OCTOBER 1997/$3

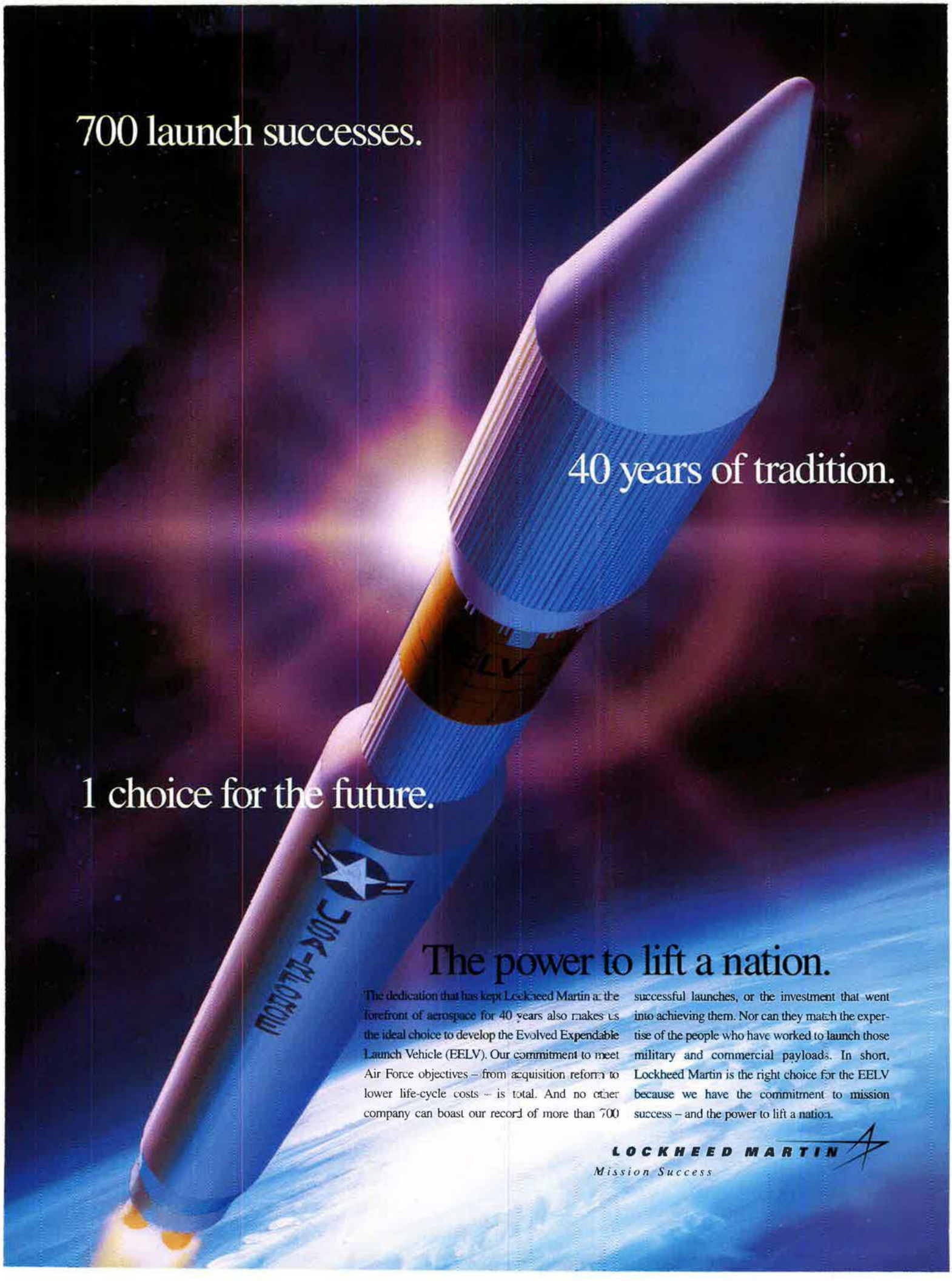
AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION MAGAZINE

Airpower in the European Theater

New Routes to Overseas Presence

Training Overload Hits the Force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October 1997, Vol. 80, No. 10

AIR FORCE MAGAZINE

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About the cover: This A-10 and F-15C, both from the 52d Fighter Wing, Spangdahlem AB, Germany, are just a small part of the critical force in USAFE today. See "Airpower in the European Theater," p. 24. USAF photo by SMSgt. Rose Reynolds.

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AIR FORCE Magazine (ISSN 0730-6784) October 1997 (Vol. 80, 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:** $30 per year; $75 for three-year membership. **Life Membership (nonrefundable):** $450 single payment, $475 extended payments. **Subscription Rate:** $30 per year; $25 per year additional for postage to foreign addresses (except Canada and Mexico, which are $9 per year additional). Regular issues $3 each. Special issues (USAF Almanac issue and Anniversary issue) $5 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send changes of address to Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Publisher assumes no responsibility for unsolicited material.


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Editorial

By John T. Correll, Editor in Chief

The Headwinds of Tradition

Two documents are currently steering the US defense program. They are "Joint Vision 2010," published by the Joint Chiefs of Staff in July 1996, and the Report of the Quadrennial Defense Review, put out by the Department of Defense in May 1997. From an Air Force perspective, they contain several important conclusions.

- A Revolution in Military Affairs, the principal elements of which are long-range precision strike and information technology, is making a fundamental change in how wars are fought.
- The Joint Chiefs acknowledge that "we will be increasingly able to accomplish the effects of mass—the necessary concentration of combat power at the decisive time and place—with less need to mass physically than in the past."
- The Department of Defense says that one of the most critical requirements in theater war is to halt an enemy invasion rapidly, short of its objective, heading off a long and costly operation to evict the enemy from captured territory.

These capabilities are to be found mainly in air and space forces. That might seem to mean that the Air Force, upon the 50th anniversary of its founding, has finally achieved recognition of what it can contribute to US military power. Unfortunately, there are complications.

Airpower is still undervalued in Joint doctrine and war plans. Land forces dominate the theater commands and their influence is strong. In the Joint world, the Air Force encounters the headwinds of tradition. The belief is widespread that "boots on the ground" are more important than precision attack.

The ground forces' definition of a Joint operation is one in which they are supported by airpower. The notion that airpower might achieve anything on its own, or with land or sea forces in support, is heresy. Air Force airpower not in support of land forces is considered "unjoint," says Maj. Gen. Charles D. Link, who was the Air Force's point man on the QDR.

Our defense strategy centers on winning two major theater wars that occur almost simultaneously. When the enemy attacks, the traditional sequence of response is the deployment of airpower to halt the invasion, the buildup of US combat power in the theater, and finally, the launch of a decisive counteroffensive. Joint planning models—reflecting the assumptions on which theater war plans are built—have airpower pounding the enemy force hard in the first two weeks of conflict, bringing the invasion to a stop. However, instead of continuing the attack, the Air Force then cuts back drastically on sorties and conserves its munitions until land forces arrive and are ready, many weeks later, to begin the Joint counteroffensive.

Air Force operations not in support of land forces are considered "unjoint."

The Gulf War gave us an outstanding example of what airpower may accomplish when not held back. The theater commander, Army Gen. H. Norman Schwarzkopf, wisely relied on the air campaign for the first 38 days of combat, during which Iraq's command-and-control system was destroyed, its air force neutralized, and a high percentage of its forces rendered militarily ineffective. Coalition ground forces joined in for the last four days of the war.

The revised defense strategy puts unprecedented emphasis on Smaller-scale Contingencies and Military Operations Other Than War. That diverts attention and resources from the main requirement, which is to fight and win the nation's wars. It also tends to lessen the priority on Air Force combat airpower, since other services are seen as more relevant to peacekeeping and constabulary functions.

The QDR reductions fell heavily on the Air Force, which took 43 percent of the total active-duty force cuts. It lost an active-duty fighter wing, replacing it with a reserve component wing created by converting force structure from Air National Guard air defense squadrons. The F-22 fighter was cut from 438 aircraft to 339, and the production rate was slowed down. The Joint Stars deep-surveillance aircraft was reduced from 19 to 13. Although additional B-2 bombers "would improve our ability to halt an adversary's advance during the opening days of a Major Theater War," no additional B-2s are planned.

The problems are both doctrinal and fiscal. The QDR wound up cutting too much and cutting the wrong things. The defense program does not take advantage of the Revolution in Military Affairs. We do not present theater commanders with their most effective range of options. Our capability to execute the strategy is in serious doubt.

The National Defense Panel, established by Congress to review the QDR, makes its report in December. Several thoughts would be particularly appropriate in its final deliberations.

- We should fund the defense program to actual requirements, not to wishful thinking. Outlays are dropping toward 2.9 percent of Gross Domestic Product. It's difficult to be a superpower on that.
- We should concentrate on the main objectives of the strategy. As the House National Security Committee said last spring, "Ultimately, the truest test of readiness will be how the US military performs in the next war, not in the next peacekeeping mission, forest fire, or hurricane."
- We are the world's leading military power primarily because of our strength in air and space. It would be difficult to exaggerate the importance of that, and it ought to figure more prominently than it does in the determination of our nation's defense policy. ■

Letters

Space Topics

In the August issue *["Space Almanac," p. 34]* you list Air Force Space Command as the Air Force component of US Space Command. This is incorrect! AFSPC is responsible for organizing, training, and equipping forces. They do *not* execute forces. AFSPC's 14th Air Force is the Air Force component that executes Air Force space forces.

This distinction causes a lot of confusion. We are trying very hard to educate everyone on the difference.

Lt. Col. Michael J. Scott,
USAF
Vandenberg AFB, Calif.

■ *We noted the distinction in the May Almanac issue but failed to correct the August Space Almanac.—THE EDITORS*

You folks are usually pretty good, but the "Orbits" illustration on p. 40 of your August issue is embarrassing. First, 18,000 mph is about right for a circular orbit at sea level, but at geosynchronous [orbit] it's less than 7,000 mph. [Second,] the numbers you list under "Orbital Radii" are actually orbit altitudes. Finally, you list "Eccentric" as a type of orbital inclination. Eccentricity has nothing to do with inclination. These independent parameters are two of six quantities that define an orbit and a satellite's location in that orbit.

Lt. Col. Randy Liefer,
USAF
USAF Academy, Colorado Springs, Colo.

■ *After checking with another space expert who said our earlier source "wasn't very precise," we find that reader Liefer is correct.—THE EDITORS*

Scarlet Letters

I was rather surprised to read in the August editorial *["Scarlet Letters," p. 3]* that "adultery" by itself is not a violation of military law. I was under the impression the term military law referred to the *Manual for Courts-Martial,* 1951, commonly known as "the code" or the UCMJ.

Were John T Correll to check the UCMJ before writing editorials, he would find in the index, under "adultery," a reference to Article 134, Section 119, on p. 488: "In that ___, (a married man,) did, (at) (on board) ___, on or about ___ 19__, wrongfully have sexual intercourse with ____, (a married woman) (a woman) not his wife." The military, like our civilian authorities, sometimes chooses not to enforce the letter of the law. That does not mean the letter does not exist.

Robert Hazlett
Bisbee, Ariz.

■ *Both the Air Force and DoD Judge Advocates say that adultery alone is not a violation of the UCMJ. According to the UCMJ and MCM, prosecution for adultery requires three proofs:*

(1) That the accused wrongfully had sexual intercourse with a certain person;

(2) That at the time, the accused or the other person was married to someone else, and [the "and" means all three elements are required for prosecution]

(3) That, under the circumstances, the conduct of the accused was to the prejudice of good order and discipline in the armed forces or was of a nature to bring discredit upon the armed forces.

The language reader Hazlett quotes is similar, but not exactly the same, as in the current sample specification, but it does not constitute the elements for violation of the code. Those are cited above. The current sample specification states: "a (married) (woman/man) not (his wife) (her husband)."—THE EDITORS

Do you have a comment about a current issue? Write to "Letters," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. (E-mail: letters@afa.org.) Letters should be concise, timely, and preferably typed. We cannot acknowledge receipt of letters. We reserve the right to condense letters. Unsigned letters are not acceptable. Include city/base and state. Photographs cannot be used or returned.—THE EDITORS

With regard to the article entitled "The Departure of Kelly Flinn" in the July issue *[p. 11],* a point overlooked is one that I often raise with friends (usually retired military officers) when discussing the case: At some time in Lieutenant Flinn's career she would be in the command of something other than an airplane. And if someone in her command refused to obey a written order, I am sure that person would be court-martialed—and with good cause.

Flinn disobeyed orders. Thus, she should have had a court-martial rather than a general discharge from the service. All things considered, had it been a male first lieutenant, I doubt that it would have reached the front page of most major US newspapers

Lt. Col. Robert Kahn,
USAF (Ret.)
Lafayette, Calif.

Correll's editorial in your August edition was one of the best pieces of editorial writings that I have read. It was forceful, factual, and apolitical. It was the type of article that I can best praise with the expression "I wish that I had said that."

The most grievous offense that a military officer can commit is an act of treason. Ranking right below that, in my opinion, is the act of an officer of either gender preying on the spouse of an enlisted person. Whether or not the spouse had agreed to this arrangement is completely beside the point. What Flinn did was a betrayal of trust, a debasement of professional ethics, and a defilement of the integrity of the officer corps. In short, she willfully committed a supreme act of moral turpitude, lied about it, and then defied her commander's written orders to cease and desist.

Due to the necessity of military discipline, an officer is given considerable authority over enlisted personnel. With that authority goes a tremendous responsibility. Any officer who invades the domestic serenity of

the family circle of an enlisted person, as Flinn did, should be dealt with harshly and swiftly. What chance did Amn. Gayla Zigo have to establish a durable and stable marriage when an attractive, affluent, and glamorized B-52 copilot staked out her newly acquired husband as her own property.

If local commanders do not protect airmen under their jurisdiction from the predatory instincts of people like Flinn, who will? It must be remembered that Flinn was not a young and naive girl. She probably had more formal education in ethics, integrity, and morality at the Air Force Academy than I had in 30 years of military service. She just chose to ignore it.

Col. Robert L. Gleason,
USAF (Ret.)
Clemmons, N.C.

Your [August] editorial should be published worldwide as the TV and radio have stressed the sex angle to the near exclusion of the [issues of] disobedience and lying under oath. These were almost never mentioned, which is too bad as they were the main issues. So much for objective reporting. Thank you for your presentation.

Albert Krassman
Sierra Madre, Calif.

I applaud your assessment of the Kelly Flinn issue. I am glad to finally see an accurate and thorough description of the story printed. It was never a simple case of adultery, as Flinn and her lawyer would like everyone to believe. Disobeying a written order from her commander and lying are very serious offenses and should be dealt with accordingly. I don't think that the American public really wants someone who lies and disobeys orders to fly B-52s with nuclear weapons on board.

I have been irritated over the media's handling of this story from the very beginning. I feel that a strong majority of the news media is driven by an overwhelming desire to portray the military in a negative light at every opportunity. They presented a distorted view of the story, and the American public gobbled it right up.

Unfortunately, some of our more experienced members of Congress gobbled it up, too. I was disappointed in Sens. Trent Lott and Thomas Harkin. Both of them attacked the Air Force's handling of the case before they had all of the facts. I don't think that either one of them seriously wants the military to selectively enforce the laws established in the UCMJ. If they feel that the adultery law is archaic, then I respectfully suggest that they change the law. That's what Congress is getting paid to do in the first place.

Finally, it is unfortunate that your editorial wasn't published in several other magazines, so the uninformed masses of the civilian community could benefit from hearing the whole story.

SMSgt. Timothy M. Sanders,
USAF
Hill AFB, Utah

Uniform Buffs

Since I had worn all of the USAF uniforms since 1951, I was fondly reminded of the variations we had during those years in reading "Suited for Service in War and Peace" *[August, p. 58]*. I especially liked the "Ike" jacket. Since I was overseas in Panama when I enlisted in 1951, I was issued the "full" complement of uniforms—including some very heavy blues. I wish I still had those "one piece" fatigues which I feel sure is what the airman is wearing in the photo you show on p. 60. You can clearly see that it is not a fatigue shirt as stated in the caption.

CMSgt. John E. Schmidt Jr.,
USAF (Ret.)
Tallahassee, Fla.

Thanks for the article on USAF uniforms in the August issue. No matter how individual service experiences varied, we share an interest in the uniforms we wore.

I have a correction regarding a caption on p. 60—my basic training flight at Lackland had the misfortune of being issued the older, one-piece fatigue uniform worn by the mechanic shown working on a C-47.

One-piece fatigues were awful. When legs were shortened to fit shorter men, the uniform's crotch was often much lower than it should have been, and the cuffs were almost as wide as the wearer's brogans were long. (Most current active-duty troops won't know that brogans were ankle-high, "Little Abner" style utility footwear.) When tools or other heavy items were in the huge pockets, shoulders felt almost all the weight. Upon assignment to my first base I promptly followed the examples of many older troops by purchasing two-piece "Army style" fatigues off base.

MSgt. David R. Kingman,
USAFR (Ret.)
Fort Walton Beach, Fla.

■ *Readers Schmidt and Kingman,*

AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

Publisher
John A. Shaud

Editorial

Editor In Chief
John T. Correll

Executive Editor
Robert S. Dudney

Senior Editor
John A. Tirpak

Associate Editor
Tamar A. Mehuron

Contributing Editor
John L. Frisbee

Managing Editor
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Assistant Managing Editor
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Director of Production
Robert T. Shaughness

Art Director
Guy Aceto

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Editorial Associates
Juliette Kelsey-Holland
Chanel Sartor

Administrative Assistant
Wendy Alexis Peddrick

Advertising

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

Industry Relations Manager
Jennifer Krause • 703/247-5800

US and European Sales Manager
William Farrell • 847/295-2305
Lake Forest, IL

BPA Circulation audited by Business Publication Audit

Air Force Association
1501 Lee Highway • Arlington, VA 22209-1198

Telephone: (703) 247-5800

Toll-free: (800) 727-3337

Fax: (703) 247-5853

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Letters

as well as Louis D. Bettermann, Gerald Buchko, Harlow A. Vosburgh, and MSgt. Jim Waibel, USAF (Ret.)—all of whom wrote about the one-piece coveralls—are correct that the photo on p. 60 shows an airman in coveralls not a two-piece fatigue set.—THE EDITORS

Time adds more and more glow to my service span (both in the AAF and USAF) and [to] my lifetime membership in the Air Force Association, and it was disheartening to find the first indisputable error in your illustrious publication. Earthshaking: On p. 58 you identify the handsome young corporal in the Army uniform as Cpl. Claude Ridings.

That young corporal (who finished his second hitch at the conclusion of the Korean "police action" as a technical sergeant—[promotion to] master [sergeant] was frozen) was, in mid–1948, in the Radio Unit of the Air Force Office of Public Information and was selected to wear that popular OD outfit because he was (a) so natty and (b) there.

The picture was on the first page of the *Air Force Times;* I believe he was correctly identified at that time. His name was (and still is) Frederic Grimes, and as a life member of your organization I feel that he deserves proper identification, credit, and perhaps a small royalty. I didn't know my partner, so I cannot verify, or contradict, Edward Ancas' identification. I would appreciate a corrective word in case any old friends see a photograph of me when I still had a 28-inch waist.

Frederic Grimes
Huntington Beach, Calif.

■ *The caption stamped on the back of the photo from the Air Force identified the corporal as Claude Ridings. We regret the error.—THE EDITORS*

Dwight Eisenhower was a great general and a pretty fair President, but a clothing designer he was not. It has always puzzled me why the short jacket he copied from the British was dubbed the Eisenhower or "Ike" jacket. This credit would be akin to changing the name of basketball to "Jordanball."

As a RCAF and USAAF fighter pilot during WWII, I and thousands of others wore "battle jackets" as ancillary uniforms long before Ike had his Americanized battle jacket tailored in London. This was a British military, not an Eisenhower, design.

Gerald C. Clough Jr.
Jamestown, N.C.

I enjoyed your article chronicling the USAF uniforms through the years. As Gen. Merrill A. McPeak I'm sure can tell you, little is more sacred to the troops than the uniforms they wear so proudly. I didn't see much about the famous "David Jones" fruit-loop dress shirts that were not only adopted by the Air Force when he was Chief but subsequently forced on the Army and Navy (who soon trashed them) when he became Chairman. You also overlooked the dress uniforms—gosh there are several stories there! How about the old black/white mess dress, the old white-tie and tails with all the Army-like braid on the sleeves, the black "Kennedy" dress uniform, and the current "midnight blue" mess dress. And then, who can forget the famous (or infamous) ceremonial dress blue and white uniforms. Mine still hang proudly—and unworn—in my closet. Don't think I ever wore those white shoes.

Lt. Col. Russ Davis,
USAF (Ret.)
McLean, Va.

You can't touch on every item and idea; however, to those of us who were on active duty in 1947, when the new provisional uniforms were displayed, I think that you failed to mention one of the biggest disappointments that so many of us shared: the officer's cap device.

It was said that the Army, Navy, Marines, and Coast Guard all had their own device—but for us, they "painted" the Army device silver and pushed it at us. And so it remains to this day. We looked at cap insignias such as the Navy's and the Royal Air Force's and we felt that we should certainly have our own Air Force cap insignia.

To add insult to injury, it must be recalled that during WWII nearly all air forces officers wore a somewhat unofficial device that was larger than the regulation Army device, but they "painted" the ground officer's small insignia silver to give to us, and we have been stuck with it ever since. It had been McPeak's idea to do away with the visor cap and just have the flight cap and that would have settled it, but of course this never happened.

Charlie Macgill
Aurora, Colo.

The Ace Test

Randall L. Downey's letter in the August issue *[p. 5]* was technically true in stating that the Germans were the first jet aces. However,

most of their victories were against B-24s or B-17s over German or German-occupied territory. Shooting rockets into a tight formation of several hundred bombers wallowing along at 150 mph is a far cry from one-on-one combat with a MiG-15 over enemy territory. Maj. James Jabara's accomplishments took far more skill, daring, and plain old "guts" than what the Germans did. He is the first ace in *jet vs. jet* combat!

CMSgt. Vernon V. Cool,
USAF (Ret.)
Dover, N.H.

Not an FB-111

It took me a while before I figured out what Lt. Col. Manuel F. Vega's point was *["Letters," August, p. 6]*. My memory says there were *no* FB-111 losses over Libya. I may be wrong, but while they sat a lot of alert, I don't think FB-111s have ever flown in combat. F-111s have flown a lot of combat starting in Vietnam and finishing in the Gulf. It was the 48th Tactical Fighter Wing that flew F-111s in Libya and the Gulf before the change to F-15s.

Maj. Dave Davis
Bossier City, La.

■ *Reader Davis is correct. The aircraft in the 1986 Libya raid were F-111s, one of which went down during the mission.—THE EDITORS*

What's Up, Doc?

I was really looking forward to the article "What's Up, Doc?" in the August issue *[p. 66]*—I was disappointed. Lt. Gen. Charles H. Roadman II was on target on three points, the first being the Air Force did fail the marketing test and is not improving the score with articles of this caliber.

Second, retirees were never given a contract stating medical benefits would be provided until death; it was implied. Maybe the erosion of benefits is having an impact on the retention of quality people. Retention might be improved if the leadership, commanders, and first sergeants explained reality to their troops or at least attempted to tell them the truth.

The final point the general made which demonstrated his prowess in marketing can be found on p. 68 where he states, "... but we need dependents, retirees, and the over–65 retirees to get the right spectrum to maintain our clinical skills. ... you don't want a doctor cracking a chest every three months." What the general really said was, we need dependents, retirees, and the over–65 retirees so we have someone to practice on at minimal risk. That simple paragraph was a real motivator to have an Air Force medical specialist look at me or one of my family. For years we only joked about the hospital being a hobby shop; now the head of the Air Force medical corps puts it in print.

Lt. Col. Jim Harris,
USAF (Ret.)
Anchorage, Alaska

Missing the B-29

Reading the July issue with coverage of USAF's 50th anniversary, I saw photos of the B-17, B-24, B-25, and P-51s. I was very disappointed that there was not one photo of the B-29 Superfortress. Are the B-29s an extinct species? If not, where are they hiding?

George Meloche
Champlain, N.Y.

■ *The B-29 blew an engine and was unable to make the trip.—THE EDITORS*

Test Conclusive

This refers to "Project Aphrodite" in the August issue *["Valor," p. 57]*. As a test pilot at Hurlburt Field, Air Proving Ground, Fla., I flew the third test flight on that project in a TB-24G. The first two missions were flown in B-17s. Mine was the last of the test missions.

I cannot understand why you characterize the test as inconclusive. With a TV camera in the nose and receiver in the mother ship it was a precision munition. Furthermore, the TV pickup in the nose of the baby negated the weather factor. My only reservation concerning this project stems from the fact that we three crews were lured to volunteer by the promise of getting to fly combat sorties. The airplane I flew on the test still rests in 35 to 38 feet of water off the northeast end of the Choctawhatchee Bay midbay bridge.

Col. Edward D. Griswold,
USAF (Ret.)
Montgomery, Ala.

Training Methods

As a former training technician and NCOIC of base OJT, I am bemused at the Air Force's attempt to reinvent the training process *["Air Force Training on the Move," August, p. 76]*. Bruce Callander's article is rich in undefined buzzwords like "remote learning," "craftsman courses," "hyperlearning," and other jargon of modern pedagogy. Absent from the proposals are recognition and appreciation for the proven methods of basic training, techni-

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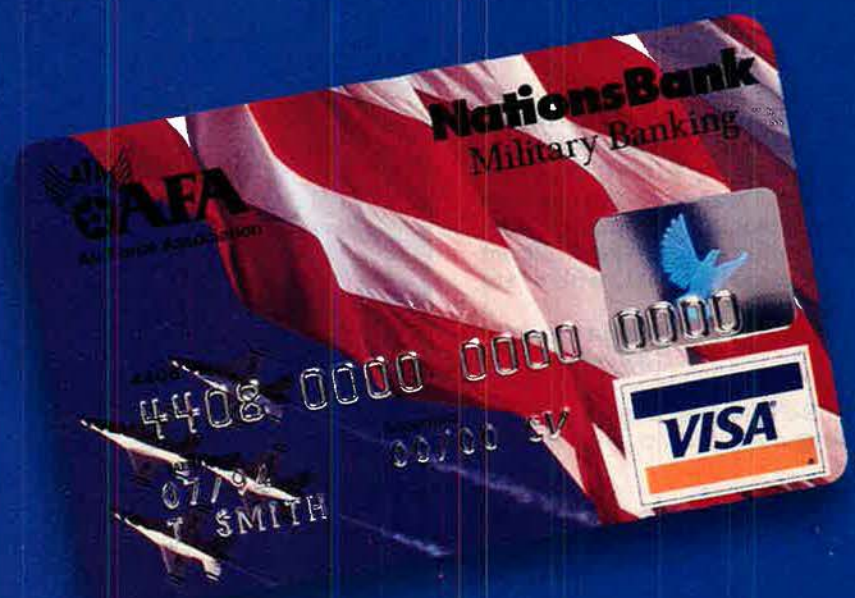

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cal schools, OJT, correspondence courses, with follow-on qualification training and PME.

