941 through 1944. **Contact:** O. C. Wilkins, 2329 Maben Ave., Palm Harbor, FL 34683.

Seeking contact with **Lt. Norm McCall**, USN, an F-8 pilot rescued May 19, 1967, from the Gulf of Tonkin, southeast of Haiphong, North Vietnam. His last known address in 1969-70 was at Edwards AFB, Calif. **Contact:** Javier Trevino, P. O. Box 1669, Santa Teresa, NM 88008.

Seeking the whereabouts of **SSgt. Edward J. Picciano** from Brooklyn, N. Y., a radio operator with the 727th Bomb Squadron, 451st Bomb Group, 15th Air Force, in Italy from January to June 1945. **Contact:** John D. Hulser, 140 Kennedy Rd., Manchester, CT 06040.

Seeking contact with members of the "Jungle Skippers" of New Guinea and the Philippines, the **40th Troop Carrier Squadron**, 317th Troop Carrier Group, especially James W. Hood from Junction City, Kan., and Edmund Rym from Pittsburgh. **Contact:** Arthur "Whitey" Chorlton, 45 Creighton St., Cambridge, MA 02140.

Collector seeks **patches and scarves** from Nellis AFB, Nev., for a display on modern air warfare. **Contact:** Joseph Hoffer, 6A 1st St. W., Randolph AFB, TX 78148.

Seeking information on **Jack C. Honisko**, who was declared MIA on January 13, 1944, when his B-24 failed to return from a mission to Borneo. Also seeking information on his plane. **Contact:** James R. Honisko, 1733 Parkway N., Maumee, OH 43537.

Seeking the whereabouts of **Harry Buchecker** and **Bill Broadhurst** of Class 45-F, Napier Field, Ala. **Contact:** R. T. DeVoe, 3307 Peach Tree Ln., Arlington, TX 76013.

Seeking **posters** that identify current Air Force aircraft in use in southern California. **Contact:** Lloyd Pidgen, 1622 Tyrol Ave., Anaheim, CA 92805.

Seeking photographs of the **F-15C Eagle**. **Contact:** José A. Cruz Fernandez, C/Canario 6 1°C, Getafe, Madrid, Spain.

Sculptor seeks information on **Boeing P-26 Peashooter variants** assigned to 73d Pursuit Squadron, Bellows Field, Hawaii, as night fighters on January 25, 1942. **Contact:** Dave Larson, 224 Portsmouth Cove, Longwood, FL 32779.

Seeking contact with collectors interested in trading air force **patches, insignia, and 35-mm slides** of current aircraft. **Contact:** Jon W. Letzkus, P. O. Box 247, Bridgeport, OH 43912.

Collector and historian seeks **Army Air Corps and AAF memorabilia** from World War I through

World War II. Interested in leather flight jackets, uniforms, flight equipment, and photo albums. **Contact:** John Cerar, 425 John St., Carlinville, IL 62626.

Seeking information on **Lt. Karl Weber** and **John H. Carlisle**, who were with Hq. 51st Fighter Group stationed at Kunming, China, in 1944-45. Also seeking information on **Aviation Cadet Leonard Blondheim**, AAF Navigation School, Monroe, La., Class 43-7/8. **Contact:** Lawrence H. Boteler, 1709 James Payne Cir., McLean, VA 22101-4223.

Seeking information on **Col. Fred Christianson**, USAF, a P-47 fighter pilot ace in World War II. He flew with the Massachusetts ANG and worked for Raytheon in Bedford, Mass. His last known address was in Wayland, Mass. **Contact:** Bob Stark, 30 Norma Dr., Nashua, NH 03062.

Historical researcher seeks information on **Naval AEW and VAW/VW squadrons**, including the following aircraft: TBM-3W, AD-2W/3W/4W/5W, E-1A/B, E-2A/B/C, B-17G, PO-1W, WV-1/2/2E, W2V-1, EC-21. **Contact:** Leigh Armistead, 4624 Bradston Rd., Virginia Beach, VA 23455.