The consolidation of courses touted as "streamlining" and cost savings will actually result in everybody becoming a generalist and proficient at nothing in particular. Job proficiency is a career-long process. It is delusional to think that the changes will produce "mission-ready technicians" who will be ready to start work the first day on the job. I certainly don't want to fly on anything they "fixed." Let's not be so hasty to abandon proven methods of training.

Capt. James A. Bailey,
USAF (Ret.)
Schenectady, N.Y.

Joint Contributions

I read the article in your June issue titled "Airpower and the Other Forces" *[p. 34]* regarding an Eaker Institute panel on strategy, requirements, and forces. I appreciate the general thrust of the article—airpower is likely to be the lead arm more often in the future than it was in the past. However, I take exception to some statements.

Gene Myers of the Air Force Doctrine Center made an outrageously partisan statement that only the Air Force has "strategic perspective" and functions "at the strategic and operational level of war" while others "operate primarily at the operational and tactical level." A logical extension of this statement would be that only the Air Force can provide officers with the strategic outlook necessary in a Joint force commander!

It would appear that Myers is unaware that the Navy–Marine Corps team maintains three carrier battle groups and three amphibious groups at sea for immediate response to likely strategic crises worldwide, or that the Army continually plans and trains for deployment and operations in every conceivable theater.

The statement by Dr. Philip Gold of the Discovery Institute that "we are not a land power or a sea power as these terms have been traditionally understood" is largely incorrect. The United States is now in almost exactly the same strategic position at sea as Great Britain was from 1815 to 1914.

This is the classic example of a sea power, a nation with the best technology and personnel, supported by a worldwide infrastructure that allows sea-based intervention and occupation anywhere there is a coastline within two weeks, or much sooner, near areas of fleet concentration.

Little mention was made of the other services' air assets except to say they are used "in relation to their other environments" and can't "fight from the back forward," the implication being that they are thus irrelevant to the strategic picture. In Desert Storm (and Vietnam, for that matter) carrier-based aircraft were capable of striking the entire theater without relying on basing agreements with other nations. They were employed on missions essentially identical to Air Force missions, usually while based even closer to their targets. Moreover, Army and Navy Special Operations Forces (with help from their Air Force counterparts) can certainly fight "from the back forward."

Robert E. Duchesneau
Sterling, Va.

Aerospace World

By Peter Grier

ACC Cancels Exercises

Air Combat Command on Aug. 19 announced that it will cancel all major flight competitions for the rest of 1997 in an effort to ease the workload of hard-pressed pilots and crews.

The move came in the wake of a RAND Corp. report finding that high Air Force operational tempo has helped produce unacceptable levels of stress among aircrews.

Scaling back on operations and competition commitments was one way to ease the pace for people, ACC said in a statement announcing the unusual move.

Among the competitions that were scrapped or postponed was Gunsmoke '97. This big air-to-ground meet, originally scheduled for October at Nellis AFB, Nev., was postponed until 1998. Proud Shield, an Air Force bombing competition, was similarly postponed. William Tell, the biennial air-to-air meet scheduled next for 1998, has been deferred until 1999.

Checkered Flag, a Tactical Air Command readiness exercise first run in 1979, was ended altogether. Air Warrior and Air Warrior II close air support competitions will be reduced from 22 to 15 each year.

Photo by Nate Leong

Air Combat Command has changed its exercise and competition schedule—eliminating some and reducing others—to help ease high stress levels among aircrews. This display used during William Tells won't appear again until 1999.

F-22 Makes First Flight

F-22 Raptor 01, first of what USAF hopes will be a fleet of at least 339 stealthy fighters, made its first flight on Sept. 7 over northern Georgia.

Air Force and company officials expressed satisfaction but appeared subdued. "Bringing the airplane to first flight marks the end of the beginning," said Tom Burbage, F-22 Team Program Office general manager. "Now it is time to test the Raptor, start production on schedule, and then get the aircraft fielded."

USAF announced the Raptor lifted off the runway at 140 mph, reached an altitude of 15,000 feet in some three minutes, reached speeds up to 285 mph, and went through power changes to test handling characteristics and engine performance. Midway through the flight, Paul Metz, chief F-22 test pilot, retracted the F-22's landing gear.

Metz flew the advanced Lockheed Martin fighter from Dobbins ARB, Ga., for about one hour. "There is no problem with that airplane," he said. "The airplane is ready to turn and fly again."

The flight was originally set for May 29 but had been delayed several times because of technical glitches.

New Alert Bomber Force?

USAF may soon revive the concept of a bomber force kept ready for combat missions on a moment's notice—but this time the alert force would be armed with conventional bombs, not nuclear weapons.

Such a force would give the United States a quick response capability for sudden emergencies such as Iraq's 1990 invasion of Kuwait. The handful of alert bombers would be able to carry the fight to an adversary within hours as a larger Air Expeditionary Force organized and moved toward the theater.

"We may in the not-too-distant future see bomber forces going back on alert," former Chief of Staff Gen. Ronald R. Fogleman, who retired Sept. 1, told an AFA symposium in Dayton, Ohio, in July.

Initial plans for the armed bomber initiative call for the use of B-52s and B-1Bs armed with precision guided weapons. The alert force might later include B-2s as the conventional capability of stealth bombers develops.

Current force structure plans call for inventory of 21 B-2s, 71 B-52s, and 95 B-1Bs, upgraded to handle conventional weaponry. In fact, the B-1 System Program Office is already considering an as-yet-unfunded Block G conventional capability upgrade. Block G upgrades would include Link 16 data link capability and a more flexible precision guided munition targeting system.

Major Promotions Leap

The Air Force selected 2,576 captains for promotion to major in 1997, the largest one-year number since 1991. Among those promoted were 905 pilots, the most since 1985.

Ninety percent of eligible candidates won their increase in grade. That is up from an 80 percent promotion rate over the past five years.

Virtually all captains recommended as "Definitely Promote" material by senior raters were tapped for major, as were 52 percent—compared to 42.2 percent in 1996—of those rated "Promote."

Some Pilots Pass Up Promotion

The 1997 Majors' Board results did contain one warning sign: Over 100 pilots wrote the board president asking to be removed from consideration. Presumably the majority of these have decided to leave the Air Force and did not want to stand in the way of another promotion candidate.

The board letters should not be taken as a sign of a decline in quality in this year's crop of majors, said USAF officials.

"A board always runs out of promotion quotas before it runs out of good people," said Lt. Col. Gayle Staten, chief of the Air Force Personnel Center's Officer Promotion and Appointment Branch.

But they could be a warning sign of problems in pilot retention. They might also lead to misunderstanding at some USAF facilities.

"We wouldn't normally address the subject of letters written to the board, but there are going to be several good officers at bases around the world who weren't selected, and other officers may question why they weren't promoted," Staten said. "This could be the reason."

Bahrain Gets New AEF

The Defense Department on Aug. 26 announced the mid-September deployment of an Air Expeditionary Force to the Persian Gulf nation of Bahrain.

Plans called for the new 366th Air Expeditionary Wing to consist of some 20 F-15E and F-16 fighter aircraft along with associated support personnel and equipment, all drawn from the 366th Wing located at Mountain Home AFB, Idaho.

The DoD announcement disclosed that the AEF task is to support Operation Southern Watch, the imposition of a restricted, no-fly zone over southern Iraq.

"Deployment of the 366th AEW was based upon consultations between the governments of Bahrain, the US, and other states in Southwest Asia," said the Pentagon announcement. "This deployment augments existing US forces in the region while validating our capability to rapidly reinforce in-place forces."

The Air Force now is sending AEFs to the Gulf on a regular basis. In early February, an AEF with about 30 fighters deployed to Qatar to support Southern Watch. That unit drew its forces from Seymour Johnson AFB, N.C.; McEntire ANGB, S.C.; Cannon AFB, N.M.; and Shaw AFB, S.C.

Photo by Susan Kennedy

Standing on the Air Force Memorial site, Robert D. Springer points toward the Iwo Jima Memorial, located up the hill and beyond a stand of trees.

Marines Object to Air Force Memorial Site

WASHINGTON, Sept. 8—A bill proposed in Congress by Rep. Gerald Solomon (R–N.Y.) would block construction of the planned Air Force Memorial on Arlington Ridge, overlooking the Potomac River. Solomon, a former Marine, says the site for the Air Force Memorial is too close to the Marine Corps Iwo Jima Memorial, which he declares to be "hallowed, sacred ground."

The perception of encroachment is unfounded, says Robert D. Springer, president of the Air Force Memorial Foundation. The Iwo Jima Memorial sits on more than seven acres of elevated ground. The Air Force Memorial will be located more than 500 feet from the outer edge of Iwo Jima, down a hill and behind mature trees.

Work began in 1992 toward the creation of a memorial to honor the men and women who served in the Air Force and its predecessors, such as the Army Air Corps. The process included review by numerous oversight bodies and the passage of enabling legislation in 1993. Among those briefed, Springer said, was the Marine Corps, which raised no objections at the time.

Now, however, a spokesman for the Marine Corps says that "we are concerned about the planned site for the monument, the impact, on our nation's Marine Corps war memorial and prefer to see it elsewhere." Some of the objection to the Air Force Memorial comes from a neighborhood group calling itself "the friends of Iwo Jima," which is concerned about an increase of cars and visitors to the area and about the loss of green space.

Rep. Sam Johnson (R–Texas) said that "the comments I have seen about the design of the Air Force Memorial have been good. I think it will enhance the Marine Corps Memorial rather than detract from it." Johnson is a former Air Force pilot and was a POW during the Vietnam War.

Solomon and his colleagues say they agree that there should be an Air Force Memorial but that it should be located somewhere else. Air Force Memorial officials are understandably reluctant to start over again. The present site was chosen for a number of reasons, including the proximity of the spot to Ft. Myer from which Orville Wright first demonstrated flight to the military in 1908. The foundation has also committed nearly $1 million to a site-specific design that has been widely praised in the architectural community.

The Air Force Memorial Foundation has worked closely with the Air Force Association and the National Park Service to provide accurate information to Congress, get the facts out to the news media, and correct misunderstandings.

Hamre Pushes Depot Maintenance Competition

Deputy Defense Secretary John Hamre told Congress that he is in favor of more-frequent competitions between public and private sectors for depot maintenance contracts. Hamre made the remarks during his July 24 confirmation hearing.

Such competitions should be limited to work that is not needed to

maintain crucial in-house capability at military logistics centers, he said.

"I would also like to increase depot maintenance public–private partnering in an effort to preserve necessary skills and utilize excess capacity," Hamre said in response to prepared questions.

Hamre also indicated that he supports regional consolidation of depot workloads that cut across military service lines. Such intraservice cooperation could lower costs while maintaining needed capabilities, he said.

Hamre on F-22, B-2

The new deputy secretary has some reservations about F-22 fighter cost projections.

Air Force officials have expressed confidence that they can build 339 F-22s for a total price of $43.4 billion. There is some risk in that estimate, Hamre told members of the Senate Armed Services Committee.

An updated F-22 cost estimate is due out early next year. This study could provide more understanding of contractor ability to implement the cost reduction initiatives that will be necessary to meet the $43 billion price tag, said Hamre.

On the B-2, Hamre expressed confidence that new questions regarding the ability of the airplane to evade radar are not as serious as quality problems that were encountered in the course of B-1B production.

The problem centers on materials and maintenance training for low-observable aspects of the B-2, according to Hamre.

T-3A Operations Suspended

The Air Force on July 25 temporarily suspended T-3A Firefly operations, pending an investigation into engine problems in the trainer aircraft.

The T-3A is used to screen abilities of young pilots. Since its introduction into the force in 1994, T-3As have experienced 30 in-flight engine stoppages, according to Air Force Safety Center statistics.

The causes of 13 of these incidents remain undetermined. The rest have been attributed to problem valves, bad fuel, or other mechanical problems.

Gen. Lloyd Newton, commander of Air Education and Training Command, ordered the stand-down after a July 23 engine mishap. Experts from prime contractor Slingsby Aviation and engine contractor Textron Lycoming are working with Air Force officials to determine the cause of the problems.

The Air Force currently has 110 T-3As in service. Fifty-three are based at the Air Force Academy in Colorado Springs, Colo., and 57 are based with the 3d Flying Training Squadron at Hondo Airport in Texas. Both units are assigned to the 12th Flying Training Wing at Randolph AFB, Texas.

Medicare Subvention Test Approved

More Medicare-eligible military retirees will be able to enroll in the Pentagon's new Tricare health plan under a limited Medicare Subvention demonstration project recently approved by Congress.

In recent years, most military retirees eligible to enroll in Medicare could not join the Tricare system. They received care at a military medical facility only on a space-available basis. But Congress included a Medicare Subvention test in its recently passed budget reconciliation legislation.

Congress' action clears the way for DoD to show, on a limited basis, how it can improve access to military health care for those beneficiaries

who are now eligible for Medicare. With Medicare Subvention, some patients will be permitted to enroll in Tricare. Demonstration details will be announced shortly.

The Department of Defense expressed its "pleasure" with the Congressional action.

"Improving access to military health care for Medicare-eligible military beneficiaries is important to the Administration, and a Congressionally authorized Medicare Subvention demonstration project is an important step toward achieving that goal for our beneficiaries," said Secretary of Defense William S. Cohen.

Edward D. Martin, acting assistant secretary of defense for health affairs, stated, "We are delighted with the outcome of this Congressional action; it provides us the ability to enroll and care for more of our Medicare-eligible beneficiaries in Tricare."

Gold Dust Peak Search Continues

Search crews battled dehydration, altitude sickness, deep snow, and rugged terrain as they continued the search for pieces of Capt. Craig Button's A-10 attack aircraft on Gold Dust Peak in Colorado.

Last April, Button departed his Arizona training mission and flew north, slamming into the peak. The A-10 shattered into what one searcher called "a million-piece jigsaw puzzle." USAF units are scouring the area to clear debris before winter sets in and find any clues that could help explain Button's behavior.

"Our job is to gather as much of what's left of that airplane as quickly as we can, as safely as we can," said Brig. Gen. Donald Streater, head of the operation, on Aug. 13.

The biggest problem, said Streater: finding the A-10's Mk. 82 bombs. USAF teams quickly found five bomb rack suspension hooks that were damaged in a way suggesting they were carrying something heavy on impact. But they have also recovered bomb rack parts that carry cartridge-powered ejection pistons, meant to jettison the Mk. 82 explosives. Some had been fired.

"The cartridges could have fired prior to impact, upon impact, after impact, or could have fired during a severe spring storm," he said. "We just don't know. They can be fired by any electrical or electrostatic source."

USAF Tests Force Protection in Bosnia

The Air Force is trying out new force protection concepts at Tuzla AB in Bosnia.

F-15 No. 1 undergoes testing not long after the July 27, 1972, first flight of USAF's current premier air-superiority fighter.

F-15 Celebrates Silver Anniversary

The F-15 Eagle—widely considered the world's finest tactical fighter—celebrated the 25th anniversary of its first flight on July 27.

USAF first requested development money for the new fighter in 1965, as it looked for a replacement for the then-dominant F-4. McDonnell Douglas was selected as the prime contractor in 1969. Then in 1972, the first model took flight. Two years later, the first F-15B was delivered to the 58th Tactical Training Wing, Luke AFB, Ariz.

The F-15 is an all-weather air-superiority fighter. "Because of the avionics and weaponry, it's just an awesome aircraft that no one can touch," said Lt. Col. Bill Shaw III, commander of the 54th Fighter Squadron at Elmendorf AFB, Alaska.

The Eagle incorporates two major technological improvements over the F-4, said Shaw. One is its look-down, shoot-down radar. The second is its HOTAS, or Hands On Throttle And Stick, controls.

Its major current disadvantage is that with a 42-foot wingspan it is easy to see. "It's big," said Shaw, who has been flying F-15s since 1983.

Eagles are likely to long remain in the Air Force inventory even after F-22 Raptors begin taking over the air-superiority role early in the next century. Most B-52 pilots have long been younger than the aircraft they fly. Soon, and for years to come, many F-15 pilots may be in the same position.

The base's entry checkpoint has been moved to a better vantage point. Defense bunkers now are scattered around the airfield. Security personnel say they have adopted a new and stricter attitude toward persons and vehicles entering the base grounds.

On July 1, security police units servicewide were redesignated "security forces." The name change is meant to help reinforce that there had been a change of emphasis from law enforcement to defense of troops and equipment from attack.

The first security force members to put this new concept to the test deployed from Ramstein AB, Germany, to Tuzla on July 8. They traveled to the base as a group, secured the airfield, and then integrated their base defense plan with that of the Army security personnel at the base.

"We normally depend on the Army to provide perimeter defense," Col. Kenneth Byrd, 401st Expeditionary Air Base Group commander, told European *Stars and Stripes,* "but what we're learning from Beirut to Khobar Towers is that terrorism doesn't care what uniform we're wearing."

Airpower Trumps Ground Force

A force of land-based aircraft can halt and then overwhelm a large ground invasion force in a matter of days, according to a RAND Corp. study on the opening phase of armed conflict.

RAND analysts focused on Southwest Asian and Korean war scenarios.

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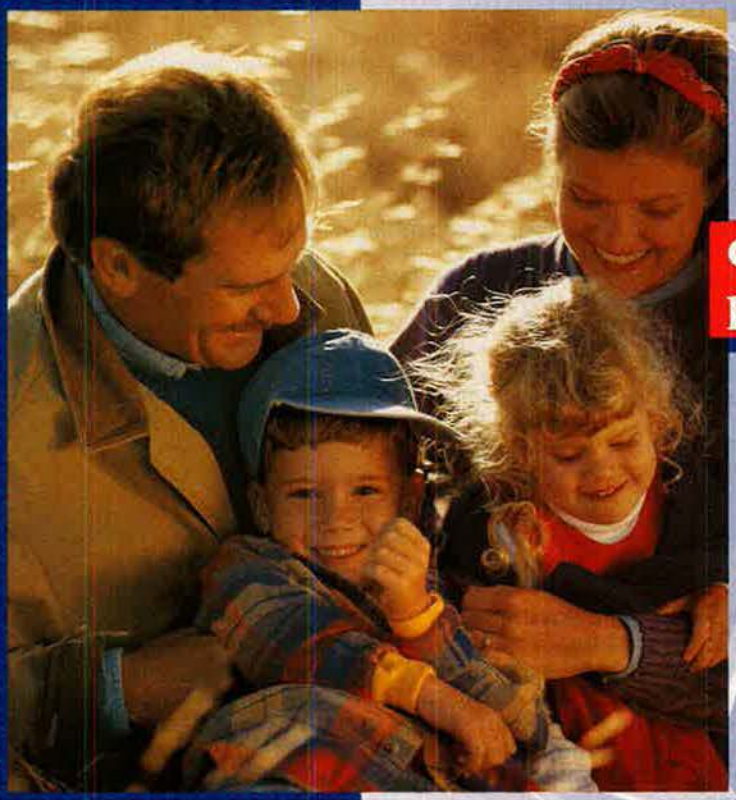

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They found that an invasion force of 25 divisions, half armored, accompanied by upwards of 500 combat aircraft and surface-to-air missile batteries, can be turned back within 10 days by a "seriously outnumbered force" of land-based aircraft, including bombers and fighters, one carrier air wing, and attack helicopters.

That time frame can be cut to only three days if several squadrons of new F-22s are assumed to be available for combat, the study claims.

Analysts found that the most effective US tactics in such a case initially would not center on destruction of tanks. Rather, US forces should first establish air superiority and suppress surface-to-air and ballistic missile sites. Furthermore, the study said airpower should be unleashed quickly and en masse. The concept of husbanding aircraft and munitions to guard against counterattacks and to prepare for a ground counteroffensive was determined to be counterproductive.

Lockheed Martin and Samsung Aerospace of South Korea, who will jointly produce the KTX-2 advanced trainer/fighter, project that the jet's maneuverability, endurance, and modern systems will generate worldwide sales of 600–800.

New Guidance on Discipline

Only the most aggravated cases of improper relationships between USAF personnel should be punished with courts-martial, according to a July 16 memo to commanders.

Some infractions of relationship rules should be handled with counseling, reprimands, or nonjudicial punishments such as confinement to quarters, according to the memo from headquarters.

The document was signed by Secretary of the Air Force Sheila Widnall and Gen. Ronald R. Fogleman, who was then the Chief of Staff of the Air Force.

Senior officers need to set "an example of fair, evenhanded and thoroughly professional relations," said the document.

The Air Force has drawn criticism in recent months for pursuing criminal charges against officers involved in adulterous affairs and fraternization. Many commanders have begun to move cautiously in such cases.

At Barksdale AFB, La., a lieutenant who had a baby by a married superior officer and taunted the man's wife was recently judged in a nonjudicial administrative hearing, instead of a court-martial. The officer, Lt. Crista Davis, was reprimanded and ordered to forfeit $2,000 in pay.

UFOs Were U-2s, SR-71s, Says CIA

Throughout the 1950s and 1960s, thousands of Americans who reported unidentified flying objects (UFOs) had in fact glimpsed high-flying reconnaissance aircraft such as the Air Force's U-2 and SR-71, according to a CIA publication.

Unwilling to divulge the existence of these then-secret airplanes, the Air Force and the US intelligence community said the sightings resulted from ice crystals, swamp gas, temperature inversions, or other natural phenomena.

The disclosures were contained in an article written by Gerald K. Haines, a historian of the National Reconnaissance Organization. It was published in the spring issue of *Studies in Intelligence,* a CIA journal.

Lockheed's secret Skunk Works division and the CIA began test flights of the U-2 over isolated areas of the American West in 1955. The airplanes flew at very high altitudes and were difficult to see from the ground, but the unpainted silver metal produced a distinctive flash to commercial pilots or other keen observers of the skies. The U-2 was later painted black, as was the SR-71, which began test flights in the early 1960s.

Historian Haines holds that over half of all UFO sightings in the US

SOF Craft Flies in "Air Force One"

Along with actor Harrison Ford, an Air Force Combat Talon I aircraft from the 8th Special Operations Squadron was one of the stars of the recent action-adventure film "Air Force One."

The airplane, with two complete crews, flew last year from its Hurlburt Field, Fla., home to California for filming with director Wolfgang Peterson. At the heart of the action was the aircraft's Fulton STAR [Surface-To-Air-Recovery] system. With the Fulton system, the MC-130 can snag lift lines attached to helium-filled balloons and winch the payloads from the ground onto the back cargo ramp.

Through the miracle of special effects, Fulton equipment was used to simulate the transfer of a daring human rescuer between the Talon I and Air Force One, flying nearby.

No Air Force crew member became an inadvertent extra in the movie, however. "You won't see any faces of our people," said Lt. Col. Jeff Alderfer, 8th SOS director of operations and the mission commander during filming. "All of the interior shots were filmed in a mock model of the inside of the Talon after we were back at Hurlburt Field."

Filming took place at odd hours of the night over the ocean. Throughout the shots the Combat Talon crew had to fly a tight three-aircraft formation with the huge 747 stand-in for the real Air Force One and the camera airplane, a converted B-25 bomber named *Photo Lady.*

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during the height of the Cold War could be accounted for by espionage aircraft flights.

Cohen Complains to Congress

On Aug. 7 Secretary of Defense Cohen sent the Senate Armed Services and House National Security committees a letter outlining his objections to their 1998 defense authorization bills.

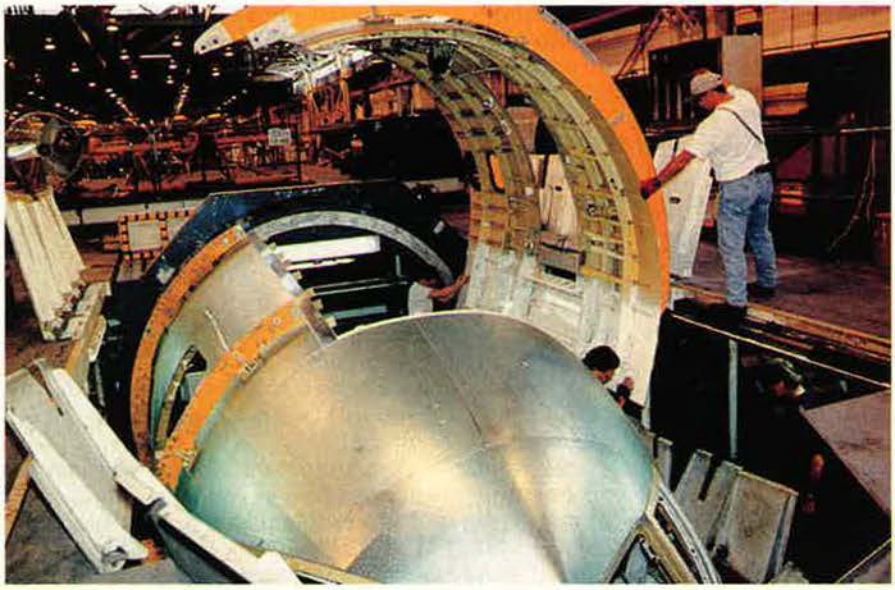
Cohen objected to many of the changes Congress has made in tactical aircraft programs. He said that major reductions in funding for the Air Force's F-22 fighter endanger the Pentagon's fighter modernization plan. Furthermore, the Senate's proposed cap of $43.4 billion for the total F-22 program robs the Air Force of flexibility, he said.

Cohen also complained about the House effort to provide funding to buy more B-2 bombers beyond the 21 now planned. He said this would be "a serious mistake."

The extra B-2s would add tens of billions of dollars in life-cycle costs to the defense budget, said Cohen. Such a burden would inevitably require cutbacks in more critical military programs, he wrote.

White House Lifts Latin American Arms Ban

The White House on Aug. 1 announced that it was lifting restrictions on the sale of most advanced weaponry to the nations of Latin America. The move clears the way for Lockheed Martin and Boeing to compete for an upcoming Chilean fighter deal.



Workers began assembling the forward fuselage of USAF's first C-32A, a slightly modified Boeing 757-200, in late July. The C-32As, purchased using commercial practices, will begin replacing 1950s–vintage VC-137s, used for executive and Congressional airlift, early next year.

President Jimmy Carter put in place restrictions on arms sales to the south. The policy aimed to deny modern equipment to military dictators who ruled much of Latin America.

In repealing the ban, officials of the Clinton Administration said they would evaluate arms sales on a case-by-case basis, essentially putting Latin America on the same basis as other nations when it comes to US weapons sales.

US airframe manufacturers could be the primary short-term beneficiaries of the move.

Chile is weighing competing proposals for a fighter force upgrade. Brazil, among others, is likely to soon follow suit.

St. Louis Gets Boeing Defense Unit

Newly enlarged Boeing Corp. will base its military aircraft division headquarters in St. Louis, company officials announced on Aug. 4.