Seeking information on and pictures of **1st Lt. William G. Daniels**, 333d Bomb Squadron, 94th Bomb Group, Bury St. Edmunds, England, who was shot down October 6, 1944. Also seeking information and descriptions of his B-17G. I also would like to purchase *The Big Square A—A History of the 94th Bomb Group*, by Harry F. Slater. **Contact:** George B. Daniels, P. O. Box 640 Charleston, SC 29402.

Seeking information on **Lieutenant Kowalick**, who served at Ascom City, Korea, with the 337th Ordnance Co., Provisional Guards. I also need information from medical personnel who served in the 24th Corps General Hospital in 1947. **Contact:** Vivian Balzer, Rewey Ave., Newark Valley, NY 13811.

Seeking contact with the following crew members of the **574th Bomb Squadron**, 391st Bomb Group: 1st Lts. Clifford F. Hocker and Roy S. McKim and Cpls. Carl Rader, Wade H. Price, and Waide E. Miller. **Contact:** Ralph C. Zuranski, 4479 Long Branch Ave., San Diego, CA 92107.

Master Sergeant in the Turkish Air Force seeks **posters, patches, stickers, rosettes, wings, and other paraphernalia** for display. **Contact:** Serdar Bulut, Air MSgt., Air Force House, Sarigazi Hv. Loj. #32/1, Umraniye/Istanbul, Turkey.

Seeking information on and photos of **Lt. Thomas C. Blackshear**, a C-47 pilot, who was in Class 42-1, Lubbock Field, then assigned to Hensley Field, Tex., and to the 1st Ferrying Group, New Delhi, India. **Contact:** Capt. Mark D. Mensack, 1375 Harrington Rd., Havertown, PA 19083.

Seeking photos of past commanders of the **92d Bomb Wing**, Fairchild AFB, Wash., specifically Col. Claude E. Putnam (June 16, 1950-February 11, 1951) and Col. Edison F. Arnold (May 15, 1964-March 15, 1966). **Contact:** Sgt. Tracy M. Partelow, 92d Bomb Wing Historian, Fairchild AFB, WA 99011-5000.

Seeking the whereabouts of **Blaise Avella**, stationed at Karamursel, Turkey, in 1974-75. Last known address was at McGuire AFB, N. J., in the early 1980s. **Contact:** Greg Mason, 5716 Elmhurst Ave. N., Crystal, MN 55428-3445.

Seeking contact with the following **92d Bomb Group** personnel: Joseph S. Barrett, George L. Volker, and William H. Cummings, who abandoned their aircraft near the Dutch border on October 7, 1944. **Contact:** Lt. Col. Robert D. Elliott, USAF (Ret.), 32 N. Madrid Ave., Newbury Park, CA 91320. ■

If you're
puzzled about
insurance coverage...



Whether you want to know more about your current coverage or simply want information about one or more of AFA's low cost insurance programs, we'll be glad to help.

Each of AFA's insurance plans—Life, Accident, CHAMPUS Supplement, Medicare Supplement and Hospital Indemnity—are designed for the exclusive benefit of members. And AFA, alone, services these plans, too. So when you need help or assistance with your coverage, just call AFA.

1-800-727-3337

INSURANCE DIVISION
AIR FORCE ASSOCIATION
1501 Lee Highway
Arlington, VA 22209-1198

Bob Stevens'

"There I Was..."

CREWS OF CARGO/TRANSPORT BIRDS CAN GET PRETTY BORED ON LONG HAULS. FIENDISH SCENARIOS LIKE THE ONE DEPICTED BELOW KILL TIME BETWEEN REPORTING POINTS...

(NOTE: THIS ROUTINE CALLS FOR A JOHN IN THE REAR, LIKE THE OL' C-46'S and 47'S)

STEP 1: SEND AN EXTRA RATED CREWMAN AFT.



STEP 2: AFTER A LENGTHY PERIOD OF WAITING FOR THE "CO-PILOT" TO RETURN, THE PILOT BACKS OUT OF THE FRONT OFFICE.



STEP 3: SET UP THE MARK.



STEP 4: RECOVERY (AFTER MARK IS REDUCED TO JELLY).