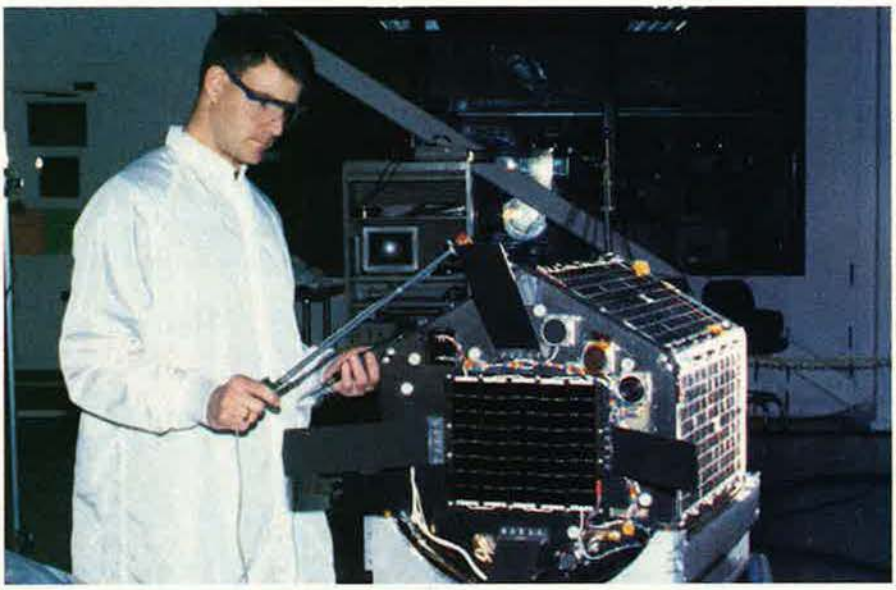
The decision settles a sensitive management question that had lingered ever since Boeing announced plans to acquire McDonnell Douglas Corp. McDonnell Douglas executives had wanted defense aircraft to stay in Missouri, while Boeing wanted to move them to that company's Washington state location.

Boeing also announced the creation of the Information, Space and Defense Systems Group to be based in Seattle. ISDS will oversee McDonnell Aircraft and Missiles Systems, as well as Space Systems, Seal Beach, Calif.; Information and Communications Systems, Seattle; and an advanced R&D unit, Phantom Works, the location of which was still undecided at press time.

B-2 and Overseas Deployments

USAF's B-2 bomber in early fall became the focus of heated claims and counterclaims about how difficult it may be to protect and maintain its revolutionary "stealth" properties.

After several weeks of debate, the bottom line that emerged seemed to



Maj. Eric R. Payne, MightySat I program manager at Phillips Lab, Kirtland AFB, N.M., checks the satellite's progress during solar cycle testing. The lab plans to launch the experimental satellite during a shuttle flight in July 1998.

be this: Maintenance of B-2's radar-defeating surfaces will take more work than expected. It will be harder—though far from impossible—to deploy the bombers overseas. And the prospect for successful fixes is reasonably high. Changes in materials or repair processes are among the possibilities.

Plans called for the B-2, produced by Northrop Grumman, to be able to attack directly from Whiteman AFB, Mo., its home base, or deploy to a forward location such as Guam in the Pacific and Diego Garcia in the Indian Ocean.

However, DoD said USAF discovered that humidity, ice, and other weather events can damage its radar-absorbing coatings and affect its "low observable" traits. It may be that, for a while, they have to stay on the ground only at locations with special climate-controlled shelters.

The problem was the subject of a recent report from a Congressional watchdog agency, the General Accounting Office. GAO said that the discoveries have caused the Air Force to drop the overseas basing requirement.

Another critical report came from DoD's director of operational test and evaluation. In a briefing for members of the Senate Armed Services Committee, Philip E. Coyle III expressed concern about the reliability and maintainability of the B-2's LO features. He claimed that the bomber averages more than three LO discrepancies per flight hour, according to press reports.

However, the Air Force said that the majority of LO discrepancies are fixed during regular maintenance and that those actually affecting low observability are fixed immediately.

In a statement, Northrop Grumman charged that the critical reports refer to old problems—affecting Block 10 and Block 20 aircraft—which "have either been solved or are being addressed." The contractor went on to say, "Neither GAO nor OSD has any data suggesting that the Block 30 [bomber] shares the same LO maintainability problems exhibited by the early Block 10 and 20 B-2s." All B-2s will be put in Block 30 configuration over the next several years.

Gen. John Shalikashvili, Chairman of the Joint Chiefs of Staff, told reporters on Aug. 28 that he would have confidence in the B-2 if he had to send it into combat, and that the LO problems are "temporary" in nature.

News Notes

■ A new survey indicates that members of the military are happier with their Tricare medical care than civilians are with their physicians. The Pentagon questionnaire, mailed in January to 75,000 service personnel who had recently undergone treatment, measured satisfaction with access, quality, and interpersonal relationships with medical staff.

■ The nation's 15th and newest B-2 stealth bomber was named *Spirit of Pennsylvania* in a ceremony at NAS/JRB Willow Grove, Pa., on Aug. 5.

■ Research engineers at Wright Laboratory, Ohio, played a key role in NASA's high-profile Mars Pathfinder mission. They developed the small, high-efficiency solar cells used to power the Sojourner robotic vehicle as it wheeled about the martian surface snapping photos of rocks and sampling dust.

■ On Aug. 2, the first active-duty

USAF Celebrates 50

■ The Smithsonian's National Air and Space Museum has an exhibit of Air Force art and model aircraft, dedicated to USAF's 50th anniversary, through November.

■ An exhibit on USAF's 50th at the San Diego Aerospace Museum features artifacts and memorabilia extending from 1909 to the present. It runs through December.

■ The air show at Eglin AFB, Fla., set for Nov. 1–2, will include fireworks, a World War II hangar party, and a concert to commemorate the Air Force's Golden Anniversary.

Air Force officer to head an Air National Guard unit took command. Col. Walter Burns will command the Connecticut ANG's 103d Fighter Wing for three years.

■ On July 31, NATO's Defense Planning Committee approved the nomination of Adm. Harold W. Gehman Jr. to be Supreme Allied Commander, Atlantic. Plans called for Gehman to assume his duties in September.

50 Years Ago in *Air Force* Magazine

October 1947

On the cover: "Warming Up the B-36." The job of the flight engineer, which came into military prominence with the B-29, takes on new stature with the Convair B-36. The magazine said that pilots "have their hands full flying the giant, so flight engineers get most of the dials."

■ At the request of the Air Force, AFA was the official sponsor of Air Force Day, Aug. 1, 1947. In Tokyo, more than 450 aircraft, including B-29s and jet-propelled P-80s, took part in an aerial review. The program was smaller in Berlin, where Americans and Allied guests watched a flight of Douglas C-47s pass over Tempelhof airport. At Andrews Field, Md., a flight of seven B-29s landed after a record-breaking, one-stop flight from Tokyo, accomplished in slightly over 31 hours, 24 minutes.

■ A report on Far East Air Forces included a photo of Capt. M.S. Sturgis fishing in the moat surrounding Emperor Hirohito's palace in Tokyo. The article explained that fishing there had been legalized by an imperial directive.

■ July 25, 1947, was declared the final day which may be counted by military personnel as service during World War II for the purpose of establishing eligibility to various veterans benefits.

■ The last C-54 Skymaster rolls off the production line in Santa Monica, Calif. Of the total, 1,163 had been built for military purposes and 79 for postwar commercial use.

AFA news: After a membership drive at Yokota AB, Japan, 83 percent of the personnel stationed there are AFA members.

Senior Staff Changes

RETIREMENTS: Brig. Gen. David E. **Baker,** Maj. Gen. Robert W. **Drewes,** Brig. Gen. William R. **Hodges,** Brig. Gen. Robert T. **Osterthaler,** Brig. Gen. Pedro N. **Rivera.**

PROMOTIONS: To be **ANG Major General:** Rendell F. **Clark** Jr., Wilfred **Hessert,** Theodore F. **Mallory,** Loran C. **Schnaidt,** James E. **Whinnery.**
To be **ANG Brigadier General:** Garry S. **Bahling,** David A. **Beasley,** Jackson L. **Davis** III, David R. **Hudlet,** Karl W. **Kristoff,** John A. **Love,** Clark W. **Martin,** Robert P. **Meyer** Jr., John H. **Oldfield** Jr., Eugene A. **Schmitz,** Joseph K. **Simeone,** Dale K. **Snider** Jr., Emmett R. **Titshaw** Jr., Edward W. **Tonini,** Ronald A. **Turner,** Giles E. **Vanderhoof.**

CHANGES: Brig. Gen. John D. **Becker,** from Cmdr., 6th ARW, AMC, MacDill AFB, FL, to IG, AMC, Scott AFB, IL, replacing Brig. Gen. James E. Andrews ... Maj. Gen. Richard N. **Goddard,** from Dir., Log., ACC, Langley AFB, VA, to Cmdr., Warner Robins ALC, AFMC, Robins AFB, GA, replacing retiring Maj. Gen. Rondal H. Smith ... Maj. Gen. Dennis G. **Haines,** from Dir., Log., AFMC, Wright-Patterson AFB, OH, to Dir., Log., ACC, Langley AFB, VA, replacing Maj. Gen. Richard N. Goddard ... Brig. Gen. William A. **Peck** Jr., from Cmdr., 366th Wg., ACC, Mountain Home AFB, ID, to Dir., Rqmts., ACC, Langley AFB, VA, replacing Maj. Gen. John W. Hawley ... Brig. Gen. Randall H. **Schmidt,** from Cmdr., 24th Wg., ACC, and Cmdr., USSOUTHCOM Air Forces Forward, Howard AFB, Panama, to Cmdr., 366th Wg., ACC, Mountain Home AFB, ID, replacing Brig. Gen. William A. Peck Jr. ... Brig. Gen. James N. **Soligan,** from Exec. to SACEUR, SHAPE, NATO, Casteau, Belgium, to Cmdr., 6th ARW, AMC, MacDill AFB, FL, replacing Brig. Gen. John D. Becker.

SENIOR EXECUTIVE SERVICE CHANGES: Kenneth R. Boff, to Chief Scientist, Crew System, Armstrong Laboratory, Wright-Patterson AFB, OH ... **Debra L. Haley,** to Dir., Communications & Information, AFMC, Wright-Patterson AFB, OH ... **Daniel F. McMillin,** to Dep. Dir., P&P, USTRANSCOM, Scott AFB, IL. ■

■ On Aug. 7, Raytheon E-Systems delivered a refurbished C-130A to the Air Force for use as a memorial to service personnel who lost their lives on secret intelligence missions during the Cold War. The restored aircraft has been reconfigured to resemble a Rivet Victor C-130A shot down by Soviet MiG-17s on Sept. 2, 1958, after it strayed into Soviet Armenia on a reconnaissance mission over Turkey. It will be displayed in an airpark setting between the National Security Agency and the National Cryptologic Museum at Ft. Meade, Md.

■ The senior Air Force official in charge of equal opportunity programs was honored by the National Association for the Advancement of Colored People at its annual convention. D. Michael "Mickey" Collins, deputy for equal opportunity in the Office of the Assistant Secretary of the Air Force (Manpower, Reserve Affairs, Installations, and Environment), received the Benjamin L. Hooks Distinguished Service Award on July 17.

■ Air Mobility Command won AFA's 1997 David C. Schilling Award for outstanding achievement. The award

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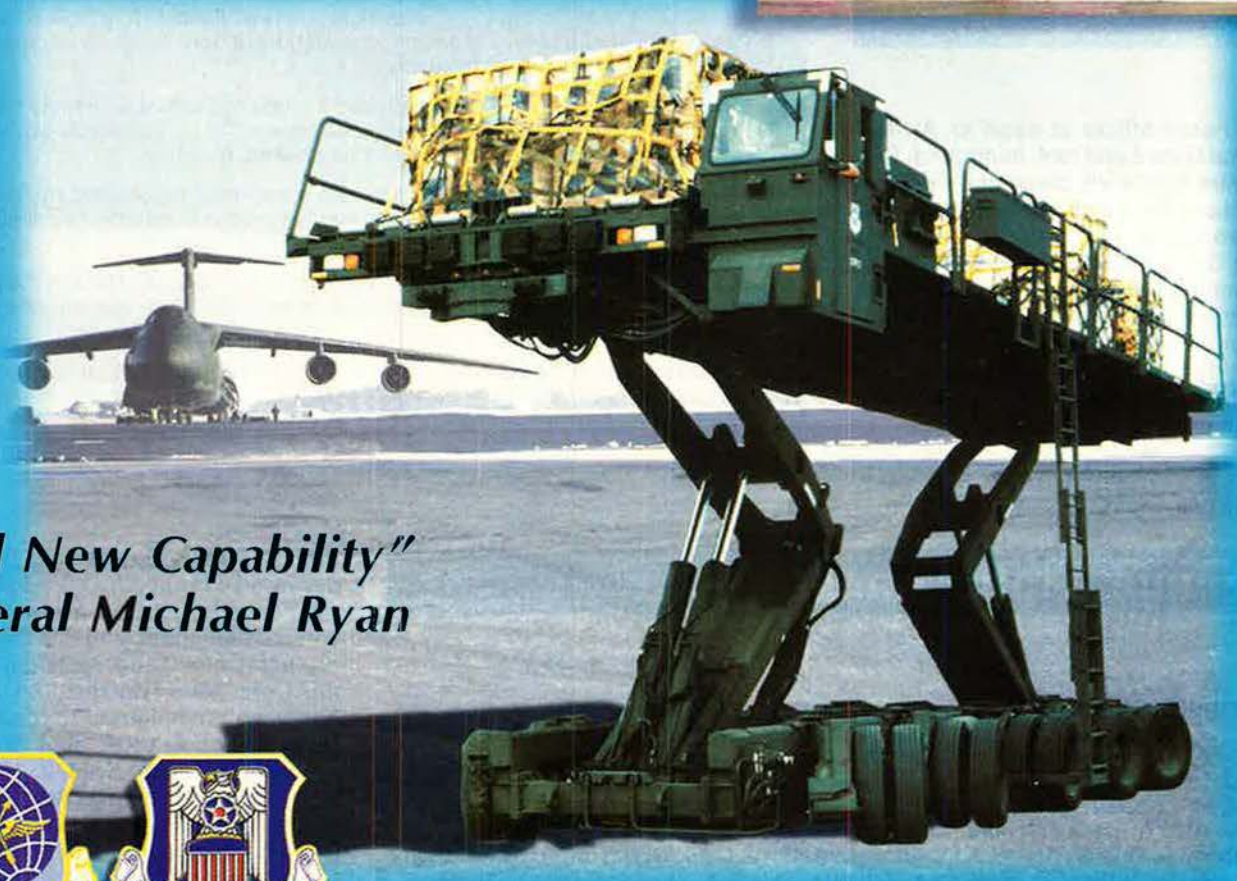

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is given annually to recognize exceptional contributions by an Air Force person or organization to the field of manned flight. AMC's worldwide airlift operations, from Bosnia to the humanitarian efforts after the Grand Forks, N.D., flood, were cited in the award.

■ The Air Force Aid Society has established a Jimmy Stewart Education Grant in memory of the late actor's distinguished Air Force career. Sons and daughters of Air Force families will be eligible for the $1,000 annual award.

■ June Sims, employed at Warner Robins ALC, Ga., on July 29 was named Air Force Suggestor of the Year. Sims, an equipment specialist with the Space and Special Systems Management Directorate, is said to have saved USAF millions of dollars with her ideas for upgrading older M-16 rifles to M-16A2 configuration and refurbishing 20 mm guns rather then buying new ones.

■ Nearly 100,000 US troops may have been exposed to small, "trace" amounts of nerve gas following the demolition of an Iraqi ammunition dump at the end of the Gulf War, DoD announced July 24. That estimate, the result of a year-long study by Pentagon and CIA officials, is almost five times larger than preliminary figures, but DoD said long-term health problems were unlikely.

■ An 11th Expeditionary Reconnaissance Squadron medic, based at Taszar AB, Hungary, saved the life of an Air Force coworker who suffered an anaphylactic reaction from eating seafood. SSgt. Victor M. Reyes Jr. quickly assessed the situation and administered life-saving injections of Benadryl and epinephrine.

Maj. Steve Mills preflights his F-15 at the Missouri ANG base in St. Louis before flying in a four-ship training formation. The four pilots—Lt. Col. Gordon Kimpel and Majs. Jon Kelk, Alan Miller, and Mills—in the formation had a combined total of more than 10,300 F-15 flying hours. The flight possibly marked a record for a single squadron, according to Kelk.

■ The Air Force says it will deactivate the last unit still based at Torrejon AB, Spain—a nine-man detachment from the 635th Air Mobility Support Squadron. Though Torrejon was a major airlift refueling stop during the Gulf War, its use has dwindled in recent years as a result of Spanish political sensitivities.

■ C-141 Starlifter aircrews from the Air Force Reserve Command's 446th Airlift Wing, based at McChord AFB, Wash., flew four victims of the Aug. 5 Korean Air jet crash in Guam to US medical facilities. The four, all in critical condition, were taken to a specialized burn treatment center at Brooke Army Medical Center, Texas.

■ The Air Force's 67th Intelligence Wing opened its new state-of-the-art headquarters at Kelly AFB, Texas, on Aug. 14. The $3 million facility will provide worldwide communications capability for the wing, which has more than 8,000 people serving at 80 locations around the world.

■ The varsity men's softball team from Lackland AFB, Texas, won the National Softball Association's Military World Championship at an August tournament held at Ft. Leonard Wood, Mo. ■

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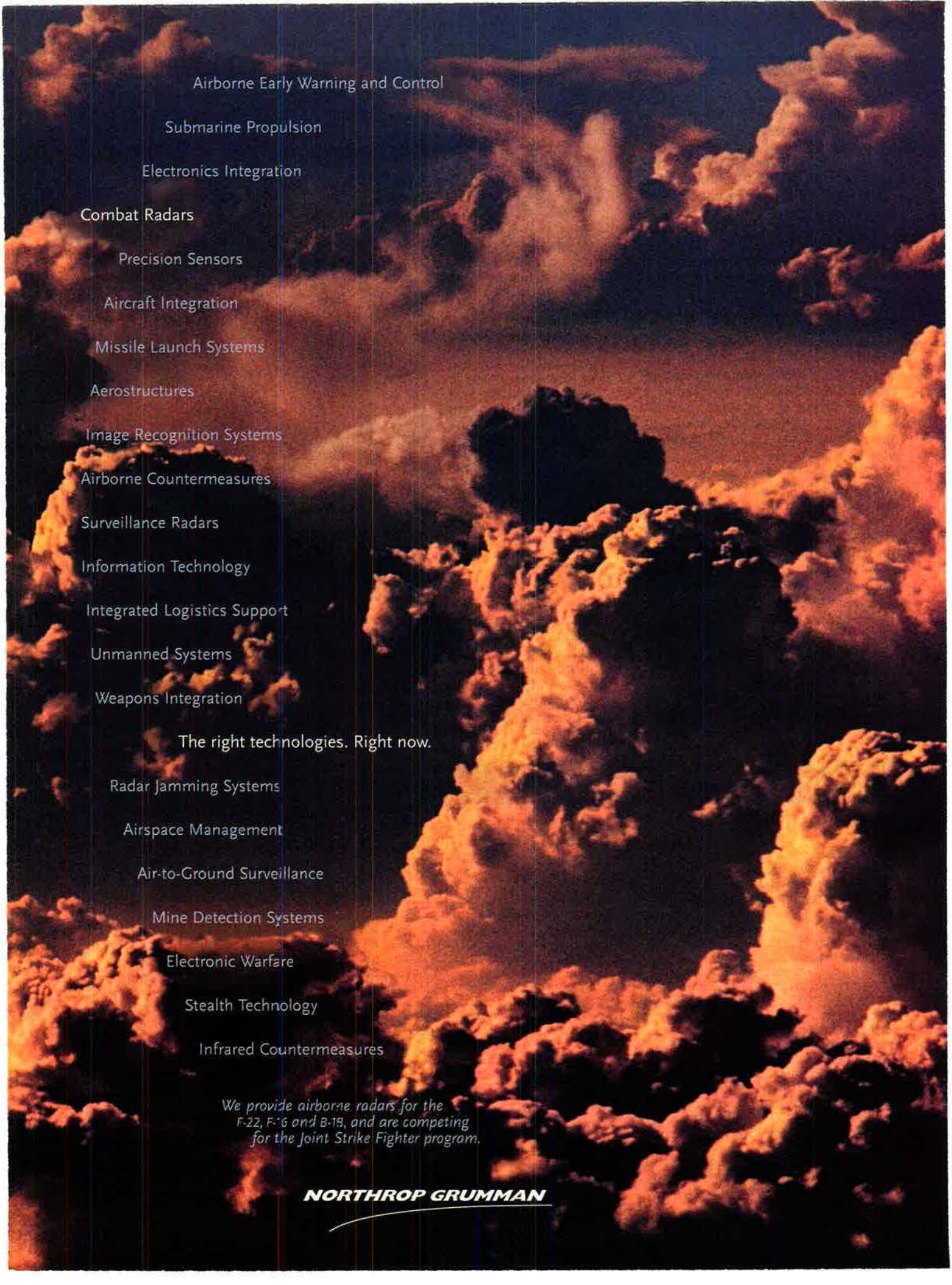
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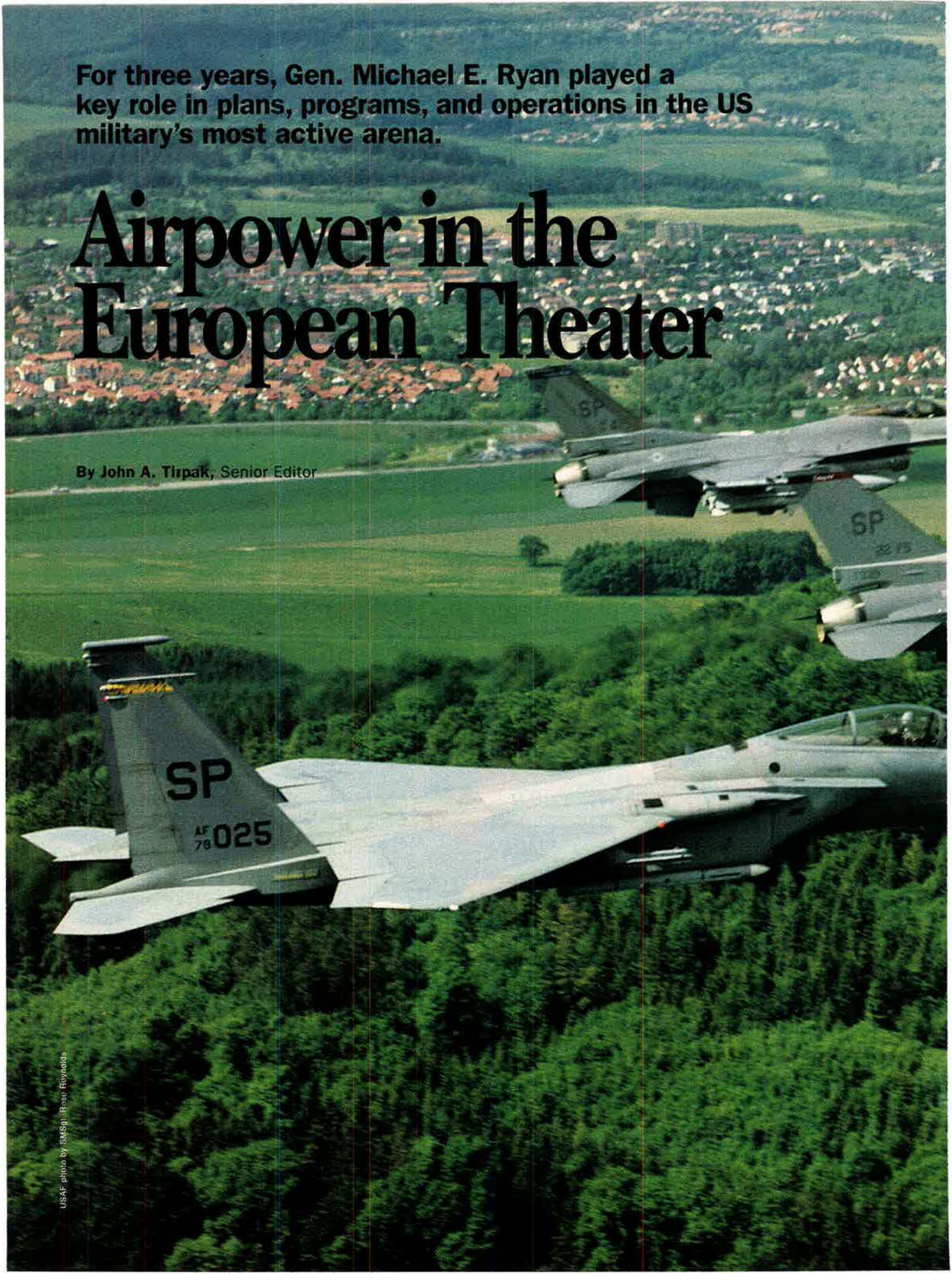
Time's up.

For three years, Gen. Michael E. Ryan played a key role in plans, programs, and operations in the US military's most active arena.

Airpower in the European Theater

By John A. Tirpak, Senior Editor



USAF photo by SMSgt Rose Reynolds

US Air Forces in Europe, the service's most active overseas command, has been kept on its toes throughout the 1990s. With the fall of the Berlin Wall, eruption of the Gulf War, collapse of the Soviet Union, ethnic war in Bosnia, and expansion of NATO all taking place on its doorstep, USAFE has, in only seven years, participated in some of the postwar era's most critical events.

For three years of those years, Gen. Michael E. Ryan played a key role in the European airpower equation. First, as a three-star general, he commanded NATO Southern Air Forces in Operations Deny Flight and Deliberate Force, the latter of which is viewed as the main factor leading to the 1995 Dayton Accords that ended the violence in Bosnia. Promoted to general in April 1996, Ryan assumed command of USAFE, with responsibility for US and NATO air forces in Europe's central region. President Clinton in August nominated Ryan to succeed Gen. Ronald R. Fogleman to be the 17th Chief of Staff of the Air Force.

On the eve of his Senate confirmation hearings, Ryan spoke with *Air Force* Magazine to discuss his perceptions of how today's optempo [operations tempo], pilot retention, air expeditionary forces, troop morale, the integration of new technologies, and the addition of new Alliance members are affecting USAFE.

Ryan understands that the operating pace for his European troops—and Air Force–wide—is certainly high, but he claims that gloom-and-doom press reports have not kept pace with reality and that the optempo has settled in at an acceptable level.

"I think the management of the optempo doesn't get much publicity, and it should," Ryan said. "The amount of attention that we put in to make sure that we don't overload any particular unit or any particular individual is something that doesn't seem to come out in the press at all."

Sharing the Burden

Ryan maintained that great strides have been made in "sharing the burden" of operations around the Air Force, drawing on Air Force Reserve Command and the Air National Guard to fill in behind active-duty units that have been tapped too long. He recalled a visit to Incirlik AB, Turkey, where, upon disembarking

USAF photo by SMSgt. Rose Reynolds, *Airman* Magazine

Here at RAF Lakenheath, UK, as throughout USAFE, the optempo level has been cut back by eliminating "nice to have" deployments. US operations in the Balkans and Middle East are now routine, says Gen. Michael E. Ryan.

from his airplane, someone put a lei around his neck. It was a member of the Hawaii Air National Guard unit, which was deployed there for combat air patrol operations in northern Iraq. He also cited a deployment of the New Mexico Air Guard to Aviano AB, Italy. Both examples show how USAF is gaining maximum benefit from the forces it has, said Ryan.

"This is a total force effort and we're trying to spread this commitment we have over all of the Air Force," he said.

In addition, he claimed, the Air Force has enjoyed much success in meeting the goal of not deploying individuals for more than 120 days in a year, and a push is on to limit any one deployment to 45 days or less to minimize training and personal difficulties created by being away from home base and family for such a long stretch.

Progress is being made even in "specialties"—that is, units with unique capabilities which are typically small in number but in high demand. Examples include the E-3 Airborne Warning and Control System aircraft and special operations forces, Ryan said.

In addition, USAFE has labored to "reduce the level of our commitments" to ongoing operations in the Middle East and Bosnia in order to eliminate "excessive redundancies" in deployments. By cutting back on deployments that fall in the "nice to have" but not critical category, USAFE has been able to take a bite out of the optempo level.

"We're trying to ... make sure that we aren't sending these crews on missions that are 'no-value-added,' " Ryan said.

The general doesn't believe that open-ended American commitments such as current ones in the Balkans and Middle East spell big troubles down the road. Rather, he said, they have largely been incorporated into the routine.

"It's fairly stable," he said. "We have downsized those commitments in both of those areas," and USAF's Air Expeditionary Force concept is "a way to rapidly reinforce as we need to."

The Air Expeditionary Force is an on-call package of airpower drawn from numerous units that are on standby to rapidly deploy to a forward area on 48 hours' notice.

"We tailor the [AEF] with the kinds of capabilities we need," Ryan said. "For Bosnia, [it's] fairly obvious: close air support kind of capabilities, precision strike, Suppression of Enemy Air Defenses." The AEF drawn from USAFE would have "pieces of almost all the wings" in the theater, including aerial refueling.

Ryan feels USAFE has enough manpower and hardware to participate in the AEF concept and that putting one together and deploying it wouldn't dangerously thin out his forces.

Our Neighborhood

"Quite honestly, for the Bosnia package, that's our AOR [area of responsibility]," he said. "That's where we would help SFOR [the UN–NATO stabilization force of peacekeeping troops]. We know what the size of the package is that we think we need, [and] we have sufficient reserves," he said.

He added, however, "If we had to stay there for a long time, in that configuration, we would then, as soon as we launch this thing, go back and see how to rotate the forces out to keep them fresh."

Ryan reflected on the long-term US armed presence in Europe and Korea following major wars in those places. "I think that the United States has always had some residual forces left behind after operations [and] that we ought to bring [them] down to the lowest possible level" that the regional commander in chief "feels comfortable with, for the mission he's given." He quickly added, though, that "we should never under-resource the mission."

Ryan said, "We're pretty good at this residual business," but that, because of military and political considerations, the US sometimes finds it difficult to disengage from an operation. "It will be a decision at ... the national security level, to determine the amount of force that we need to retain," he said.

Ryan emphasized that optempo is an issue that the Air Force works on constantly and that "we've done such a good job of getting that under control, but we continue to get these residual reports that [it] is too high." He went on, "If you look at it on an individual basis, you may find one or two folks" who are still being overworked, "but as a force, I think we are at the right place and a very reasonable pace. We continue to work it every day."

Ryan does not believe that high optempo alone is driving the current problem in pilot retention.

"We've gone through this before in the Air Force," he said. What aircrews—pilots, navigators, and enlisted troops together—expect from USAF is "a sense of mission accomplishment" and "fulfillment in the job they do," said Ryan. "They also expect a wage that ... keeps them out of the breadlines." While he doesn't think aircrews expect a princely salary, "money ... could be a disincen-

tive if they are not paid properly for the sacrifice that we expect of them."

He also noted that commercial airlines will be hiring "for the next 10 years, as best we can tell," so USAF has to concentrate on factors other than pay to keep pilots motivated. "We will be in competition ... a long time," Ryan said.

Ryan said he believes that USAF pilots "realize ... that we're doing what we can" to keep optempo at manageable levels, but, "from a pilot retention standpoint, I think that there are a lot of factors, mostly a sense of mission accomplishment," that keeps the fliers interested and willing to re-up.

He again noted that the picture isn't totally negative. "We have pilot retention figures saying that we have lots of folks that are staying," noted Ryan.

Families First

What are aircrews really after? Said Ryan: "They want us to ... take very, very good care of their families when they are deployed. ... Take care of the families, and the members will take care of the mission."

That's getting easier, according to Ryan, because the uncertainty of the long drawdown is over, and long-frozen funds are again becoming available to update and improve facilities for Air Force personnel and their families overseas.

"We've been able to get started ... in Europe on catching up after the drawdown," he noted. "We had very little funds expended on family housing or dormitories" in the past few years, because it was not certain which facilities, or even which bases, would stay open.

"Congress, I think, has recognized that where we are in Europe is where we're going to stay and that the [US military] people in Europe deserve to have a lifestyle and quality of life on our bases ... commensurate with [that of] the American public that they've sworn to defend," said the general.

Congress, he added, has "funded—to a greater extent than before—our requests for those kinds of ... things that were in play over here." He feels, though, that the task "could be done better with more money."

Ryan believes that rank-and-file troop morale remains upbeat in USAFE.

"I think the troops are in very good shape. Our ... numbers are good [for] first term/second term retention for airmen, and I think we are working very hard on the quality of life aspect for those folks."

He added that "quality of life, readiness, optempo, all play into each of the individual crews' calculus [of] whether they're going to stay with us" when their contracts are up. He believes the troops will see the attention being paid to keep those elements attractive, and "they'll respond in a positive way to those changes."

The NATO Allies were greatly relieved when they saw the results of the Quadrennial Defense Review, Ryan said, because its underlying strategy suggests that there will be no fundamental change in the US–European security relationship.

"I think they were ... heartened by the fact that our force structure, in the QDR, for the United States Air Forces in Europe, was not degraded at all," Ryan asserted. The report was interpreted by the Europeans as a sign that " 'we're going to stay ... at the size we are now,' " which Ryan feels was "a wise decision."

Indeed, Ryan sees the QDR as offering the Allies "a reaffirmation" of the US strategy of remaining forward deployed and engaged, "and I think that gave them some solace."

Meanwhile, however, "each of those nations is continuing to go through their own internal looks" at the size and capabilities of their forces, and on individual national levels, reductions are being made across the board.

Haves and Have Nots

Some senior Alliance officials, such as German Gen. Klaus Naumann, chairman of NATO's Military Committee, warn that the US is getting too far ahead of its Allies in airpower technologies such as stealth and precision weapons. Naumann warns that Allied interoperability will suffer in the long run or, worse, NATO will have two tiers of combat aircraft capabilities.

Ryan doesn't agree with that assessment. "I see it as kind of a spread ... of technology" among the Allies, "but not two different levels," he said. He noted that, even two years ago in Deliberate Force, several participating nations had precision guided weapons to contribute, and most that didn't have them then "are acquiring them now."

He added, "All the nations that are here have upgraded their forces while downsizing, ... and many of them are committed to procurement of better weapon systems in the future."

Ryan pointed to the US–led Joint Strike Fighter program as a case in point. A half-dozen NATO Allies have signed up to participate in the JSF program—intended as a replacement for the F-16 in USAF—and as many as eight more may yet join in.

"We've always had that spread in NATO," Ryan noted. "I don't see it stretching way out" to a point where the NATO air forces won't be able to work together.

Photo by Paul Kennedy

Reserve and Guard forces are helping relieve the optempo for the active force. Here, a Connecticut ANG A-10 gets ready for a sortie over Bosnia, continuing to prove the value of USAF's Total Force.

Staff photo by Guy Aceto

NATO Allies were relieved by the outcome of the Defense Department's QDR, according to Ryan. They see it as reaffirming the US strategy and making no fundamental change to the US–European security relationship.

He said that NATO does discuss the relative levels of member technologies, but "we talk about it from the point of how do we integrate, as we change our weapon systems." He pointed out that such integration was accomplished in the Gulf War and Bosnia.

"We work together all the time, we train together all the time, with the capabilities that we have. Each knows its potential and its strengths. It's up to whomever we appoint as the air commander in those operations, to use all the assets available as best they can. And NATO does, I think."

While the JSF develops, NATO partners who fly the F-16 are participating in the Mid Life Update, which gives the airplane precision munition capability and, among other things, improved communications.

Ryan said the problems of integrating new member air forces into NATO have been contemplated for some time, and most have been identified through joint exercises conducted under the Partnership for Peace program.

"The principal challenge" for the NATO air arms and those of prospective new members "is to be able to do the most fundamental thing ... and that is to make sure we do air sovereignty and air defense in an integrated way," Ryan said.

Air sovereignty is "the very first mission area" and the one most prone to trouble without careful coordination, he noted. Secondary considerations will include "how we do air surveillance, ... command and control, ... radar hookup," and finally "interoperability decisions" to make the prospective new members' air branches compatible with current members. Other "challenges" will include distribution of responsibility "in peace support operations, which is part of the mandate."

Building Blocks

To work through the problems, NATO has been engaging the "partner" countries in a variety of exercises designed to identify potential problems in coordination and at the same time build confidence in joint operations.

"It's the building-block approach," Ryan said, and it includes joint efforts in "search and rescue, airlift, air defense, [and] the fundamentals of close air support with respect to peace operations."

The goal is to have the partner nations either familiar with or common in "our systems, our procedures, our tactics and techniques," so that they could participate in a Bosnia-like operation at need.

Another large problem is money: The prospective new NATO members are largely equipped with antiquated Soviet-style hardware, much of which has suffered from shortages of spare parts and which generally does not meet NATO standards.

"The new nations that are joining NATO ... cannot immediately modernize themselves due to economic constraints," Ryan said. "The equipment they currently have has got to be made in some way compatible."

Electronically—in terms of aerial surveillance and traffic control—"we think we have the capability to do that, using their old systems, [by] digitizing them," Ryan said. This is being done under the "regional airspace initiative" which provides an analysis of existing equipment and suggestions on the most expeditious ways to make it compatible with the NATO Air-to-Ground Environment, or NAGE.

"We can help ... [with] digitization of the air control," Ryan said.

He also noted that aircraft are costly and that new member nations may not be able to afford new ones for some time. However, "most of the countries are upgrading that equipment so that it has IFF (identification friend or foe)" and modern communication systems "to the extent that they can."

More fundamental a necessity than anything else, however, is knowledge of the English language, Ryan said.

"The nations are working very, very hard on that, because we could get our procedures right, and get the electrons going in the right direction, but ... air safety [depends] ... on integration all the way down to the cockpit level."

He noted that the problem is more acute than in ground forces, "where you only have to do it down to the battalion commander level. But here we have to go all the way down to the pilot and the crew. So that is an area that those nations are working very hard on. Getting their folks to language schools [and] operational language courses offered here in NATO." Ryan reported "big progress there."

Asked if the partner pilots are learning American or British English, Ryan said he didn't know for sure, but "their program ... is probably spelled with an '-me' on the end."

In Deliberate Force, there were "eight nations actively participating with fighter and reconnaissance aircraft" and doing so with "huge success," Ryan said. "I think operations ... in the future will build on the experiences that we had in Deliberate Force" and that it demonstrated the value of "40 years of working together ... and getting it right." ■

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Rising numbers at AETC's aircrew training bases and funding constraints in technical training may force some advanced training back on operational units.

Training Overload Hits the Force

By Suzann Chapman, Managing Editor

Photo by Paul Kennedy

AETC faces a conflict between the need to train more aircrew members and the reality of fewer training bases and tight budgets. One solution could place bomber trainees from the overtaxed T-38 fighter/bomber track into the T-1 (above) airlift/tanker/maritime track for some portion of their training.

EDUCATION and training in the Air Force is "just big business," said Gen. Lloyd W. "Fig" Newton, the commander of Air Education and Training Command, Randolph AFB, Texas. "It's big, in that there are just so many people going through it at any one time."

Each year about 44 percent of the active-duty force receives some form of formal training provided by AETC at its various schoolhouses. For Fiscal 1997 the number equaled some 168,000 personnel, and that figure does not include training provided by AETC at operational units.

Almost that same number—more than 160,000 in Fiscal 1997—participated in some form of professional or continuing education through Air University programs.

In 1993, the Air Force created the mega-command, merging the old Air Training Command with Air University's education function and adding a large chunk of the service's graduate flying training and follow-on enlisted technical training into the mix. The major objective: to provide complete centralized training to produce a fully trained, near mission-ready person for the operational commands.

The idea was to create a continuum of training—"a crawl, walk, run kind of regimen," said Col. Robert J. Martinelli, AETC's deputy director of operations. The system would relieve the operational commands of the need to train.

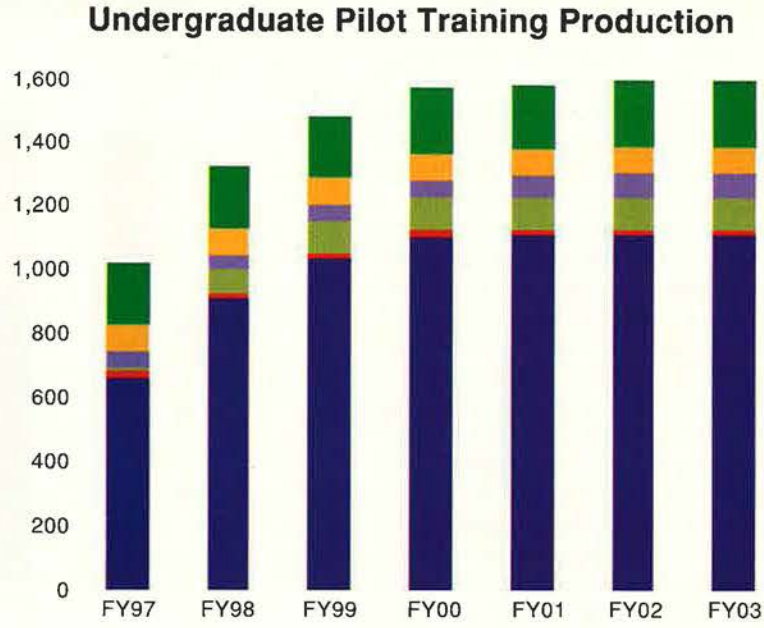
What seemed practical and feasible in 1993 is proving to be unrealistic in today's tight fiscal environment. AETC is facing increasing challenges with this basic tenet of its business.

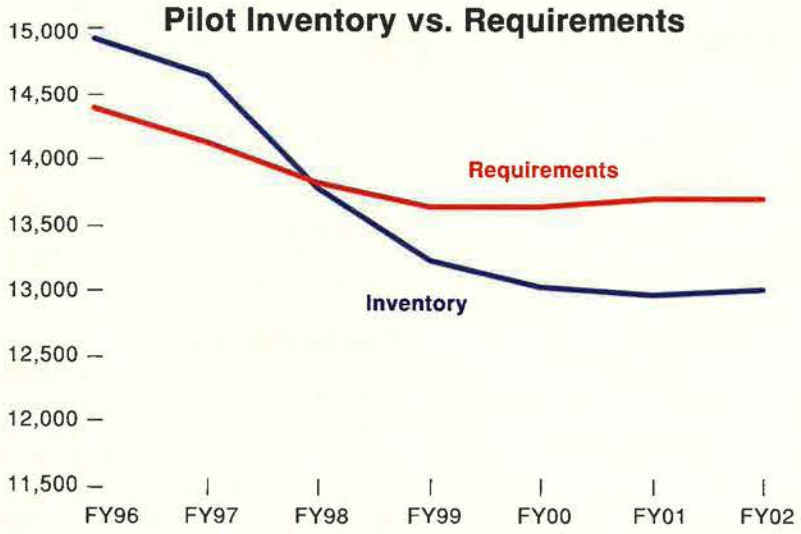
Fiscal realities, according to Martinelli, are forcing the command to default on some of the advanced train-

ing and send it back to operational units. The problem applies both to aircrew and technical training, now known as operational training.

For instance, he said, the service in 1993 moved seven-level enlisted upgrade operational training from the operational units to AETC schoolhouses. At that time, AETC could afford to do the job. In Fiscal 1995, AETC provided seven-level training for only 2,481 enlisted members, compared to 13,565 in Fiscal 1997. Today command officials state they may not have the funding needed to continue this schoolhouse training. They may turn, instead, to some sort of "distance learning" program for some courses.

The same type of situation exists with combat aircrew training. AETC is coming up against a funding wall that may force some advanced flying training back to the operational units.





Compounding the dollar problem for aircrew training is a new and possibly more vexing matter—overload in the system.

The Capacity Issue

In the early 1990s, the Air Force substantially reduced its undergraduate pilot training program to cut back the pilot inventory as part of the overall drawdown. Now the service must build back to a sustaining level—that is, produce about 1,100 UPT students per year to sustain a pilot force numbering about 14,000 to 15,000.

Right now, the Air Force has a shortage of fighter pilots. By 1998 it will be short in all systems. When faced with this kind of shortage, the service traditionally has been able simply to add training dollars and increase its training load.

It won't work this time. "One, there's no money to throw at [the problem]," said Martinelli. "Two, we have downsized now to the point where that option is no longer available."

In the early 1980s, the command had five pilot training bases that could easily train about 2,400 new pilots each year—or about 80 percent of the training capacity. Today, as AETC ramps up toward the 1,100 mark, said Martinelli, "We are getting to a percent of that capacity that we have never lived with before."

The full effects of sustaining a higher capacity are not known, but a major concern is the potential for safety problems.

In 1997, even before the full ramp up to 1,100 students per year, pilot training bases averaged at least 300 sorties per day. At Laughlin AFB, Texas, the number was 330. That's a high level of operations, by Air Force standards. By comparison, Air Force units carrying out Southern Watch operations in Southwest Asia have flown an average of about 80 sorties per day.

Actually, the situation is worse than indicated by sortie volume alone. The sorties generated at pilot training bases are flown by unqualified students, often at intervals of three minutes or less. The risk factor is so great that Newton told his wing commanders they are free to call "knock it off" whenever it's necessary to get an unsafe situation under control.

The Air Force sets an upper level of 85 percent—the Navy uses 80 percent—as the desired target capacity. However, during Base Realignment and Closure rounds, an assumption was made that 90 to 95 percent capacity would work. "In retrospect those were not good assumptions, but that's hindsight," said Martinelli.

T-38 Problems

In the out-years, the Air Force will be pushing the optimum capac-

ity in all its training aircraft. Today, the T-38 is actually programmatically above 100 percent, he noted. "Obviously you can't do that."

One solution being pursued by AETC is to lay off some training in overcapacity aircraft programs to lower-capacity aircraft programs.

For example, the T-1 aircraft used in the airlift/tanker/maritime advanced pilot training track is currently operating at only 57 percent capacity and rises to 79 percent in 1999, then down to 76 percent by 2002. The idea then would be to move some of the bomber pilot training conducted in the overtaxed T-38 fighter/bomber track into the T-1.

"The customer [Air Combat Command] won't get the student they are looking for," stated Martinelli. "They prefer to have them trained in the T-38." He said AETC was still working the particulars, but they will probably train them in the T-1, then top off the program in the T-38.

Additionally, the command must factor in the upcoming upgrades to its T-38 fleet. The addition of new avionics/glass cockpits are necessary upgrades to extend the jet's service life, according to Martinelli, but the loss of 40 to 50 aircraft per year during the modifications will complicate the capacity problem even further.

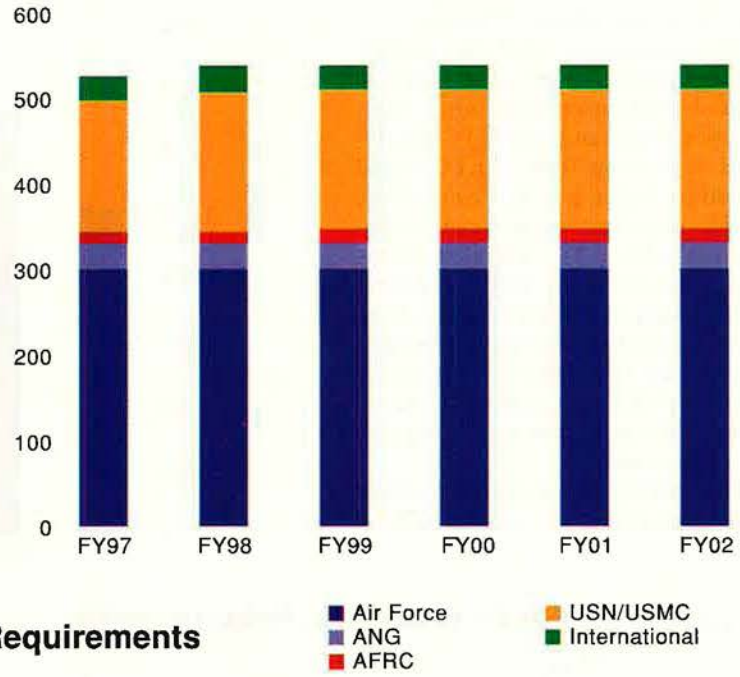
The same problem will exist in the T-37 primary pilot training program, beginning next year when the aircraft reaches 86 percent and then 98 percent in the out-years.

Martinelli emphasized that the T-37 program "can't operate in that regime [nearly 100 percent of capacity]," and so AETC is "looking for some safety valves or release valves."

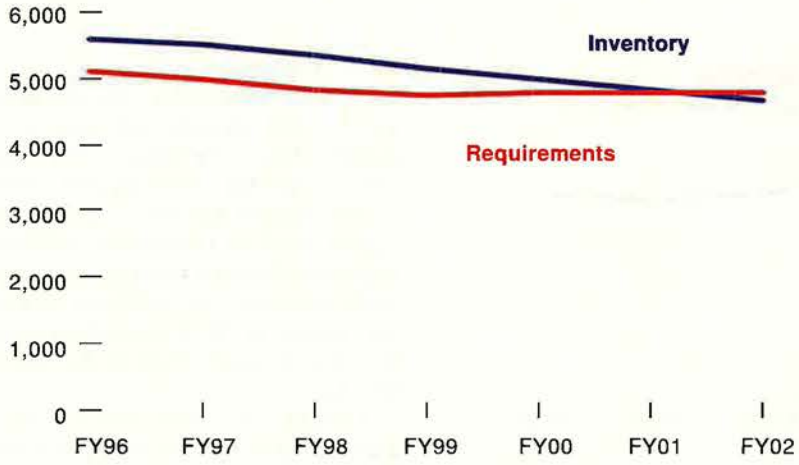
One of those release valves might entail simply moving some aircraft from one heavily taxed base to one currently operating at a lower level. Another even more promising solution would be to accelerate the buy of the new Joint Primary Aircraft Training System aircraft, now called the T-6A.

AETC wants to move ahead of the projected procurement time line—a move command officials said would greatly simplify the overcapacity problem. Right now the Air Force plans to purchase 372 of the new trainers through 2009. Under an accelerated program, each undergraduate pilot training base would receive more of the aircraft sooner—the last coming on line in 2005.

Undergraduate Navigator Training Production



Navigator Inventory vs. Requirements



The Attrition Factor

These high capacity levels will do more than jam the pilot pipeline and stretch safety margins. It will also bring higher costs. As the capacity rate goes up, experience has shown, the service winds up with a higher attrition rate as well.

Why? Those higher capacity levels in the training load lead to an overburdened training force and reduced efficiency.

AETC programs an annual attrition rate. When the attrition rate climbs higher, the command must bring in more students, buy more flying hours, put more airplanes on the line, and pay other associated costs. This year, the command programmed a lower, 10 percent rate, said Martinelli. AETC plans a 15 percent attrition rate from 1998 through 2002.

However, even that number may be overly optimistic. The last time the Air Force had such high pilot training capacity levels was in the mid–1980s, and the programmed attrition rate was about 18 percent. The actual rate was nearly 30 percent.

"That's very inefficient; it costs

you a lot of money to do that," stated Martinelli. "We want less attrition, more efficiency."

Martinelli added, "We think we're in pretty good shape here at 15 percent; however, given that we're pushing that capacity level way high, we could have this kind of phenomenon occur again."

The object, of course, is to weed out those students who simply do not have the capabilities to become military pilots and do it very early in the program, before USAF has invested much money in their training.

However, you can, in Martinelli's words, "shoot yourself in the foot," if, by having too many students to run an effective program, you end up washing out many more than you would under normal circumstances.

The Air Force has already experienced a production problem with its navigator force, prompting it to recall older navigators to cockpits to cover unexpected shortages. The shortages came from a decision to make undergraduate navigator training a Joint program with the Navy. In 1994, AETC shut down navigator training at Mather AFB, Calif., and moved it to Randolph, with a subsequent move to NAS Pensacola, Fla. In that year, the service only graduated 22 navigators from UNT.

"We knew we'd go a year without any production because we were moving a one-of-a-kind schoolhouse," stated Martinelli. "We in the Air Force sucked it up and said we'd live with that—a known risk."

Today and through 2002, AETC plans to produce 300 navigators per year. Martinelli emphasized that the Air Force, if it wants to get to a true sustaining level, will need to move the figure up to about 360 per year.

He added that, because of the low production years during the early 1990s, the Air Force has some very serious year group problems. "We're having a hard time manning the crew force with the young officer you'd like to man it with, [so] we're putting lieutenant colonels back in the cockpit."

AETC expects the training capacity level for UNT at Randolph in the airlift/tanker/maritime track to remain around the optimum 80 percent level. At the same time, the command is currently exploring the possibility of using the Randolph T-43s to provide some additional electronic warfare officer training. Use of the T-43s, which can handle up to 12 students, might be one way to satisfy new customer requirements as the demand rises for more electronic warfare training.

New Pressure on Training Continuum

The increased flow of students through undergraduate training will inevitably produce a greater flow through graduate flying programs, as well. This presents a new problem for AETC.

"While we have good definition and understanding of the pressure in the undergraduate world," said Martinelli, "we're still coming to grips with it on the graduate side of the house."

The command can measure the UPT production increase very easily. However, AETC schoolhouses don't just train undergraduates. They also conduct other forms of training such as aircraft commander upgrades, requalification training for those returning to flying from a staff job, other aircrew positions, instructor upgrades, and so forth.

Traditionally, the Air Force has not projected those types of training requirements far enough into the future to be able to program them well. "When you're driving your training plan up into that 90 percent kind of regime, you have to start doing this better and do it far enough out to where you can programmatically get the resources you need, whether it's airplanes, instructors, flying hours—the money associated with that," stated Martinelli.

The concern, he maintained, is that a strained system will have to default on graduate training and return it to

Aircrew Training and Operations Training

Parameter	Aircrew Training	Operations Training	Total Training
Sites	19	46	65
Personnel	29,373	16,907	46,280
Aircraft	1,539	0	1,539

Mixed Gender Training

As the executor of the Air Force's basic military training function, Gen. Lloyd W. "Fig" Newton has been called to testify before Congress this year to defend the service's mixed gender basic training. In his words, the 21-year-old program "works" for the Air Force, but "you can't make it a cookie-cutter kind of business."