Next generation low-cost simulator technology is here today.

Hughes Training and Eidetics Incorporated have teamed to offer a superior solution for air tactics training.

Now, pilots worldwide will be able to hone their skills in a real-time, high fidelity simulator designed for operational training in a realistic tactical environment.

Using Eidetics' Arena air combat simulator as the baseline, Hughes and Eidetics have jointly developed the most advanced training system of its kind available in the world today.

From the outset, key features such as system flexibility and effective training transfer have driven the design of this next generation simulator. The instructor operator station, for instance, has been designed to allow pilots or instructors to easily access and change multiple tactical mission scenarios.

The unique visual system also provides pilots a full 360° awareness, a capability reserved heretofore only for very expensive full dome simulators. This feature supports critical, multi-bogie post merge air combat maneuvers. Key force level training exercises also can be achieved by simply networking multiple simulator cockpits.

This affordable, high quality air tactics simulator is the product of our extensive backgrounds in complex weapon systems simulation and the latest low-cost technology breakthroughs. Quite simply, we have defined the future of air combat tactical training realism.

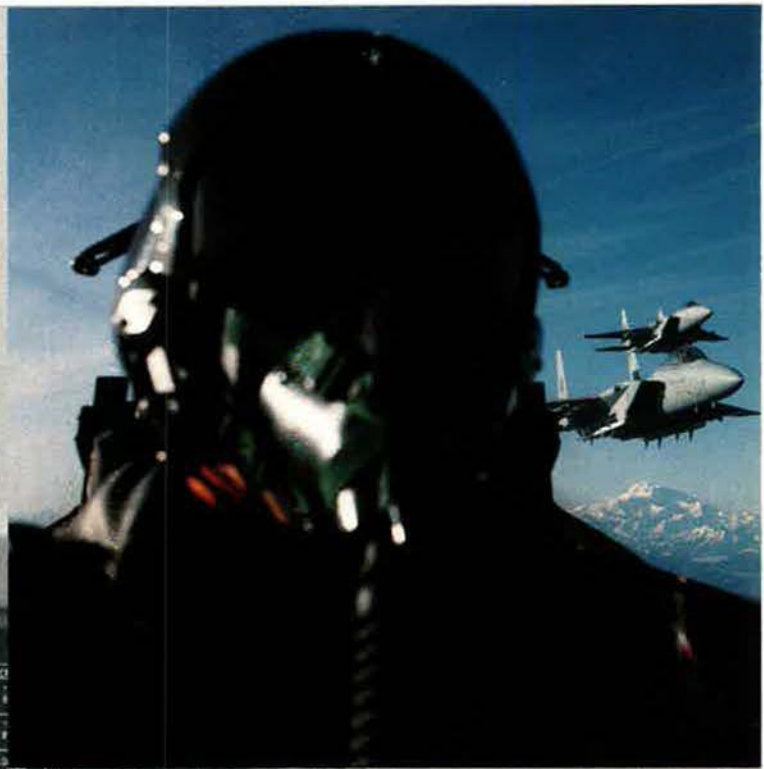
Hughes Training and Eidetics...

...when only the best will do.

E I D E T I C S

HUGHES

MDMSC: Smart choices for tough decisions.



HOW CAN A MORE SOPHISTICATED AFMSS FOR HIM ACTUALLY MEAN LESS NEW-PROGRAM RISK FOR YOU?

Air Force Mission Support Systems (AFMSS) from the McDonnell Douglas Missile Systems Company (MDMSC) provide planning packages with highly sophisticated, proven products behind them. And unparalleled experience.

No other company in the world employs more experts dedicated solely to the job of developing and improving mission support systems. It's a depth of experience that gives our systems a depth of capability second to none.

Far more advanced than the planning systems

commonly available today, ours have established a reputation for in-depth planning and analysis using standard data bases supplied by the United States government. In fact, our AFMSS is based upon systems that have proven themselves in the harshest environment on earth, delivering as promised.

Maximum capability combined with maximum experience means minimum program risk. And a choice that can help Air Force decision makers rest easy.

MCDONNELL DOUGLAS
A company of leaders.