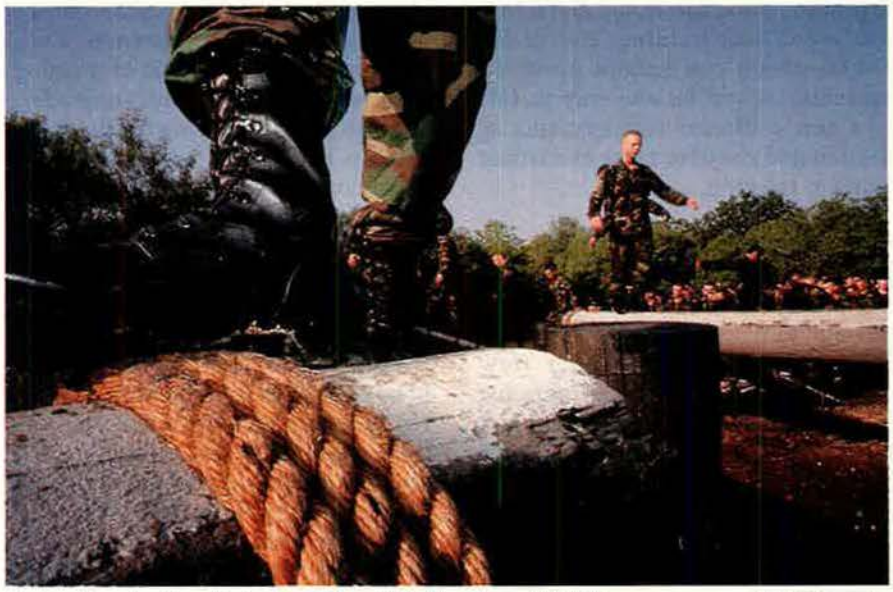
The missions of the services are different, and, thus, there should be different training approaches.

The Air Force began mixed gender training in January 1976. Since then, more than 1.2 million male and female recruits have trained side by side in basic and follow-on technical training. Today, 24 percent of BMT graduates are women. Members of those early mixed training classes are now in senior enlisted grades, and "they are performing exceptionally well. Our training system works," Newton told a Senate Armed Services subcommittee in June.

"We mint our [military training instructors] very carefully," he added. They are volunteers who "undergo a very stringent screening process and then attend an intensive 14-week training course." That course covers sexual harassment and unprofessional relationships.

One thing he stated he has made clear within AETC is that those who can't follow the zero tolerance policy, "we'll find employment for them elsewhere."

According to Newton, in the past four years, the Air Force graduated more than 120,000 basic trainees and had just seven allegations of sexual harassment by MTIs. "Four cases were substantiated and the MTIs were dealt with ... all were removed from instructor duty and each was punished appropriately," he said. "I assure you these isolated breaches of faith are the exception rather than the rule."



USAF photo by MSgt. Val Gempis, *Airman* Magazine

According to its chief, Gen. Lloyd W. Newton, AETC has run some 30,000 male and female recruits through a mixed gender basic training program each year since 1976. The program works, he said.

operational units. The question then becomes, What is the full impact?

"It's a very complicated kind of equation," he said. "It's a very costly one both in terms of resources and also in terms of readiness if we screw it up. We're working with the Air Staff to quantify the entire training continuum, then consciously decide how many to try to squeeze through in a week."

When we increase the undergraduate part of the continuum, if we don't make corresponding changes in the other parts of the continuum, then we haven't done our work properly, explained Martinelli. "So we have to evaluate the entire continuum, keeping an eye on readiness because this is your combat capability—we don't want to adversely affect that."

Other AETC Concerns

Joint Training. According to Newton, the path to Joint training is not an easy one. As for pilot training, he stated that both the Air Force and the Navy are getting "closer to the products we need." The general adamantly opposed the notion that all training should be Joint. In fact, command officials noted that they have shared about as much training as possible; today it stands at about 34 percent.

More or Less Technology? Newton is convinced that infusing technology into the training process will enable AETC to produce a better product in the 21st century. A better product, he said, could be defined as producing a training graduate faster, at less cost, or both.

If the command could produce a graduate faster, it would shorten the pipeline and provide more flexibility. When the Air Force needed more or fewer pilots, the command could expand or shrink the output each year.

However, his concern is to inject technology at the right point and in the right amount in each training process. To do that, he said, the command has to do a "bit of reengineering."

"You have to look at all the processes of all the training programs out there and evaluate them from beginning to end and say, 'What do we need to do to make this happen?' " stated Newton.

"Modernization in the training business means a lot more than just going out and buying aircraft. It means modernizing classrooms—the modernization of how I train you—if you don't do this right, you'll struggle on the other end."

One problem AETC officials find is that new technology may not save "gobs and gobs of money and train lots of people" painlessly and with little cost. They maintain that there's a lot of up-front money needed to buy any new technology. They want to approach the technology gambit smartly without making big dents in a limited budget, then only to find the technology doesn't really pay off.

Outsourcing and Privatization. AETC has been in the O&P business for decades—Vance AFB, Okla., began contracted base operating support in 1960. The command has contracted some flying training and is looking at technical training. Officials note that everything is on the table, except BMT. They emphasize, though, that training courses for new airmen must maintain a blue-suit presence to ensure adequate indoctrination into the Air Force. The command is concentrating now on taking a systematic big picture approach—the larger contracts, they found, produce as much as 10 times the savings of multiple smaller contracts.

The National Pilot. Newton and other Air Force leaders are pursuing the notion of the "national pilot." He said that with military pilot retention such a high priority, "We're beginning to focus on maybe a different way to think about our pilot force." The goal is to come up with some way to view pilots as a national resource and to partner with the nation's entire aviation community, rather than taking the traditional parochial approach where the airlines and the Air Force and the other services concentrate solely on their own immediate needs. Newton said that this is certainly not a new idea and that, he thinks, the airlines will be very receptive.

He noted, though, that the retention problem is just one in a continuous cycle, raising the question: Why can't the Air Force get this right? His answer is that the process is much more dynamic and complicated than it appears. He said: "For instance, those folks that came in the Air Force eight years ago and did their commitment, if they say they want to go do something else, we have no way, nor should we have a way, to say, 'No I'm not going to let you do that.' I think that would be wrong."

Everyone's a Recruiter. Apart from training new and current Air Force members, AETC also oversees the Air Force Recruiting Service. "We've got a whole host of top-notch recruiters working the nation very, very hard. We're getting the quality and making the numbers that we want," stated Newton. However, the job is tough and he wants everyone in the Air Force to recruit one person each year. He said that whenever an Air Force member goes home to visit, he or she should talk with at least one young person to tell him or her what the service is about. ■

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A three-week air campaign in the fall of 1995 was the decisive factor in bringing the recalcitrant Serbs to the peace talks in Dayton.

Artwork by K. Price Randall for Lockheed Martin

On Aug. 28, 1995, an artillery shell ripped through the stalls of an open market in Sarajevo, Bosnia, killing 38 civilians and maiming or injuring 85 others. For the leaders of a joint United Nations–NATO force charged with protecting refugee "safe areas" like Sarajevo, it was seen as the last straw after a lengthy spree of deal-breaking attacks by the Bosnian Serbs.

Joint Force leaders quickly moved to exercise their internationally granted authority to launch "disproportionate" retaliation.

A three-week campaign—called Deliberate Force—was launched. It included some artillery fire, but it was dominated by airpower, the weight of which hammered the Bosnian Serb heavy weapons, ammunition depots, command-and-control bunkers, and other targets. At the same time, NATO air forces undertook a parallel operation called Dead Eye, which took down

Deliberate Force

By John A. Tirpak, Senior Editor

On Sept. 6, 1995, an F-16C from the 23d Fighter Sq. at Spangdahlem AB, Germany, equipped with the new HARM Targeting System, took out a Surface to Air Missile site in what was the first missile launch with the new targeting system.

the Serbian Soviet-style air defense network.

Within three weeks of the first bomb on target, recalcitrant Serb leaders agreed to enter serious negotiations with their foes in the three-year-old war. Within two months, the Dayton Accords had been signed, effectively bringing the war to a halt.

The operation is regarded as the prime modern example of how judicious use of airpower, coupled with hard-nosed diplomacy, can stop a

Staff photo by Guy Aceto

Of the 3,515 NATO sorties, shooters flew 60 percent of the missions—releasing 1,026 munitions, including 708 PGMs. This F-16 from the 510th Fighter Sq. at Aviano AB, Italy, is loaded with a 500-lb. precision weapon.

ground force in its tracks and bring the worst of enemies to the bargaining table. It also illustrated that years of working together had made NATO an efficient fighting force, though one heavily dependent on US contributions of airpower, satellite and airborne reconnaissance, and electronic jamming.

In November 1995, President Clinton said that the US "led NATO's heavy and continuous air strikes, many of them flown by skilled and brave American pilots. Those air strikes, together with the renewed determination of our European partners and the Bosnian [Muslim] and Croat gains on the battlefield, convinced the Serbs, finally, to start thinking about making peace."

"Impressed and Awed"

Then–Defense Secretary William J. Perry said the belligerents were "just sick of the war" but that another factor was that "the warring parties were impressed and awed at the military capability of the United States and NATO."

He went on, "They got a sample of that during the bombing raids. They witnessed our military power, but they also came to believe that, in the context of an agreement, that power would be used constructively—not to harm them but to enforce the peace. That was the solid foundation which allowed them ... to make the necessary compromises to reach this peace agreement."

Ambassador Richard C. Holbrooke, special US negotiator in the Balkans and primary architect of the Dayton peace accords, told AFA's 1996 National Convention that Deliberate Force was the decisive factor in bringing the Serbs to the peace table. Holbrooke flatly declared that the diplomatic effort wouldn't have succeeded "without the United States Air Force and Navy and the precision bombing." Holbrooke said he believed at the time of Deliberate Force that "more bombing" would lead to better diplomacy. "And it was true," he said.

Of the bombing, he observed, "The precision of it, its immediate and visible effects on the negotiations, made a real difference. Those people who argue about airpower have got to stop arguing only about Vietnam and talk about what can be done in the [Persian] Gulf, what was done in Bosnia."

Paul G. Kaminski, who was then DoD's top weapons official, told an Air Force Academy audience on May 2, 1996, that Deliberate Force surpassed even Desert Storm as a demonstration of modern airpower. "In Desert Storm, only two percent of all weapons expended during the air war were precision guided munitions," he said. "In Bosnia, they accounted for over 90 percent of all ordnance expended by US forces."

Kaminski went on to suggest that the United States had entered a radically new warfare era. "The bomb damage assessment photographs in Bosnia bear no resemblance to photos of the past, where the target, often undamaged, is surrounded by

The American Aircraft of Deliberate Force

US forces assigned to NATO, Aug. 30–Sept. 14, 1995

Service	Aircraft Type	Number	Mission	Location
USAF	AC-130H	4	combat	Brindisi AB, Italy
USAF	A/OA-10A	12	combat	Aviano AB, Italy
USAF	EC-130H	3	combat	Aviano AB, Italy
USAF	EF-111A	6	combat	Aviano AB, Italy
USAF	F-15E	8	combat	Aviano AB, Italy
USAF	F-16C	12	combat	Aviano AB, Italy
USAF	F-16C HTS	10	combat	Aviano AB, Italy
USAF	EC-130E	4	support	Aviano AB, Italy
USAF	KC-10	5	support	Genoa, Italy
USAF	KC-135	12	support	Genoa, Italy
USAF	M/HC-130P	4	support	Brindisi AB, Italy
USAF	MH-53J	7	support	Brindisi AB, Italy
US Navy	EA-6B	10	combat	Aviano AB, Italy
US Navy	F/A-18C	18	combat	Adriatic Sea
USMC	F/A-18D	12	combat	Aviano AB, Italy
Total		127		

The US Air Force supplied 69 percent of US aircraft assigned to NATO for the Balkan campaign, and the Navy and Marine Corps the rest. The US also made available these nonassigned supporting forces: **USAF:** U-2R, RAF Fairford, UK; RC-135, RAF Mildenhall, UK; F-16C, Aviano AB, Italy; and F-15E, RAF Lakenheath, UK. **US Navy:** F-14, Adriatic Sea; P-3C, NAS Sigonella, Italy; E-2, Adriatic Sea; S-3, Adriatic Sea; HH-60, Adriatic Sea. **USMC:** AV-8B, Adriatic Sea.

craters," said Kaminski. "The photos from Bosnia usually showed one crater where the target used to be, with virtually no collateral damage."

He concluded, "We are moving closer to a situation known as 'one target, one weapon.' It was actually more than one—but less than two—weapons per target in Operation Deliberate Force. This has been the promise for the past 20 years; now it is becoming a reality."

Who Flew the Missions?

All Sorties, Aug. 30–Sept. 14, 1995

Nation	Sorties	Percent
US	2,318	65.9
United Kingdom	326	9.3
France	284	8.1
Netherlands	198	5.6
NATO AEW force	96	2.7
Turkey	78	2.2
Germany	59	1.7
Italy	35	1.0
Spain	12	0.3
Other	109	3.1
Total	**3,515**	**100.0**

Considering the scale of the results, Deliberate Force was an economical use of power. It took just 3,515 NATO air sorties—about a day's work in the 1991 Gulf War—to get the Serbs to negotiate in earnest. Of those sorties, about 60 percent were flown by "shooters." These combat aircraft released 1,026 munitions, 708 of which were precision guided. Though the weather was often bad, the well-trained and disciplined aircrews got virtually everything they aimed at, hitting 97 percent of the targets and destroying or inflicting serious damage on more than 80 percent of them.

The targets themselves—338 individual aim points within 48 "complexes"—were checked and rechecked and painstakingly selected so as to virtually eliminate the risk to civilian life and property.

Deliberate Force was an achievement on a scale that even airpower proponents did not anticipate. Shortly after Operation Desert Storm, the USAF Chief of Staff, Gen. Merrill McPeak, told a Senate committee not to expect too much from airpower in the Balkan context. Mountainous terrain, heavy foliage, and bad weather would conspire to prevent the kind of success seen in the Gulf War, he said, where targets were easier to find in the flat, open desert under typically clear skies.

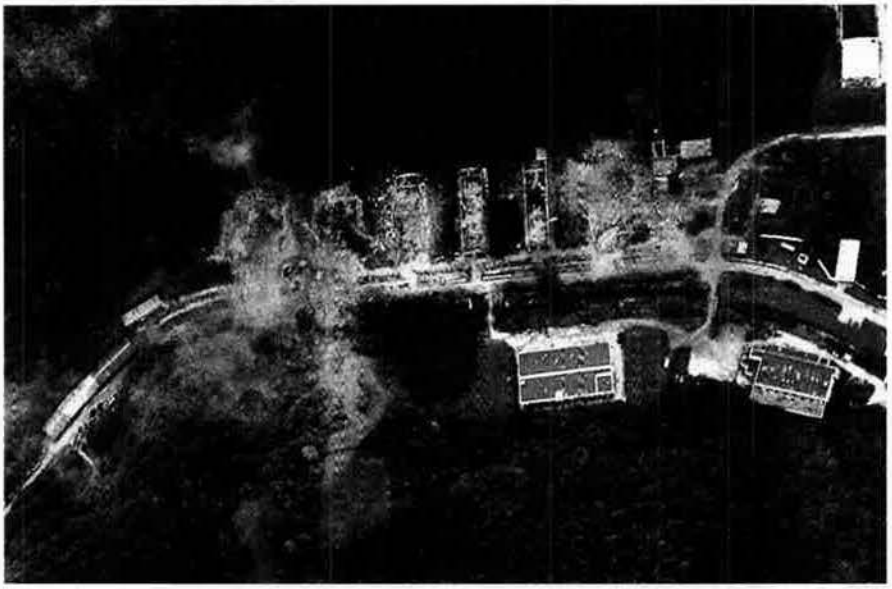
"Imagine flying over the Blue Ridge Mountains at 600 miles an hour ... in overcast ... and picking out the right target somewhere down there in the woods," McPeak had said, illustrating the difficulties airpower would face in Bosnia.

However, the Air Force had been busy since then, equipping far more of its airplanes with precision weapon capability than had been the case in the desert. "Deliberate Force extended a trend which began with the Vietnam War," Air Force Secretary Sheila E. Widnall said at the 1996 AFA Air Warfare Symposium.

Up From Vietnam

In Vietnam, only two-tenths of one percent of the bombs used were precision guided, she noted. In Desert Storm, "contrary to the general per-

Photo via Eric Hehs *Code One* Magazine



This reconnaissance photo, taken by Royal Netherlands Air Force RF-16s over Bosnia, shows the precision with which targets were hit—bunkers containing munitions were destroyed while nearby buildings were untouched.

The Dominance of Precision Weapons

All Attacks, Aug. 30–Sept. 14, 1995

Precision Weapon Type	Number Expended	% of Total Weapons
GBU-10 2,000-lb. laser-guided bomb	303	29.5
GBU-12 500-lb. laser-guided bomb	125	12.2
GBU-16 1,000-lb. laser-guided bomb	215	21.0
GBU-24 2,000-lb. laser-guided bomb	6	0.6
AS30L laser-guided air-to-surface missile	4	0.4
SLAM EO/IR-guided missile	10	1.0
GBU-15 2,000-lb. EO/IR-guided missile	9	0.9
AGM-65 EO/IR-guided missile	23	2.2
Tomahawk EO-guided cruise missile	13	1.3
Total precision guided munitions	**708**	**69.0**

Nonprecision Weapon Type	Number Expended	% of Total Weapons
Mk. 82 500-lb. general purpose bomb	175	17.1
Mk. 83 1,000-lb. general purpose bomb	99	9.7
Mk. 84 2,000-lb. general purpose bomb	42	4.1
CBU-87 submunition	2	0.2
Total nonprecision weapons	**318**	**31.0**

ception of its having been a 'video war,' only about nine percent of our bombs were precision guided. In Deliberate Force, over 60 percent of the bombs dropped by the NATO force were precision guided."

Planning for Deliberate Force began back in September 1994, when NATO defense ministers met in Spain to discuss possibilities for using airpower to stem the ever-worsening Balkan war.

They used it two months later against Krajina AB in Serb-held Croatia, which had been used to launch attacks against the UN-guaranteed Bihac "safe area"—one of several where refugees were supposed to have a haven from attack. Serb surface-to-air missiles were fired against the NATO airplanes, which returned fire.

The use of airpower was sporadic, however—not the sustained campaign many believed was necessary to influence the Serbs. NATO had carried out Deny Flight, enforcement of a no-fly zone over the Balkans, but that did not have much impact on the ground.

NATO developed Operation Dead Eye as a response to the Bosnian Serb air defense threat. Should the call come for an air campaign, it would target air defense communications, command-and-control nodes, early-warning radar sites, known SAM sites, and related support facilities.

Simultaneously, NATO began the planning for Deliberate Force, the strike campaign which would be unleashed if the Serbs failed to respect the UN-identified "safe areas" and comply with other cease-fire terms. The target list concentrated on Serb heavy weapons, such as large artillery and tanks, command-and-control centers, dedicated military support facilities, and lines of communication.

The UN and NATO were extremely patient with the Serbs—critics said too much restraint was exercised—as the Serbs moved toward and attacked the safe areas. NATO and the UN were blocked by divisions among members.

"We had piecemealed airpower, in a way—for lots of reasons—over the course of Deny Flight," said Gen. Michael E. Ryan, Air Force Chief of Staff nominee and then-commander of NATO southern air forces, who oversaw Deliberate Force.

Without "a sustained effort," Ryan said, airpower was not "taken seriously by the warring factions."

As 1995 unfolded, Bosnian Serb defiance of UN mandates grew routine. From "weapons collection points" outside Sarajevo where they were to turn in certain kinds of armaments, the Serbs began shelling the city and reclaiming surrendered weapons. Shelling in May was met with limited air strikes on Serbian ammo dumps. In retaliation, the Serbs took UN hostages, then in June shot down Capt. Scott O'Grady's F-16 with a SAM, proving that the Integrated Air Defense System from the dismembered Yugoslavia—including SA-2 and SA-6 missiles and man-portable air defense weapons—was still active and potent.

No Penalty

In July, the Serbs overran the safe areas of Srebrenica and Zepa and set their sights on Gorazde. On a roll, the Serbs had little to lose by defying UN admonitions to leave the safe areas alone, as the "penalty" air attacks had not been unleashed.

NATO and UN ministers agreed that trying to appease the Serbs and hoping for better behavior on their part was proving futile and humiliating and that, with each defiance, their organizations looked paralyzed and unable to act decisively.

In late July, the NATO/UN ministers agreed that an attack on Gorazde would be "met by substantial and decisive airpower."

Any attack on a safe area, by troops, artillery or aircraft, or the massing of forces or heavy weapons in preparation for such an attack, would trigger a "disproportionate" response in the form of bombing anywhere in the "wider area" of Serb operations.

Ryan was to "build the campaign" of air attacks. His instructions were to get the Serbs' attention and compel them to stop the "wanton shelling" of the safe areas.

"We were not at war with any faction," Ryan explained, and that included the Bosnian Serbs, "so it was not an attack that was meant to take away or destroy their army. It was an attack to take away the military capability they had ... that made them dominant." Once the Serbs "realized what was happening" and that they were losing their edge against their enemies, Ryan reasoned, the Serbs would comply with UN mandates, fearing their enemies would move to take advantage of the disruption of Serbian forces.

The Serbian strengths centered on "their command and control, which was very, very good—intricate, interconnected, and redundant," Ryan noted. The command-and-control network allowed the Serbs to move their forces—which were outnumbered by those of the Muslims and Croats—quickly to where they were needed.

A network of ammunition dumps and vehicle parks also meant that the Bosnian Serb army didn't have to lug around lots of armor and supplies and so could move faster. The combination of command and control with scattered ammo and vehicle supplies was what gave the Serbs their edge.

Then, "if we could take away their mobility by taking down some very key ... lines of communications," the Serbs wouldn't be able to move forces quickly, communicate, or resupply, Ryan said.

Such targets would include "some bridges" and roads. "We minimized that because we didn't want to do any more damage to this poor nation that had been beat up so long," Ryan added. If the bombing campaign had the desired effect of taking away the Serb strengths, "and they realized it was happening to them," Ryan said, Deliberate Force would work. However, "they would not realize it unless we had a sustained operation that would show them that we really meant business."

When the Sarajevo market was hit by the artillery round on Aug. 28, Adm. Leighton W. Smith Jr., commander of NATO's Southern Region, and his UN counterpart, French Lt. Gen. Bernard Janvier, agreed it was time to launch the bombing campaign. The two had to agree to the action under a "dual key" system put in place to assure that the attacks were mutually agreed to and approved.

On Aug. 29, the order came for Deliberate Force to commence at 2 a.m. the next day. UN forces in Gorazde—deemed to be at risk of being taken hostage by Serbs—were to quietly leave their positions.

A crew chief marshals a Predator UAV to its parking spot. Predators flew critical reconnaissance missions during Deliberate Force to help determine if the Serbs were complying with NATO/UN conditions.

Bombs on Target

At 2:12 a.m. on Aug. 30, the first bombs hit their targets.

Any and all IADS sites or related facilities anywhere in Bosnia were considered legitimate targets. However, diplomatic language governing the use of force in retaliation for the market shelling mandated that non–IADS targets be linked with shelling of the safe areas. Strikes were therefore limited at first to the "southeast zone" of Bosnia. This restriction would also give critics of the operation—such as Russia—less ammunition to argue that NATO was acting as the de facto air force of the Croat and Muslim forces waging a ground offensive in the northwest.

NATO and UN mandates "limited the target set," Ryan noted. "Then I further limited it" to specific aim points, in order to "minimize collateral damage and, in fact, minimize carnage."

Bridges, for example, would be hit only at night, when it was assumed there would be no traffic on them. Ammo dumps would be hit but adjacent administration buildings would not. On some targets, the sequence of attacks was important, Ryan recalled.

"We'd start at the back end of the ammo dump and work our way forward to where the administrative buildings were" so anyone nearby would "get the idea that it was probably not a real good place to be."

The Suppression of Enemy Air Defenses mission was handled principally by Navy and Marine Corps fighters, which, operating off carriers in the Adriatic Sea and from Aviano AB, Italy, performed 60 percent of the SEAD missions in the operation. On the first night, the SEAD plan called for F-14 Tomcats to launch a volley of Tactical Air-Launched

Decoys into the vicinity of known air defense sites; when the sites turned on their radars to shoot at the decoys, F/A-18 Hornets behind the Tomcats would rain a barrage of AGM-88 High-speed Anti-Radiation Missiles down on the missile batteries.

The tactic had worked brilliantly in the Gulf War, but the Serbs—as the Iraqis had learned the hard way—found it better to hunker down and not turn on their radars.

Although the SAM batteries were "off the air" most of the time—effectively self-suppressed—these batteries continued to be a threat until specifically tracked down.

Not relying just on the threat from HARMs to thwart the SAMs, Marine EA-6B and Air Force EC-130 airplanes jammed the Serb radar frequencies. Meanwhile, USAF's Airborne Battlefield Command and Control Center airplanes maintained communications links between ground commanders and the air armada, while NATO E-3 AWACS aircraft kept track of the aerial traffic and kept it deconflicted.

France Loses a Fighter

One French Mirage 2000K was shot down near Pale, brought down by a shoulder-fired SAM. It was the only aircraft lost in the operation. Numerous attempts to rescue the two French aircrew members proved unsuccessful, but they were eventually repatriated by the Serbs who had captured them.

The second day of air strikes mirrored the first, though fewer targets were struck. Bomb damage assessment continued. Late in the day, word came from the Serb leadership that they had received the NATO/UN ultimatum—to withdraw heavy weapons beyond 12 miles outside Sarajevo, abandon the siege, and allow free passage in and out of the city—and that they were willing to talk. Janvier ordered a 24-hour halt to the operation so he could talk with Serb leader Ratko Mladic. The strike "packages" set to go that day sat alert, while reconnaissance and SEAD missions continued.

After a marathon negotiating session, Janvier accepted Mladic's pledge that NATO's terms would be met and ordered a four-day extension of the bombing halt. Some believed the Serb leaders were as yet unaware of how much harm had been done to them and needed time to comprehend the damage.

There were strings to the Serb agreement, however, and NATO/UN leaders quickly decided that the assurances provided, like all those that had come before, were semantic and insubstantial. The Serbs were given a new ultimatum—rejecting their conditions—and this time a deadline was given for compliance. The withdrawal and other conditions were to be accomplished by late Sept. 4 or the bombing would resume.

On the morning of Sept. 5, imagery from Predator and Gnat UAVs showed that the Serbs were only making a halfhearted show of moving weapons around, and the heavy weapons stayed defiantly put. Seeing no gesture of compliance, NATO/UN leaders ordered a resumption of bombing. By lunchtime, attacks were under way against more ammo dumps, vehicle staging and repair areas, and like targets, as well as some targets that needed a second round of bombs to finish the job.

Similar sites were struck on Sept. 6 and 7, but with bridges and choke points added to the mix. The idea was to force Serb forces onto roads where they could be watched by UAVs and reconnaissance airplanes, the better to determine if compliance was forthcoming.

The pattern of strikes continued, but plans were refined for striking targets in the "northwest zone" of Bosnia, some of which would be hit by standoff weapons. Moreover, the initial list of targets prepared for Deliberate Force was more than 80 percent destroyed and a new list was drawn up, expanding the target set to include power stations, factories, and oil refineries. It would have to wait for senior NATO/UN approval, however.

On Sept. 9, HARMs and GBU-15 2,000-pound glide bombs were thrown against heavily defended

Breaking Down the Missions

All Sorties, Aug. 30–Sept. 14, 1995

Mission Category	Sorties	Percent
Combat Air Patrol	294	8.4
Suppression of Enemy Air Defenses	785	22.3
Close Air Support/Battlefield Air Interdiction	1,372	39.0
Reconnaissance	316	9.0
Support Operations	748	21.3
Total	**3,515**	**100.0**

The pace of Deliberate Force was furious. Theater operations centers, like this one at Aviano's 555th Fighter Sq., went into overdrive after the shootdown of Capt. Scott O'Grady, one of the 555th's pilots.

air defense targets in the northwest zone. Late that day, there were reports that Serbian vehicles were withdrawing from the NATO/UN–imposed "exclusion zone" around Sarajevo, and attacks in this area were temporarily halted.

Here's Our Answer

On Sept. 10, the Serbs again requested talks, and Janvier obliged by traveling to Belgrade to meet with Mladic. But with no progress after four hours of verbal potshots, Janvier beat a hasty retreat, knowing that just a few minutes after his airplane was airborne, Tomahawk Land-Attack Missiles would be launched from USS *Normandy* in the Adriatic Sea. Their target was the Lisina radar complex near Banja Luka in northwest Bosnia, which gave the Serbs a clear view of the Adriatic. Destroying this complex would open up yet another safe avenue of ingress for NATO warplanes coming from the Adriatic and Italy. Eleven of the 13 TLAMs hit within 30 feet of their targets; two missed.

For three more days, targets were struck and reconnaissance performed, almost to the point of exhausting the target list. On Sept. 12 and 13, bad weather kept most missions on the ground.

Then, on the 14th, the Serbs capitulated.

At first, a 12-hour bombing halt was ordered, then it was extended three more days. As the Sept. 17 deadline for action neared, it became clear that the Serbs were indeed making good on Mladic's signed agreement to meet the NATO/UN demands, and Serb artillery was on the move away from Sarajevo.

On Sept. 20—just three weeks after the first weapons of Deliberate Force had been dropped—NATO and UN leaders issued a statement that "the resumption of air strikes is currently not necessary."

Ryan believes that Deliberate Force testifies to the capability of airpower "to coerce compliance with international mandates." Against an intransigent Serb leadership, airpower had shown little effectiveness in small doses, Ryan said, but "when it was finally used in very deliberate ... but sustained way, I think it ... was the most decisive element of bringing the warring factions to the table and to the successes that were achieved at [Dayton] and eventually signed in Paris."

USAF photo by SMSgt. Rose Reynolds, *Airman* Magazine

Previous smaller doses of airpower had proved ineffective. According to Gen. Michael E. Ryan, using airpower in a deliberate, sustained way was the decisive element in the success of Deliberate Force.

He believed that the size of the operation was small enough—but the stakes high enough—that it was his duty to personally choose the aim points.

"Minimizing not only collateral damage but also carnage was first and foremost in my mind," Ryan noted, "because in that particular operation, ... if NATO had committed an atrocity from the air, then we would be seen in the same light as those who were committing the atrocities on the ground. And that would have brought the operation to a dead halt."

Given the stakes, and Smith's delegating the choice of targets to him, Ryan felt "a great responsibility to make sure it was done exactly right." And, at about 300 sorties a day, "it was manageable."

Look no Further

Moreover, said Ryan, "If anything went wrong, well, they had one person to hang—not a sergeant who was working in the [imagery interpretation] shop saying, 'That looks like a good one to me.' "

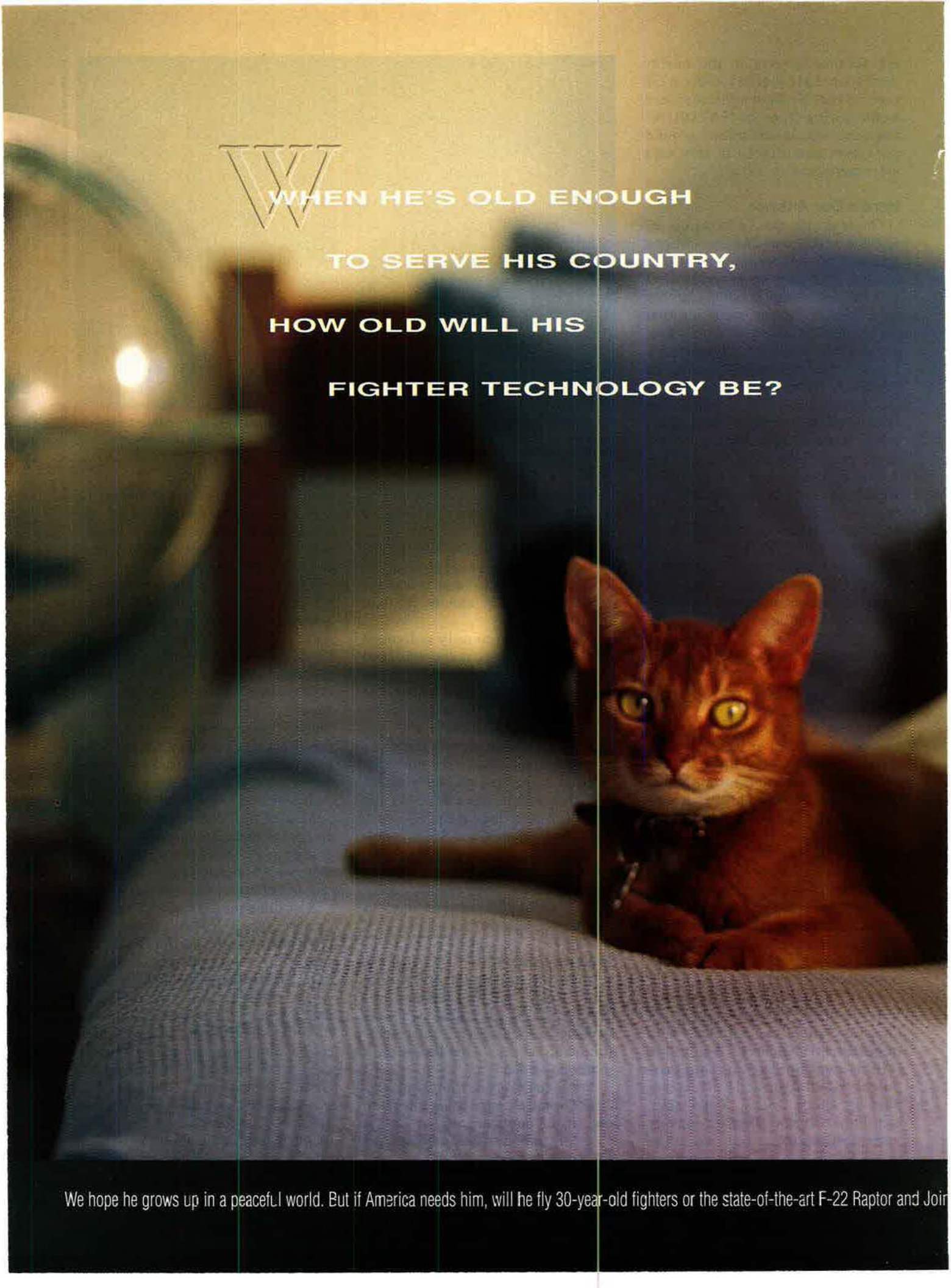
He added that "one thing we know about [bomb damage assessment] in this era of communications is that it's going to be Joint, combined, and it's going to be on CNN."

Contributing to the success, Ryan noted, was that NATO was "fortunate to have a three-year buildup" to iron out command and control, infrastructure, and especially reconnaissance issues that would be vital to Deliberate Force.

"We were also very lucky that over 40 years NATO had practiced together so that when we did this it was ... seamless," Ryan asserted. Eight nations contributed fighter or reconnaissance aircraft, "and almost all the other NATO nations in some capacity" contributed to the effort. "It was ... a recognition that all of the effort that we've put into NATO over all these years toward interoperability and ... integration was well worth it."

Most of the countries contributing combat aircraft used precision weapons, he said. Those that did not have them were assigned targets where the risk of collateral damage was low.

Ryan also took issue with a recent Congressional report arguing that precision weapons offer little advantage over those without such guidance. He said that in Deliberate Force, which offered "probably the best-documented ... BDA of any operation that's been done in years," precision munitions were "absolutely vital to the success of the mission." Given the absolute requirement to avoid civilian casualties, it could not have been accomplished without them, he said. "I think precision munitions are not only here to stay, but they're ... the wave of the future." ■


WHEN HE'S OLD ENOUGH
TO SERVE HIS COUNTRY,
HOW OLD WILL HIS
FIGHTER TECHNOLOGY BE?
We hope he grows up in a peaceful world. But if America needs him, will he fly 30-year-old fighters or the state-of-the-art F-22 Raptor and Join

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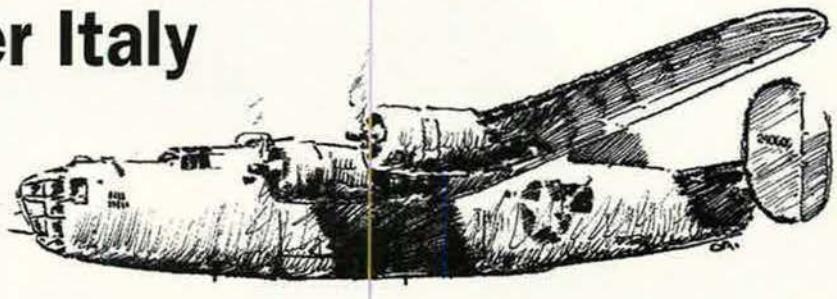
Valor

By John L. Frisbee, Contributing Editor

"Interlude" Over Italy

The 44th Bomb Group mission to Foggia was expected to be a breather after Ploesti. It turned out to be a day of surprises.



EIGHTH Air Force's 44th Bomb Group deployed its B-24s to North Africa in June 1943 to participate in the low-level Ploesti mission of Aug. 1. More has been written about that mission, including several stories in this magazine, than about any other single mission of World War II, with the possible exception of the atomic bombing of Hiroshima.

The 44th distinguished itself that day. Col. Leon W. Johnson, its commander, was awarded the Medal of Honor for his brilliant leadership under extremely difficult conditions.

Wars are not over until the last shot is fired. After Ploesti the 44th remained at its temporary base in North Africa to support ground forces during the closing days of the Sicily campaign. On Aug. 16 the group was sent against an enemy airfield at Foggia, about 30 miles inland from the east coast of Italy and about 600 miles from its temporary home at Benina, Libya. Based on recent missions to southern Italy, opposition—at least from fighters—was expected to be light. The mission was planned accordingly.

Winston Churchill once observed that in war nothing ever goes according to plan except occasionally and then by accident. Aug. 16 was not a day of fortuitous "accidents" for those assigned to the Foggia mission. Among them was 1st Lt. Charles A. Whitlock Jr., pilot of the 506th Bomb Squadron's B-24 #42-40606. Four of his regular crew were suffering severe dysentery and had to be replaced for the mission.

The squadron flew through heavy flak from the Italian coast to the target, bombing successfully at 1:15 p.m. No fighter opposition was expected, but unknown to the Americans the Luftwaffe had moved in many Bf-109s. A few minutes after "bombs away" 20 to 30 Bf-109s hit the group on the 506th's left. Almost immediately the 506th came under attack. Whitlock's airplane, flying in the tail-end-Charlie element, took the brunt of this and subsequent attacks.

On their first pass, the fighters did only minor damage, but the second strike downed a B-24 on Whitlock's left wing and wounded two of his crew, both of whom were able to stay at their posts. From the number of enemy fighters and the ferocity of their attacks, it was certain the battle would continue until the bombers were beyond the range of the -109s.

The third attack was disastrous, killing two gunners and seriously wounding waist-gunner SSgt. Ralph Knox, who took many shell fragments in both legs. The intercom and alarm systems were out, the controls inoperative, the left wing ablaze, both engines on that side dead, and there was a fire in the bomb bay.

Whitlock sent copilot Flight Officer Edward Wilson and engineer SSgt. Edwin Stewart back to attempt putting out the fire in the bomb bay. Its doors would not open, so Wilson jumped on them, opening one door, but in doing so he was caught below and burned to death.

Stewart went back to his turret and continued shooting at the attacking fighters. His now were the only guns firing. Whitlock remembers that smoke was so thick he could barely see across the flight deck. As the smoke cleared a bit, he could see that flames were coming through the radio compartment and up into the top turret. Stewart, who was not wounded, probably could have climbed down from his turret and bailed out. Instead he continued to fire at the enemy fighters until he was consumed by flames in a death most dreaded by airmen. Greater devotion than this hath no man.

The uncontrollable bomber was going down rapidly. It was time to get out. One of the waist gunners who appeared to not be wounded was too dazed to find his way out of the burning wreck. Though his legs were virtually paralyzed by shell wounds, Knox managed to drag the gunner to a waist window and punch him out. The man's chute did not open. Knox could see the tail gunner slumped over his guns, his turret swung completely around to one side. There was no way to get to the man through the flames.

The five men of that 10-man crew who were able to do so bailed out at about 18,000 feet. All landed safely, though Knox was unable to walk. He attempted to crawl to a secure place, but all five men soon were rounded up by Italian soldiers. Knox was taken to a hospital, where the fragments were removed from his legs without benefit of an anesthetic. Later, he and radio operator TSgt. Robert Mundell escaped from their captors and were returned to Allied hands.

When Italy surrendered, the other three POWs—Lieutenants Whitlock, navigator Robert Ricks, and bombardier John Waite—were turned over to the Germans and remained prisoners of the Reich until the war ended.

Whitlock's crew, especially Edwin Stewart, demonstrated once again the heights of valor to which good men will rise when confronted by overwhelming odds. On Aug. 16, 1943, they earned a place in the Air Force Hall of Valor. ■

Thanks to Will Lundy, author of "44th Bomb Group Roll of Honor," and a wartime member of the group.

Rogue nations are using deeper and stronger bunkers, mines, and caves to protect their nuclear, chemical, and biological facilities.

The Threats Go Deep

Maj. Gen. Gary L. Curtin, USAF, is director of the Defense Special Weapons Agency (formerly Defense Nuclear Agency). George W. Ullrich is DSWA's civilian deputy director. On July 16, 1997, they addressed the Defense Writers Group in Washington.

New Cave Dwellers

Curtin: "Hardened and deeply buried targets have evolved over the years as one of the lessons of Desert Storm. A lot of the people who are involved in either the proliferation of weapons of mass destruction or in wanting to protect command-and-control facilities have migrated into making their facilities harder and harder.

"The old 'cut-and-cover' kinds of targets we saw in Desert Storm—and which we were really pretty successful at destroying—were perceived as no longer hard enough, so building things into mountains has become the way to preserve the things that are most important to you. We have witnessed that in Korea for many years. We have witnessed it in a lot of other places in the world. ...

"These are very difficult targets, and the idea of being able to destroy them totally was principally in the past focused on nuclear weapons. But nuclear weapons are basically not ... acceptable ... for most cases, so we have to look at alternatives."

Targets in Two Flavors

Ullrich: "In the cut-and-cover kind of facility, ... you basically dig a hole and build a concrete bunker, and you cover it. And then, there are tunnels. They are really two very distinct targets.

"For the cut-and-cover type, there is no question that conventional munitions can be designed. It's always a measurement of who's ahead. You can go deeper, but there's a cost of going deeper. There is also a cost to trying to get a better penetrator. ...

"However, tunnel facilities pose a challenge in and of themselves. That's a much more difficult target to deal with. In fact, there are some targets where even nuclear weapons are challenged by these kinds of facilities, if they are sufficiently deep. So that group truly requires a different approach."

Of Tunnels and Tributaries

Ullrich: "Now, there are subclasses of tunnels. There are what we call the simple tunnels and very complex tunnels. The simple tunnels are basically tunnels that are used, say, to park Scuds [missiles], and you require ingress and egress. That's the primary function, to protect the system, but the system has to come out to do its work. ... You deal with impeding ingress and egress.

"With facilities that are designed to be buttoned up, it's a more difficult challenge, but there's no facility that doesn't require some sort of umbilicals, and over the long term, you can't isolate yourself from the rest of the environment and from power sources, water sources, and so forth. There are other functions that can potentially be attacked and disrupted."

"Functional Kill"

Curtin: "What we are focusing on is not trying to blast them [the targets] into oblivion but rather something we call 'functional kill.' Functional kill is the ability to go after the specific system or systems in a facility that you can shut down and in doing so put it off line for a period of time but not forever.

"You want to do something that will keep it from doing what it's supposed to do for a specified period. That can require, for example, going after power, after communications, after ventilation—things like that which you might be able to access, or some portion.

"So, understanding underground facilities, and then applying the current technologies of weapons—which are, surprisingly, better than you might imagine, in terms of penetrating into rock, detonating, and causing damage—is where we are working today. We have been using some of the facilities ... at the Nevada test site, underground tunnels, and the tunnelling capability that we have out there, to test and demonstrate the effects of high explosives on tunnels, and are working to find different ways to attack tunnel facilities. The program is still under way. There's no conclusion that I can give to you. We're making some progress."

New Weapons

Curtin: "The Air Force has something called the Advanced Unitary Penetrator, which is a narrower weapon, harder, designed to penetrate deeply into rock and other kinds of material. It shows a lot of promise.

"You couple that with the hard target smart fuze. It has a number of modes. One is what they call a 'path length' mode, which measures the distance it travels in an object. We also have the ability, with that fuze, for it to count the number of voids it passes through. It has a timing option as well. So it's a very flexible fuze, ... and it will be part of future weapons. It will allow us to more specifically go after targets and then to destroy them with the penetration into the area.

"The charge itself [in the Air Force's AUP] is small, but when you're talking underground, you don't need a large charge. If you can get the charge down to the target point, then a small charge in a confined space does a tremendous amount of damage."

Near Nuclear

Curtin: "Against a wide variety of targets, precisely aimed and accurately delivered conventional weapons will do the job that, many years ago, we only thought could be done with nuclear weapons. I think there is certainly a capability to take on very difficult targets today that we couldn't have done in the past with anything less than nuclear weapons."

Attack Depths

Ullrich: "It [the AUP] would have roughly the capabilities of the [Air Force] GBU-28, but it sits in a much smaller package. ... It [the weapon's potential attack depth] depends. It could be a hundred feet in soil, but with rock and reinforced concrete, you're probably talking tens, a few tens of feet."

Curtin: "We're talking granite and reinforced concrete as the kind of obstacle that you're throwing these things against, and those are very difficult to penetrate. ... The AUP will go further than [12 feet], but, again, it depends on the composition of the material. And if you're talking reinforced concrete, it depends on how reinforced it is. There are just a lot of variables involved. It's designed to go further than 12 feet. I can't give you specific depths, obviously, because that just means the other guy will build them [hardened targets] deeper."

Achilles' Heels

Ullrich: "If you're looking for large-area structural defeat [of a hardened tunnel target], which is sort of the metric from the old nuclear targeting days, then no, you can't do that [with conventional arms]. But every one of these facilities has probably a collection of Achilles' heels. Now, if you have the capability to assess the functionality, the locality, through sophisticated sensor technologies, there is hope in applying some conventional insults that would disrupt that facility."

Curtin: "You have to break lock with the idea that you're *smashing* a facility. That's not the right answer. That's why the functional-kill approach—to go after entrances, or the pad outside for the launcher, or something like that—is used to achieve the same thing."

Chemical, Bio Sensors

Curtin: "We are working programs with other organizations, including Sandia Corp., for unattended ground sensors that could be deployed around a suspected facility to provide monitoring over a period of time to try to detect the proper signatures that would allow you to characterize the facility itself.

"The biggest problem with underground tunnel facilities is intelligence. You can't, over time, as you would with a cut-and-cover facility, see them build it. All you're seeing is the entrance and the spoil coming out. You don't necessarily know where the path is inside. Short of having the blueprints, you have to find some other way to characterize it.

"That is a real challenge for ... human intelligence. ... It's also a challenge to find sensors that will add to that information and allow you to characterize it sufficiently so that you can do this functional-kill operation. ... We're talking seismic sensors. We're talking electrical sensors. There is a variety of different sensors that you can put out there to try to detect either emissions or vibrations or other things from the facility itself."

Catching the Cloud

Curtin: [Our goal is] "to provide the warfighter with the necessary

planning tools and then the weapons and tactics [to prevent the postattack spread of WMD toxins]. The planning tools allow you to understand the facility and know where to put the weapon precisely to close it down. We have done testing with simulants to allow us to know what's coming out, and we've worked different kinds of tactics.

"In the cut-and-cover facility, the idea is to collapse the facility in on the material inside by setting off the charge beneath the floor, so that you don't just blast up into the air. This has proven to be a very effective technique to dramatically cut back on the emission of any products inside.

"We have also been working with the services on other techniques to try to nullify what might be inside to keep it from causing any damage even if it does come out."

Tracking Airborne Poisons

Curtin: "We have worked prediction models and have tested and demonstrated them, so we understand pretty well what comes out of a point source, if you in fact strike it, and how much of that will propagate, and where it will go, and we can then alert people downwind if there is in fact any hazard. We put together a package of things that allows the warfighter to do much more than he could in the past."

Ullrich: "These facilities are often fairly large. ... One of the difficulties is: How do you distribute the damage to one of these facilities? We are looking at some so-called advanced payloads. At this point it is very preliminary. The prospect for using, say, incendiary-type warheads or other warheads that would distribute the energy better and for a longer period of time. ... Fuel-air [explosive], per se, doesn't work that well on the ground, we believe, but there are other techniques using thermites or other payloads that might offer some advantage.

"Of course, the key here is that you want to have the high-temperature environment to neutralize potential agents [over a period of time.] They would have to reside in that thermal environment for a period of seconds to minutes."

Weapon Development Effort

Ullrich: "We are about to embark on Counterproliferation ACTD II—CP II as it's called—that will in fact demonstrate this Advanced Unitary Penetrator. Should it appear very promising, one could probably develop a few prototypes under that program and then get into some quick development program, but I think it's premature at this point. That [effort], by the way, will carry on for about another two years. At that point, we'll at least have an assessment of whether that concept is worthy of pursuit."

Curtin: "And the AUP is not specifically focused on the tunnel targets. It's more focused on the hardened, shallow-buried targets ... where you have to go through a lot of reinforced concrete as opposed to going into granite or something like that."

The Tyranny of Physics

Ullrich: "You're dealing with fundamental material parameters here. ... There is a limit to how deep you can get with a conventional unitary penetrator. There is some improved penetration with fragments and rods, and a lot of R&D has gone on in the past, but fundamentally, you're not going to come up with a magic solution to get 100 feet or deeper in rock.

"If you go to higher velocities, you reach a fundamental material limit where ... the penetrator will eat itself up in the process, and in fact that will achieve less penetration than at lower velocity. So you get into these different regimes where you are really just fundamentally limited, physically, in how deep you can get into rock.

"What's left, then, is to deal with the energy package that you have on board [the weapon]. The B-61 nuclear penetrator is intended to have a substantial kill capability against these kinds of targets. Conventionally, if you're set on structural damage to these targets, I think you're going to be very disappointed.

"The conventional solution has got to focus on these functional defeat mechanisms. ... We've looked at shaped charge, two-staged-type weapons. Boosted penetrators and a variety of options. These experimental concepts have been explored. Even with those, it's an incremental gain. You can always find a mountain that's going to go a lot deeper than the weapon." ■

Two Types of Bunker-Busters

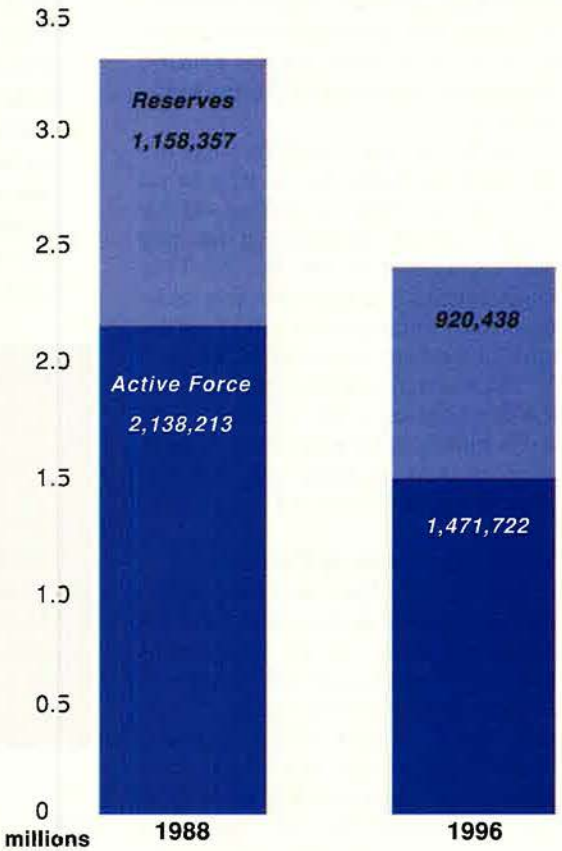
GBU-28 weapon	
Length	Approx. 13 feet
Weight	4,700 pounds
Body design	Based on BLU-109/B penetrator
Explosive type	Conventional
Guidance/delivery	Modified GBU-27 semiactive laser system
Carrier aircraft	Flight tested on F-15E, F-111F
Penetration depth	Concrete, 20 feet. Soil, 100 feet.
Developers, contractors	National Forge, Texas Instruments
Entered service	February 1991
Employment	Gulf War

B61-11 weapon	
Length	Approx. 12 feet
Weight	Approx. 1,200 pounds
Body design	Based on B61-7 weapon
Explosive type	Nuclear
Guidance/delivery	Free fall
Carrier aircraft	Tested on B-1B, B-2, B-52, F-16
Penetration depth	Shock effect to several hundred feet
Developers	Los Alamos, Sandia National Laboratories
Entered service	January 1997
Employment	None

The US, with fewer forces stationed overseas and afloat, is looking at different ways to exert influence.

New Routes to Overseas Presence

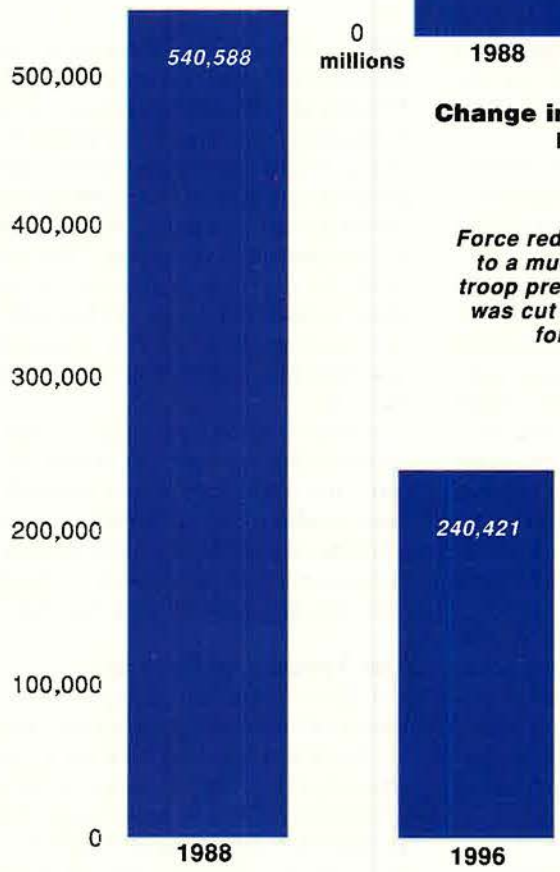
More than 240,000 US troops are forward deployed around the world, providing US "presence" overseas. The Pentagon says such forward deployments ensure that US forces are ready to fight, familiar with regions in which combat operations may take place, and able to operate with allies. They allow the US to deter aggression or respond swiftly to threats. However, with the end of the Cold War and the danger of global conflict with the Soviet Union, American presence is undergoing significant change. The General Accounting Office recently conducted a study of the issue. Moreover, DoD and the Joint Chiefs of Staff are studying whether there are better ways to provide US overseas presence. Airpower advocates say that rapidly deployable, US-based air assets can provide another highly effective form of presence and influence at lower cost.



Change in Total Troop Levels
Fiscal 1988–96

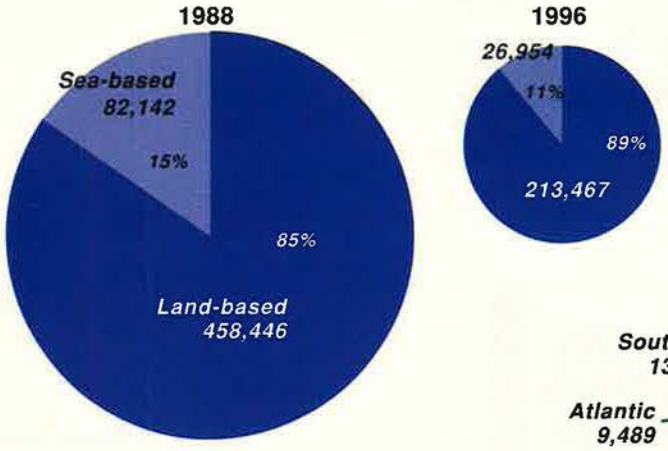
Force reductions since 1988 have led to a much smaller level of overseas troop presence. The force as a whole was cut by 27 percent, but overseas forces were cut by 56 percent.

Source:DoD



Change in Overseas Personnel
Fiscal 1988–96

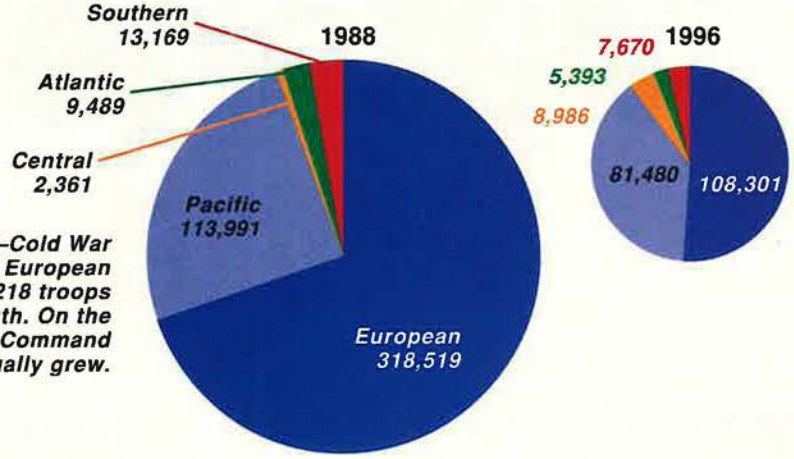
Land-based and Sea-based Presence
Fiscal 1988–96



Land-based tactical air and ground forces now account for a larger share of the nation's overseas deployments.

Source: DoD

Forces in the Major Combat Theaters
Fiscal 1988–96

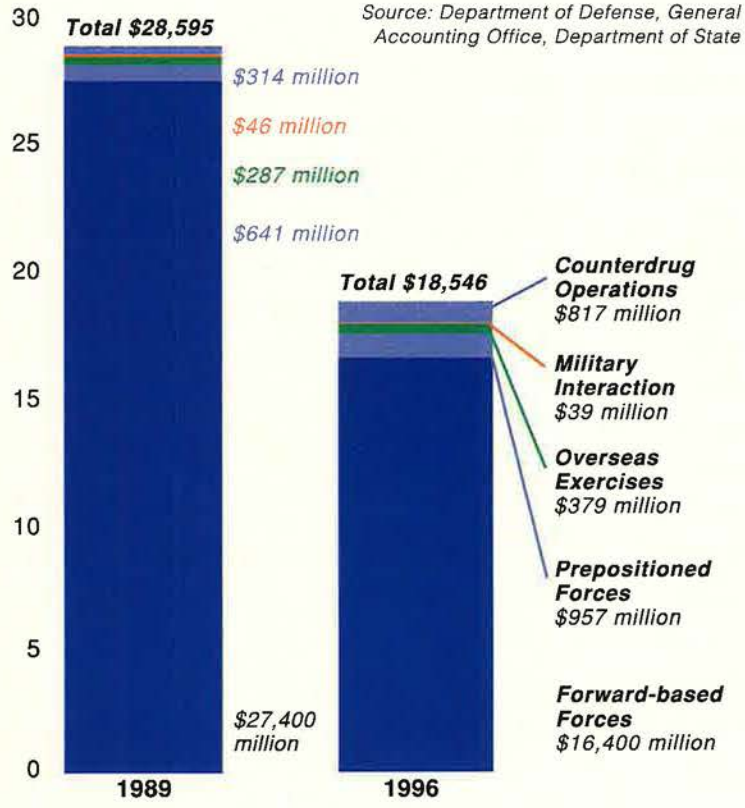


Hardest hit by the post–Cold War reductions was US European Command, which lost 210,218 troops or 66 percent of strength. On the other hand, US Central Command actually grew.

Funding of Overseas Presence
Fiscal 1989–96 (Millions of constant 96 dollars)

Funding for overseas presence has dropped sharply. With fewer forces abroad, DoD requires less to sustain overseas operations.

Source: Department of Defense, General Accounting Office, Department of State



US Forward-deployed Forces
Fiscal 1988–96

Overseas Force Element	FY88	FY96
European Command		
USAF Fighter Wing Equivalents	9.33	2
Army Ground Divisions	4	2
Marine Expeditionary Forces	0	0
Navy Carrier Battle Groups	1–2	1
Amphibious Ready Group	0	1
Pacific Command		
USAF Fighter Wing Equivalents	4	3
Army Ground Divisions	2	2
Marine Expeditionary Forces	1	1
Navy Carrier Battle Groups	1–2	1
Amphibious Ready Group	0	1
Central Command		
USAF Fighter Wing Equivalents	0	1
Army Ground Divisions	0	0
Marine Expeditionary Forces	0	0
Navy Carrier Battle Groups	1	1
Amphibious Ready Group	0	1

Source: DoD

Streamlining acquisition and logistics is not as easy as it seems in theory.

The Materiel World

By Peter Grier

To senior Air Force officials, the idea seemed simple enough: Conserve its funding by leasing new engines for some B-52 bombers. If leasing a car is a good way to get transportation without laying out lots of up-front cash, they reasoned, so might leasing turbofans have the same advantage.

In practice, however, the lease has proved difficult to close. Under Pentagon accounting practices, the Air Force has to reserve enough money to cover the whole lease liability on the day the contract is signed. That means that the Air Force has to set aside some $2 billion—a hefty sum by today's procurement standards. It defeats the whole purpose of leasing.

That is just the sort of government regulation that needs to be changed if the Air Force is to modernize its force within the constraints of today's budgets, said Assistant Secretary of the Air Force for Acquisition Arthur L. Money, speaking last July at AFA's Dayton national symposium, "Acquisition, R&D, and Logistics: Looking Forward to the Next 50 Years."

"We've had this Revolution in Military Affairs," said Money. "It is time we have a revolution in business practices."

Much progress has been made in streamlining service acquisition and support efforts, said he and other

Top 20 USAF Acquisition Programs

Fiscal Years 1997–2003 (in billions)

1. F-22 fighter	$22.3
2. C-17 transport	21.1
3. SBIRS system	5.4
4. Joint Strike Fighter	5.3
5. E-8 Joint STARS	4.3
6. F-15 fighter	3.6
7. Minuteman III ICBM	3.4
8. Titan booster	3.3
9. Milstar satellite	3.1
10. F-16 fighter	2.8
11. EELV booster	2.6
12. GPS satellite	2.4
13. B-2 bomber	2.3
14. B-1B bomber	1.8
15. E-3 AWACS	1.7
16. Electronic combat	1.7
17. Airborne Laser	1.6
18. CV-22 SOF craft	1.5
19. C-130 transport	1.5
20. Advanced MILSATCOM	1.4

Source: US Air Force

officials at the Dayton meeting, but much more needs to be done if the Air Force hopes to adequately outfit and maintain the high-tech force of the early 21st century.

Secretary Widnall

Sheila E. Widnall, the Secretary of the Air Force, offered a quick review of the service's broad strategic priorities.

First, she said, is a move toward expeditionary capabilities. The reasons for this change are well-known: While the number of overseas bases shrinks, the demand for US air and space forces has never been greater. The Air Force has only two-thirds the personnel it did during the Cold War, yet its tempo of operations is now four times higher.

A second priority for the USAF of the future will be a greater reliance on space-based assets. Space is now a center of gravity in Air Force capabilities, said Widnall, as the number of service satellites on orbit has increased 250 percent since the fall of the Berlin Wall.

A final Air Force strategic goal is to continue to capitalize on past experience and reduce infrastructure and support costs. An aggressive move toward business efficiency is necessary, said the Secretary.

In general, the importance of information is expected to grow. In fact, Widnall said, the Air Force is looking toward a day when sensors, command centers, and aircraft will form a single web with data flowing instantly along its strands. "We're aiming toward getting tailored, real-time image, weather, and targeting information to our aircraft and ground troops," said Widnall.

Assistant Secretary Money

If there was a common reference point at the symposium, it was the importance of technology to the Air Force of 2010. The problem is that there is a gap between the kind of equipment that commanders believe they need and the amount of future funds available to pay for it.

"We are probably $3 billion to $5 billion per year short now on the modernization account budget vs. the demand coming out of the warfighters," Money said.

Thus, for next-generation systems, "affordability is a key performance parameter," said Money. "We are willing to trade damn near everything based on cost."

Knocking down the stovepipes of acquisition and sustainment and combining those two functions is one economy that is already being put in place. Another is the husbanding of R&D money. No longer will the Air Force pay to develop anything it thinks it can buy commercially.

There is also savings to be found in continued reduction of government owned and operated parts of the support structure. Over time the depots and the air logistics centers will likely just do services that are unique to the Air Force, said Money.

Overall, acquisition reform has already freed up lots of extra money, according to the Air Force acquisition czar. Savings totaled so far are $17 billion over the last two years. "About five and one-half [billion] of that is actual, honest-to-God savings that we've taken," said Money. "The other 12 and one-half [billion] or so is future savings yet to be realized, but it is cost avoidance."

Given that USAF's procurement budget is around $20 billion, that means that the savings—if fully realized—will come close to providing an extra year's worth of acquisition money.

Reduction of operations and maintenance costs remains a major issue, said Money. So does a reduction in parts inventory—a big part of so-called "lean logistics."

Finally, Money said, DoD's financial system "drives me nuts." A long career in industry did not prepare him for such problems as the B-52 engine lease set-aside, Congressionally mandated budget changes, reprogramming issues, and expired funds.

According to Money, "We need to change the paradigm of managing the budget to managing the cost."

General Babbitt

Gen. George T. Babbitt Jr., commander of Air Force Materiel Command, made a similar point on the subject of changing the way acquisition officials think about their funds. His goal, Babbitt said, is to shift the focus of the command from budget, or "input management," to cost, or "output management."

There is a big difference in viewing oneself as a cost, not a budget, manager, said the AFMC chief. If 10 budget managers sat around a table, they would all say they needed more money, argued Babbitt, whereas 10 cost managers talking around a similar table would all say they needed to save more money.

"Their goal is not to deliver less; it is to continue to perform the mission well but at a reduced cost," said Babbitt.

Cost reduction initiatives are already well under way at AFMC, said Babbitt. Research labs have already been consolidated under a single commander; test range and facilities are being studied for possible management streamlining.

Babbitt said that the Air Force had made big strides in pre–Request For Proposal release planning. For one thing, he noted, there is more emphasis in specifying desired performance than in specifying the particular processes for achieving it. Reliance on military specifications has been greatly reduced, for another.

Babbitt said that in the near future he will put more emphasis on production and support costs during the engineering and manufacturing development phase of acquisition, when careful engineering can best control them. He favors more innovative contractor support arrangements, such as co-use of production facilities for support.

"We can do little else when the cycle time of obsolescence is shorter than the time required to field an organic support facility," Babbitt noted.

Norman R. Augustine

Norman R. Augustine, president and CEO of Lockheed Martin Corp., gave his view of the current state of what he called "America's fifth armed force"—the defense industrial base.

Augustine noted that the past decade has been "Darwinian times" for industry. "Fortunately, we have been able to preserve a defense industrial base," he noted. "The lesson to be learned comes from Charles Darwin, who said it is not the strongest of the species that survives, nor the most intelligent, but rather the one that is most adaptable to change. ... The willingness to change has been absolutely essential—and to place so much greater focus on things such as cost than we are accustomed to doing in the past."

What remains is remarkably efficient, capable, and competitive, said Augustine, but there's not much industry left, and it "has very little ability to surge" its level of output.

In Augustine's view, the future is clouded by many fundamental questions currently being raised about the industrial base. Among them:

- If the industry is to globalize, who will decide what will be sold and to whom?
- Should the US permit foreign governments to indirectly own major elements of US defense R&D and production capability?
- Should the US let itself become technologically dependent on offshore software and electronics?
- How much internal capability does the US government maintain in terms of depots and arsenals?
- Who has responsibility for maintaining a strong domestic defense industrial base?
- Can the US make a fundamental shift to a service economy and still maintain military capabilities?
- How do you plan for a viable industry when decades pass between production of new aircraft, tanks, and warships?

Getting the right answers is critical, Augustine noted, because "one can no more win in modern combat without a strong industrial base than one can win without a strong Air Force or Army or Navy or Marine Corps."

General Skantze

At the AFA symposium, some negative reviews were voiced concerning USAF's current acquisition structure, at the heart of which lay a fusion of traditionally separate development and logistics functions.

Retired Air Force Gen. Lawrence A. Skantze decried this step, suggesting that the Air Force would benefit from returning to a dual setup in which it had Air Force Systems Command to handle research, development, and acquisition of major systems and production of new weapons and Air Force Logistics Command to manage logistics and handle some near-term forms of acquisition.

Skantze, a former AFSC commander, told a panel on the Program Executive Officer system that he has "deep concerns" about what he views as a "steady and dangerous erosion of what was once a strong, focused Air Force research and development institution."

Logistics and support, on the one hand, and research and development, on the other, are not compatible in philosophy or culture, Skantze argued. Logisticians' concerns are day-to-day support of operational forces. They are risk averse—and their activities tend to be fully funded. Researchers focus on risk management. Their money comes in chunks.

"In the R&D world the future is tomorrow," said Skantze. "In the logistic world the future is today."

Keeping the functions separate thus makes sense for a high-tech Air Force, according to Skantze. When they are combined, as they are in today's AFMC, something gets lost. Day-to-day battles consume the AFMC commander, and a focus on R&D gets lost.

"There is no real, discernable Air Force R&D institution in the field," said Skantze.

Furthermore, said Skantze, the PEO system violates good management practice. A short chain of command, with the PEO reporting directly to the top of Materiel Command, sounds good in theory, but it cuts out the middle layers of management—product development chiefs and their staffs, among others—who are the teachers and librarians of Air Force acquisition. As a result, Skantze said, each new PEO sets out on developing his or her new system, unaware of the many pitfalls that lie ahead and without access to any real peer review process that can judge where they are heading before it is too late.

"In my judgement, we have seriously weakened the Air Force acquisition institution to where its strength, its substance, and its roots are eroding," said Skantze.

General Kadish

The other two members of the panel, however, gave much higher marks to the AFMC and PEO structure.

Lt. Gen. Ronald T. Kadish, commander of Electronic Systems Center at Hanscom AFB, Mass., argued that the overall goal of the PEO system was to give the Air Force a very short chain of acquisition command and a sharper focus on the big acquisitions that are the crown jewels of the force.

"By and large it has worked very well," said Kadish. "There is always a problem in dislocations and balance in every organization, but it has worked fairly well."

Recent acquisition results speak for themselves, said Kadish. Two years ago the C-17 was near cancellation; now it has been put on a multiyear procurement contract. The shortened PEO system allowed the Air Force to sign off on the multiyear idea after only a few days of consideration, according to Kadish.

Rebecca L. Grant

Another panel participant, Dr. Rebecca L. Grant, the president of IRIS Corp., a research group, in Arlington, Va., said that PEOs were established for a number of purposes.

One was to get clear command channels that make it easier for weapon systems to gain support of top Pentagon officials. Another was to limit reporting requirements. Still another was to put good managers in place with small staffs and free them of the need to constantly defend their systems on Capitol Hill.

"With all the turbulence and chaos that went on with the creation of the Air Force we have today, there was an overriding theme to all that reorganization," said Grant. "I would characterize it as a focus on the operator and on the operator's requirements."

Furthermore, she said, the Air Force's warfighting commands and their staffs are much more technologically sophisticated than ever before. The number of big programs has shrunk drastically from that of 15 or even 10 years ago.

"I would submit ... that the stand up of AFMC was ... not a moment too soon," said Grant. "Many of the benefits that we have begun to see, both on the acquisition side and particularly in logistics—in the two-level maintenance initiatives, in lean logistics—have been greatly enhanced by the existence of a single and unified command. It is not a perfect command but ... an integrated command that pulls these issues together."

General Haines

When it came to logistics, speakers at the AFA symposium spent much time discussing Joint Vision 2010 and "agile combat support," the picture it presented of the support system of the future.

Maj. Gen. Dennis G. Haines, AFMC director of logistics, said that the Air

Force will need to be competent in a number of core areas to successfully implement the new Joint support concept.

One is long-range communications—an ability to reach any source of supply in the world, be it an Air Force depot, a Navy yard, or contractor, and find a needed component. Another is air mobility express, which will use a blend of military and commercial flights to move parts anywhere in the world in a maximum of three days. Finally, agile support will likely depend on a lean, responsive depot structure which uses performance-based business processes.

Jeffrey A. Jones

The idea is to move just what you need, said Jeffrey A. Jones, executive director of logistics management, Defense Logistics Agency. The idea is also to avoid what happened during Operations Desert Shield and Desert Storm. In Jones' view, USAF simply emptied the entire inventory of consumables onto the back of US Transportation Command to get it moved into the theater, after which it sat idly until 40 percent was moved back to the United States.

The problem lay at the boundaries between echelons and functions, said Jones. Within a depot, or a fighter wing, there are wonderful management systems that handle parts movement. The second these management systems start talking to other systems outside their narrow world, the result is friction that slows down response. Inventory is the primary symptom of this friction, said Jones. It's a stockpile of components judged necessary to deal with the whole support system's inefficiencies.

Cutting inventory will be crucial if agile combat support is to really save money. That is because much inventory represents waste. Between 30 and 40 percent of what is inventory ultimately never gets used because of obsolescence of one kind or another, said Jones.

General Tuttle

Retired Army Gen. William G.T. Tuttle Jr., president of the Logistics Management Institute, said that 21st–century logistics will rest on three principles.

The first is Joint common supply and services support of dispersed elements. In other words, Joint logistics for things everybody uses and service logistics for their own unique weapons. Development of Joint service logistics processes will be key if this first principle is to be fulfilled.

The second principle is the need for a minimum logistics footprint. That keeps targets for tactical ballistic missiles to a minimum. "You tailor your loads," Tuttle said. "Air mobility express delivers direct to the Air Force dispersed operating bases."

Third—and most controversial: The services and the Defense Logistics Agency need to contract out many, if not most, support functions. "I am saying we need to get the services out of the business of operating logistics infrastructure," said Tuttle.

One Man's Vision

In sum, speakers at the AFA meeting agreed that more needs to be done, whatever the progress that has been made in recent years. Otherwise, a vision outlined by Augustine, CEO of Lockheed Martin, might become reality.

In 2020, according to Augustine's fanciful remarks, the Pentagon has been downsized to "the Square," the nation's entire defense industry can sit at two tables, the Secretary of Defense is Mike Wallace, and Augustine himself is head of Lockheed Martin Northrop Grumman Loral Disney. The Air Force wants to replace its entire inventory of aircraft, which consists of one F-16—but a Congressional staffer points out that all active-duty forces were phased out years earlier in favor of simply telling enemies we have lots of airplanes that are designed with stealth technology, so no one can see them.

"That's the way it could sound if we don't do things that really do fix the acquisition process, given the amount of money we are likely to be able to spend in the years ahead," he said. ■

General Fogleman

In decades to come, the Air Force will be looking to technological advancement to offset the limitations inherent in a smaller, less expensive force, said Gen. Ronald R. Fogleman, the former Chief of Staff, who issued his remarks only days before he announced retirement from active duty.

The methods Air Force planners use to weigh technological breakthroughs will have to change in the future, added Fogleman. The Cold War threat provided an easy benchmark against which to measure new systems. In the new era of multiple regional threats, making the cost-benefit analysis will be much more difficult.

"We are going to have to be able to intellectualize and think through what it means to have a capabilities-based force," said Fogleman.

Officials will also have to keep in mind that the fast development of commercial technologies may have an asymmetrical military impact. In other words, computer developments may favor the other guy, not us.

"An enemy does not have to build the same kind of R&D complexes that we have built in the past," said Fogleman. "Folks are going to be able to go buy things that it took us years and billions of investment dollars to produce."

Meanwhile, the Air Force has been proceeding with a "time-phased modernization," in Fogleman's phrase.

The near-term priority has been building and sustaining a new core airlifter. The advent of the C-17, which survived a near-death experience with Congress, means this goal is now right on track. The midterm priority has been bomber upgrades and autonomous precision munitions. The Air Force is continuing its move toward outfitting the B-2, B-52, and B-1 for a full range of conventional operations, said Fogleman. The mid- to late-term modernization priority is space, with a new launch vehicle (the Evolved Expendable Launch Vehicle), new missile warning system (Space Based Infrared System), and a new satellite communication system.

The long-term priority is air superiority.

One clue that you—and the fighter force—are getting old is when you go visit the Air Force Museum and you see an F-15 that you flew and you were a lieutenant colonel when you flew it, said Fogleman.

Peter Grier, the Washington bureau chief of the Christian Science Monitor, *is a longtime defense correspondent and regular contributor to* Air Force Magazine. *His most recent article, "Stressed Systems," appeared in the July 1997 issue.*

RUSSIAN

Organization of the Russian Armed Forces

In January 1997, President Boris Yeltsin signed an order making official a new heraldic emblem for the armed forces. The double-headed eagle has wings spread to indicate readiness to take flight, attack, and defend. At the heart of the emblem lay a shield depicting St. George and the Dragon, the symbol of the city of Moscow.

Several military structures, each subordinate to Russia's President, composed the nation's armed forces in 1996 and through the first half of 1997.

At the top level, direction was provided by two organizations, each chaired by the President and directed by politically powerful civilian secretaries. The first was the Security Council, responsible for formulating the National Security Concept. This document defines Russia's priority national interests and reportedly was completed in May 1997 but not published. Second was the Defense Council, created in July 1996 and charged with producing a new military doctrine and guiding military reform. This was scheduled to have been ready in June 1997 but was delayed indefinitely. Threats to Russia's security, as well as the role, structure, and composition of its armed forces, are to be determined by the provisions of these two documents.

Heads of the five most influential Russian uniformed organizations sat on both the Security and Defense councils. These were the Minister of Defense, the Director of the Federal Security Service, the Minister of Internal Affairs, the Director of the Foreign Intelligence Service, and the Director of the Federal Border Guards. The Minister for Civil Defense and Emergency Situations, the Head of the Federal Security Guard Service, and the Minister for Nuclear Energy (who heads troops) were members of only the Security Council.

Less prominent power centers, commanded by generals and filled with troops, also reported to the President. These included the Presidential Security Service, the Federal Communications Agency, the Federal Railroad Troops Service, the Construction Troops, and the Federal Special Construction Directorate. Neither the Russian Minister of Defense nor the Chief of the General Staff had any control over these other power structures, whose numbers were estimated to be between 800,000 and two million. All of these troops, however, were subject to the Military Regulations of the Armed Forces of the Russian Federation.

The Ministry of Defense (MoD) administered eight regular military districts inside Russia. In addition, there were seven districts of Internal Troops, six districts of Border Guards, and seven regional centers of Civil Defense Troops. Each agency supported large local staffs with general officers in abundance. There was much overlapping and duplication in their work but little coordination.

Non–MoD organizations, in particular Border Guards and Internal Troops, were not paramilitary forces in any sense. With the treaty-driven downsizing of MoD troops in the early 1990s, many units were simply transferred to one of the other "power ministries." As the fighting in Chechnya showed, non–MoD troops often were better armed and trained than MoD forces.

Russia's conventional military capability continued to decline. Troop training was at a minimum. "Untouchable" reserves of both food and equipment, intended for wartime emergency, were utilized. Soldiers often were undernourished; medical support was primitive. There was a serious shortage of junior officers. Women helped compensate for the shortage of qualified male conscripts.

President Boris Yeltsin and other political leaders emphasized the importance of Russia's nuclear forces. Deputy Security Council Secretary Boris Berezovskiy asserted that Russia's new National Security Concept provided for first use of such weapons in a crisis. Priority was given to maintaining these weapons and to R&D for future weapons systems, with emphasis on space. Work appeared to continue on a massive, deep underground battle station in the Ural Mountains.

Armed Forces under the Defense Ministry. These forces had the primary responsibility for defending Russia against external threats. They are divided into five services, as in Soviet days. Moreover, there were two smaller forces: Military Space Forces and Airborne Forces, referred to as "reserves of the Supreme Command." Leading political and military leaders emphasized that MoD forces will be reorganized. Newly appointed Minister of Defense, Gen. of the Army Igor D. Sergeyev, declared that Russia would establish four rapid-response mobile forces, each with its own air and naval support, if needed. They would be located in the Far East, North Caucasus area, and Moscow Military District (with two). The size of these planned forces, which were primarily intended to deal with regional conflicts, was not given.

Defense Ministry. This once highly professional body became politicized and

MILITARY ALMANAC

By Tamar A. Mehuron, Associate Editor, **with Harriet Fast Scott, William F. Scott, and David Markov**

rife with dissent and corruption. Minister of Defense Gen. of the Army Pavel Grachev, who came to President Yeltsin's aid in the coup attempts of 1991 and 1993, was dismissed in June 1996. His successor, Gen. of the Army Igor Rodionov, on reaching compulsory retirement age of 60 the following December, retired and became Russia's first civi ian Defense Minister. However, Rodionov was never accepted in the President's inner circle and disagreed with the reform policies of Yuriy Baturin, Defense Council Secretary.
In May 1997, dur ng a televised meeting of the Defense Council, both Minister of Defense Rodionov and the Chief of the General Staff, Gen. of the Army Viktor Samsonov, were dismissed. Gen. of the Army Igor Sergeyev, CINC of the Strategic Rocket Forces, was designated the new Defense Minister Gen. Col. Anatoliy Kvashnin, initial Commander of the Joint Group of Federal Troops fighting in Chechnya, moved from Commander of the North Caucasus Military District to Chief of the General Staff. Dr. Andrey A. Kokoshin retained his position as First Deputy Minister of Defense guiding military-technical and economic policy.

Strategic Rocket Forces (RVSN) continued to have first priority in personnel and equipment. This service consisted of four missile armies, which contained 19 divisions. The Topol-M missile, an advanced version of the silo-based and mobile Topol ICBM, was introduced into service. RVSN conducted five practice missile launches in 1996. The last was a RS-22 rocket launch from a combat ra lway car launching pad. The primary central command point of RVSN was located underground next to the headquarters building in Vlasikha near Moscow. The RVSN also had several other reserve command points in various regions of the nation, situated at depths of several hundred meters in cliff and mountain shafts. These were designed to ensure the functioning of the nation's combat control system for over a six-month period in conditions of total nuclear war. Sergeyev asserted that missiles could be launched when under attack "in a few tens of seconds."
Sergeyev recommended that Russia's Military Space Forces be combined with the Strategic Nuclear Forces, a move which he claimed would increase "deterrence efficiency" by 10–15 percent.

Troops of Air Defense (VPVO) remained divided into four operational commands: missile-space defense troops, surface-to-air missile troops, air defense aviation troops, and radiotechnical (radar) troops. President Yeltsin continued to press for a "Unified Air Defense System" for the commonwealth and directed the Ministries of Defense and Foreign Affairs to develop and implement it. The "Agreement on the Creation of a CIS Unified Air Defense System," signed in 1995, had not been implemented. Only air defense troops of Kazakhstan, Russia, and Belarus performed alert duty. Azerbaijan had not subscribed to the Agreement; Turkmenistan, Uzbekistan, and Ukraine cooperated with Russia only on a bilateral basis. Moscow's ABM system, intended "to combat unauthorized, provocative, or terrorist strikes by various categories of combat missiles," continued to receive attention.

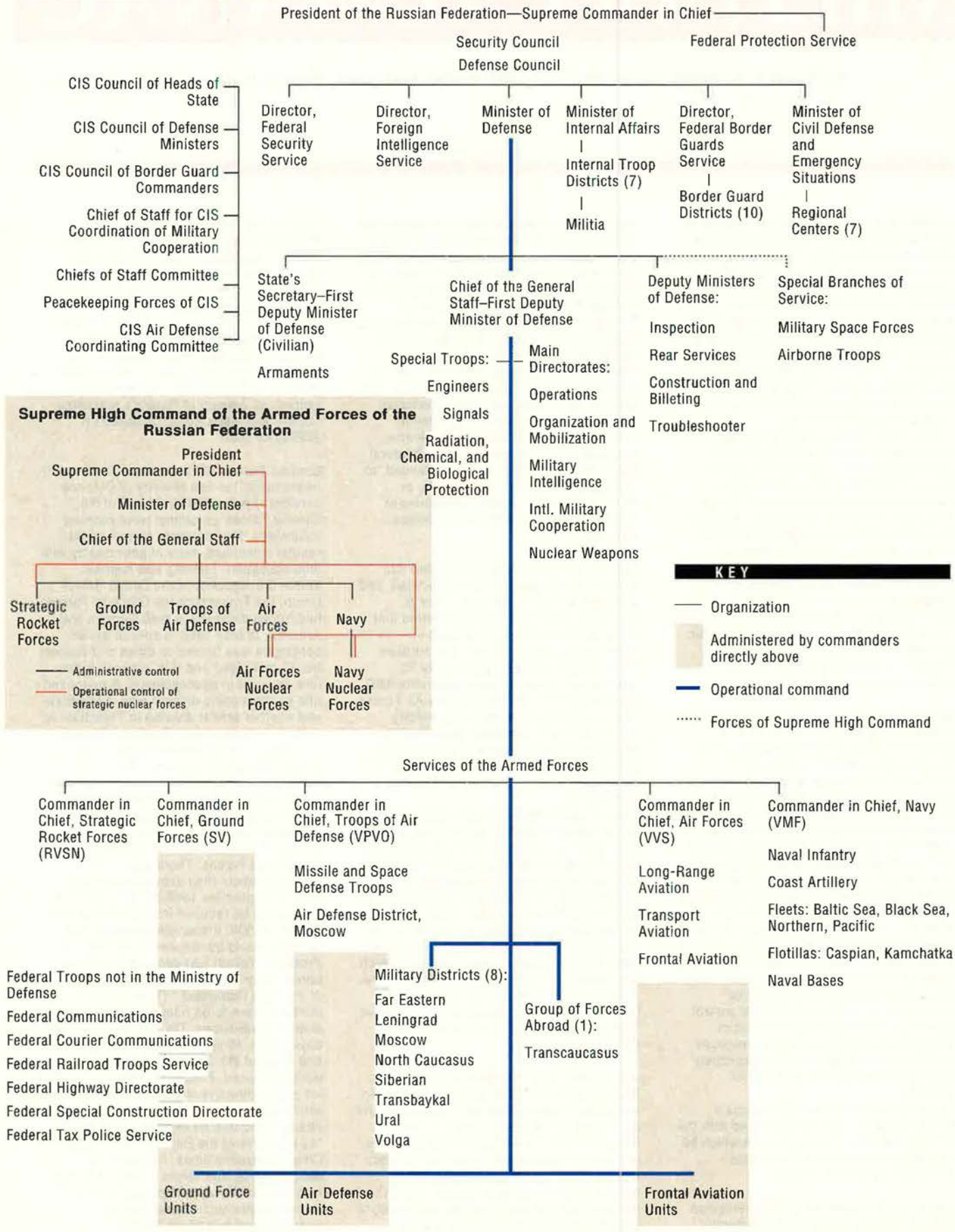
Air Forces (VVS) remained divided into long-range (strategic), frontal (tactical), and transport aviation. Gen. Col. Peter S. Deynekin, CINC Air Forces, admitted that, of the Air Forces' tactical aircraft—interceptors, ground attack, and medium-range theater bomber types—only 30 percent consisted of fourth generation MiG-29s and Su-27s. He said that the Air Forces "did not purchase a single new military aircraft in 1996." Deynekin described the shortage of parts, engines, accumulators, and rubber as disastrous and said that only some 50 percent of the airplanes were operational.
Lack of flying time for pilots remained a major problem. Military air transport pilots were able to maintain a level of proficiency by flying paid air cargoes and by supporting Russian peacekeeping operations. In tactical units fuel shortages limited pilots to 30–50 hours a year of flight time, compared to 180–240 hours during the Soviet era. At the same time Russia's aircraft industry was kept alive by sales to foreign nations, which accounted for approximately one-half of the nation's arms production of more than $3 billion. Customers included India, Indonesia, Taiwan, South Korea, North Korea, and China.

Navy (VMF) still maintained its four fleets: Black Sea, Baltic, Northern, and Pacific. An agreement was reached with Ukraine for the continued use of Sevastopol in Crimea. However, with the exception of a few ships, in particular one remaining aircraft carrier, the *Kuznetsov,* and the *Peter the Great* nuclear-powered missile cruiser, Russia's surface fleet has been sold off, scrapped, or abandoned. Many of the Navy's older submarines have met the same fate. Russia's newer submarines were a different story. A new fourth-generation ballistic missile submarine, referred to as the *Borey* project, has been approved by presidential decree and work started on the lead unit in November 1996. The first *Borey* is scheduled to be launched in 2002, with an additional unit each year thereafter. The *Borey* is expected to carry 12 new ballistic missiles. If the START II agreement is ratified, 55 percent of Russia's remaining nuclear warheads would be based on SSBNs by 2003.

Ground Forces (SV) appeared as the most neglected of the five Ministry of Defense services. Approximately 90,000 of the Ground Forces' personnel were contract volunteers. These troops, as well as the regular conscripts, were of poor quality with little education. Training was minimal. Within the republics of the former Soviet Union, the Transcaucasus Group of Forces had troops deployed in both Georgia and Armenia. In May 1996, a special military contingent was formed to direct and support the 17 motorized and four airborne battalions involved in peacekeeping. A motorized rifle peacekeeping division was in Moldova and another similar division in Tajikistan. A military unit remains in Southern Ossetia (Georgia). Some units were part of CIS Collective Peacemaking Forces based in Abkhazia and Tajikistan. Russian units also serve as part of UN peacekeeping operations. A special branch of service, the **Airborne Forces,** were under the direct control of the President but administered by the Ground Forces. There was much confusion about their subordination and size. In September 1996 the MoD ruled that they would be reduced from 64,000 servicemen to 48,500. It was later reported that the strength would be reduced to 34,000, and President Yeltsin had decreed that the airborne troops would no longer be a "means of the High Command." Three Airborne divisions were to be relegated to military district commanders. On May 20, 1997, two days before Minister of Defense Rodionov and Chief of the General Staff Samsonov were dismissed, President Yeltsin rescinded his earlier directive. He specified there would be no reduction in the Airborne strength and that he regards these forces "as a reserve of the Supreme Commander in Chief in peaceful times, the basis for peacekeeping operations." Units of Russian Airborne Forces were deployed outside of Russia proper such as the Russian peacekeeping brigade in Bosnia.

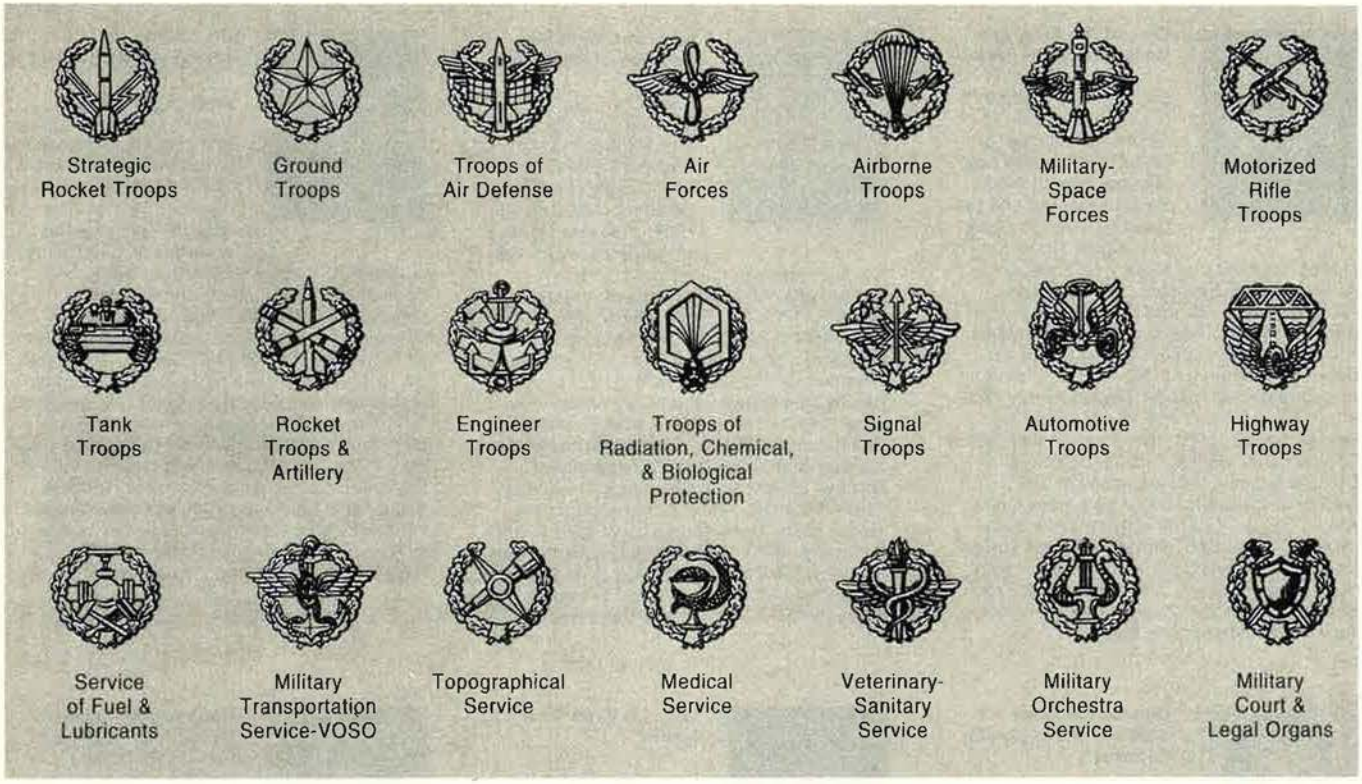
Structure of the Russian Armed Forces

As of July 1, 1997



RUSSIAN MILITARY EMBLEMS

In December 1995, Krasnaya Zvezda *published the 21 new emblems of the Russian Armed Forces. They depict four of the five services: Strategic Rocket Forces, Ground Forces, Troops of Air Defense, and Air Forces, plus service branches and rear services.*



Lineup of Russian Aerospace Power, 1996

Strategic Forces

Includes Deployable Russian and Deactivated Ukraine Strategic Forces

838–Intercontinental Ballistic Missiles
SS-18 (RS-20): 180. SS-19 (RS-18): 206. SS-24 (Silo) (RS-22): 56. SS-24 (Rail) (RS-22): 36. SS-25 (RS-12M): 360.

113–Long-Range Bombers
Tu-95(MS6) Bear-H6: 32. Tu-95(MS16) Bear-H: 56. Tu-160 Blackjack: 25.

440–Submarine-Launched Ballistic Missiles
SS-N-18 (RSM-50): 208. SS-N-20 (RSM-52): 120. SS-N-23 (RSM-54): 112.

26–Strategic Ballistic Missile Submarines
Delta-III (Kalmar): 13. Delta-IV (Delfin): 7. Typhoon (Akula): 6.

Air Defense Forces

945–Interceptors
MiG-23 Flogger: 240. MiG-25 Foxbat: 60. Su-27 Flanker: 325. MiG-31 Foxhound: 320.

25–Airborne Early Warning and Control Aircraft A-50 Mainstay: 25.

100–Strategic Antiballistic Missile Launchers
ABM-3 (SH-11) Gorgon: 36. ABM-3 (SH-08) Gazelle: 64.

2,700–Strategic Surface-to-Air Missile Launchers
SA-2 (S-75): 100. SA-3 (S-125): 25. SA-5 (S-200): 400. SA-10 (S-300P): 2,075. SA-12 (S-300V): 100.

Air Forces

130–Medium-Range Theater Bombers
Tu-22M Backfire: 130.

780–Tactical Counterair Interceptors
MiG-23 Flogger: 200. MiG-25 Foxbat: 21. MiG-29 Fulcrum: 461. Su-27 Flanker: 98.

722–Ground-Attack Aircraft
MiG-27 Flogger: 120. Su-24 Fencer: 347. Su-25 Frogfoot: 255.

371–Reconnaissance/ECM Aircraft
Tu-22MR Backfire: 20. MiG-25 Foxbat: 50. Su-24 Fencer: 80. Su-17 Fitter: 50. Il-22 Coot: 20. An-12 Cub: 125. An-26 Curl: 20. Tu-134 Crusty: 6.

50–Tanker Aircraft
Tu-16 Badger: 20. Il-78 Midas: 30.

976–Aircraft of Military Transport Aviation
An-2 Colt: 135. An-12 Cub: 200. An-22 Cock: 25. An-24 Coke: 25. An-32 Cline: 50. An-72/74/ 79: 25. An-124 Condor: 25. An-225 Cossack: 1. Il-76 Candid: 300. Tu-134/154 Careless: 15. YaK-40 Codling: 25. L-410UVP Turbolet: 150.

Naval Aviation

1–Aircraft Carriers
Kuznetsov–class CTOL ship: 1.

105–Bombers and Strike Aircraft
Tu-22M Backfire: 105.

50–Fighter/Interceptors
Su-27 Flanker: 30. Su-33 Flanker: 20.

140–Fighter/Attack Aircraft
Su-24 Fencer: 70. Su-25 Frogfoot: 40. MiG-27 Flogger: 30.

79–Reconnaissance/Electronic Warfare Aircraft
Tu-95 Bear: 24. Tu-22MR Backfire: 20. Su-24 Fencer: 25. Il-20 Coot: 3. An-12 Cub: 7.

311–Antisubmarine Warfare Aircraft
Tu-142 Bear-F: 55. Il-38 May: 36. Be-12 Mail: 50. Ka-25 Hormone-A: 75. Ka-27 Helix-A: 85. Mi-14 Haze-A: 10.

190–Helicopters
Ka-25 Hormone: 25. Ka-29 Helix: 25. Ka-31 Helix: 5. Mi-6 Hook: 10. Mi-8 Hip: 70. Mi-14 Haze:55.

Note: Increases in some categories from 1995's military aircraft lineup reflect equipment changes to maintain minimal readiness and force levels. In addition, new information on aircraft inventory types is also reflected in changes to individual aircraft numbers.

RUSSIAN DEFENSE MINISTRY As of July 1, 1997

Gen. of the Army Igor Dmitriyevich Sergeyev

Born 1938 in Ukraine. Russian. Russian Federation Minister of Defense since May 1997. Member of both the Security Council and the Defense Council. Black Sea Higher Naval School (1960). Dzerzhinskiy Military Engineering Academy (with distinction, 1973). Military Academy of the General Staff (1980). Sergeyev transferred from coastal artillery to Strategic Rocket Troops in 1960. Chief of Staff then Division Commander (1975). Chief of Staff and First Deputy Commander Rocket Army (1980–83). Deputy Chief of Main Staff of Strategic Rocket Troops (1983) then First Deputy (1985). Deputy CINC, Rocket Troops, USSR, for Combat Training (1989–December 1991). Deputy Commander, Strategic Forces, Joint Armed Forces, CIS (ID in April 1992), and Deputy Commander, Strategic Rocket Troops for Combat Training (January–August 1992). Commander in Chief, Strategic Rocket Troops, Russian Federation (August 1992). Promoted June 1996. Married, one son.

Gen. Col. Anatoliy Vasilyevich Kvashnin

Born 1946. Chief of the General Staff of the Armed Forces of the Russian Federation and First Deputy Minister of Defense since June 19, 1997. Probable Member of the Defense Council. Kurgan Engineering Institute (1969). Malinovskiy Military Academy of Armored Forces (1976). Military Academy of the General Staff (1989). Served in command posts in Czechoslovakia, Central Asia, and Belarus. Commander of a tank division (1978). First Deputy Commander, then Commander of an army (1989). Deputy Chief, then First Deputy Chief of the Main Operations Directorate of the General Staff (1992–95). Commander of Military Operations in Chechnya (December 1994—February 1995). Commander of the Troops of the North Caucasus Military District (February 1995), in charge of Russian Armed Forces in the Chechen conflict. Acting Chief of the General Staff from May 23. Promoted February 1995. Married with two sons.

Dr. Andrey Afanasyevich Kokoshin

Born 1945. Russian. State's Secretary (1996) and First Deputy Minister of Defense (since April 3, 1992). Member of the Defense Council. The only civilian in the top echelons of the Ministry of Defense. Deals with the State Duma and Federation Council, the military-industrial complex, and promotes arms sales abroad. Graduated from the Moscow Bauman Institute of Technology (1969). Was Deputy Director of the Institute of the United States and Canada of the Russian Academy of Sciences, specialist for military-political questions and national security. First Deputy Minister of Defense since April 1992. Doctor of sciences (history, 1982). Professor. Corresponding member, Russian Academy of Sciences. Author of many articles and books on disarmament, conversion, and military policy (*Army and Politics,* 1995). Reserve officer. Married, two children.

Gen. of the Army Vladimir Mikhaylovich Toporov

Born 1946. Russian. Deputy Minister of Defense, Russian Federation, since June 1992. Troubleshooter. Member of Commission on the Social Affairs of Servicemen and Others Discharged from Military Service and Their Families (December 1996). Odessa Artillery School (1968). Frunze Military Academy (1975). Military Academy of the General Staff (1984). Twenty years in Airborne Troops. Chief of Staff and First Deputy Commander, Far Eastern Military District (1989–91). Commander of Moscow Military District (September 1991). Coordinator for sales of military equipment through *Voentekh* (1992–95). Worked on Yeltsin's election campaign (1996). Promoted 1996. Married, two sons.

Gen. Lt. Vladimir Il'ich Isakov

Born 1950. Deputy Minister of Defense and Chief of Rear Services (Logistics) of the Armed Forces since June 30, 1997. Moscow Military School of Civil Defense, Military Academy of Rear Services and Transport, Military Academy of the General Staff. Deputy Commander of an army for Rear Services. Served in Afghanistan (1984–86). Chief of Staff of Rear Services, Western Group of Forces (Germany, 1991). Deputy CINC–Chief of the Rear, Western Group of Forces (Germany, 1992). Chief of Staff of the Rear of the Armed Forces (1997).

Gen. Col. Aleksandr Davydovich Kosovan

Born 1946. Deputy Minister of Defense and Chief of Construction and Billeting of Troops since April 1997. Novosibirsk Construction Engineering School. Deputy Commander of Troops of the Transcaucasus Military District for Construction and Billeting Troops (1988). First Deputy Chief of Construction and Billeting of Troops (1992).

A Year of Upheaval

Even by post-Soviet standards, 1997 has been chaotic for Russia's high command. The 1996 "Russian Military Almanac" listed seven top Ministry of Defense officials. One—Andrei Kokoshin—remains. The other six have either been sacked or arrested or have retired.

In addition, two of their replacements came and went so rapidly that they never made it into a single Russian Almanac. We present them here for the record.

Finally, Gen. of the Army V.M. Semenov, the Commander in Chief of Ground Forces, was relieved of command in April 1997. In July President Yeltsin issued a decree calling for abolition of the position. Semenov's replacement serves in an acting capacity.

Gen. of the Army, retired, Igor Nikolayevich Rodionov

Born 1936. Minister of Defense from July 1996–May 1997. Retired in December 1996, remaining Defense Minister as civilian. Member of the Security and Defense Councils. Orel Armored School (1957). Malinovskiy Military Academy of Armored Forces (1970). Military Academy of the General Staff (1980). Commander of Limited Contingent of Russian Forces in Afghanistan (1985). First Deputy Commander of Moscow Military District (1986). Advisor in Syria. Commander of the Transcaucasus Military District (1988). Commandant of the Academy of the General Staff (August 1989). Promoted October 1996. Married, one son.

Gen. of the Army Viktor Nikolayevich Samsonov

Born 1941. Chief of the General Staff of the Armed Forces of the Russian Federation and First Deputy Minister of Defense (October 1996–May 1997). Was Member of the Defense Council. Far Eastern Combined Arms Command School (1964). Frunze Military Academy (1972). Military Academy of the General Staff (1981). Commander of an army, Chief of Staff of the Transcaucasus Military District. Commander of Leningrad Military District (1990). Chief of the General Staff of Armed Forces, USSR–First Deputy Minister of Defense (December 1991). Chief of Staff–First Deputy CINC, Joint Armed Forces, CIS (1992). Chief of Staff for Coordination of Military Cooperation of Participating CIS States (1993). Promoted January 1996. Married, two children.

UNIFORMED CHIEFS OF THE MILITARY SERVICES

Commanders in chief are listed in the same order of service precedence as applied in the days of the Soviet Ministry of Defense. However, these commanders are no longer deputy ministers of defense.

Gen. Col. Vladimir Nikolayevich Yakovlev

Born 1954. Commander in Chief, Strategic Rocket Forces, since June 30, 1997. Kharkov Higher Military Command Engineering School (1976). Dzerzhinskiy Military Academy (command faculty) (with gold medal, 1985). Candidate of sciences (military). Commander of a missile regiment (1985). Deputy Commander (1989), Commander of a missile division (1991). Chief of Staff–First Deputy Commander of a missile army (1993). Commander of a missile army (1994). Chief of the Main Staff–First Deputy CINC of the Strategic Rocket Forces (December 1996). Married, two daughters.

Gen. of the Army Viktor Alekseievich Prudnikov

Born 1939. Russian. CINC of the Russian Air Defense Troops (since August 1992) and CINC of the Commonwealth Joint Air Defense Force since February 1995. Armavir School for Pilots (1959). Gagarin Military Air Academy (1967). Military Academy of the General Staff (1981). Over two years as fighter aviation regiment Commander (1971). Deputy Air Defense Division Commander (1973), Commander (1975), First Deputy Detached Air Defense Army Commander (1978–79 and 1981), then Commander (1983). Deputy Commander of a district for Troops of Air Defense. Commander of the Moscow Air Defense District (1989–91). CINC of the Troops of Air Defense and Deputy Minister of Defense, USSR (Aug. 25–Dec. 31, 1991). Commander, Troops of Air Defense (January 1992). Military Pilot First Class. Promoted in 1996. Married, two sons. (Lost younger son in 1991.)

Adm. Felix Nikolayevich Gromov

Born 1937. Russian. CINC of the Navy since August 1992. Pacific Ocean Higher Naval School (1959). Naval Academy (1983, by correspondence). Military Academy of the General Staff (1991, by examination). Pacific Fleet (1967–76). Chief of Staff of a training division, Leningrad Naval Base (1977–81). Chief of Staff, later Commander of an operational squadron (1981–84). First Deputy (1984–88), then Commander of the Northern Fleet (1988–92). First Deputy Commander of the Navy, CIS (March 1992). Promoted in 1996. Married, daughter and son.

Gen. of the Army Peter Stepanovich Deynekin

Born 1937. Russian. CINC of the Air Forces since October 1992. Balashov Military Aviation School for Pilots (1957). Gagarin Military Air Academy (1969). Military Academy of the General Staff (with gold medal, 1982). Bomber pilot. Deputy Air Army Commander (1982), then Commander (1985). Long Range Aviation Commander (1988). First Deputy CINC Air Forces (1990–91). CINC of the Air Forces and Deputy Minister of Defense, USSR (Aug. 31–Dec. 31, 1991). Commander, Air Forces of Joint Armed Forces, CIS (January–July 1992). Distinguished Military Pilot (1984). Promoted 1996. He is a doctor of sciences (military) and a professor. He has more than 5,000 hours' flying time. Married, three children.

Gen. Col. Anatoliy Andreyevich Golovnev

Born 1942. Acting CINC of the Ground Forces since November 1996. Moscow Higher Combined Arms Command School (1963). Frunze Military Academy (1973, gold medal). Military Academy of the General Staff (1980). Deputy Commander, Commander of a motorized rifle regiment, Chief of Staff–Deputy Commander of a motorized rifle division in the Far Eastern Military District (1973–78). Commander of a guards motorized rifle division, First Deputy Commander of a Guards Tank Army, Soviet Forces, Germany (1980). Commander of a tank army, Transcarpathian Military District. First Deputy Commander of the Moscow Military District (1988). Deputy CINC of the Ground Forces for Combat Training (1992). First Deputy CINC of the Ground Forces (1995). Promoted 1993.

Russian and US Grades

Naval grades in italics

Russia	US
Five Stars	
Marshal of the Russian Federation	General of the Army General of the Air Force *Admiral of the Fleet*
Four Stars	
General of the Army	General (USA)
General of the Army	General (USAF)
Admiral of the Fleet	*Admiral (USN)*
Three Stars	
General Colonel	Lieutenant General
Admiral	*Vice Admiral*
Two Stars	
General Lieutenant	Major General
Vice Admiral	*Rear Admiral (Upper Half)*
One Star	
General Major	Brigadier General
Rear Admiral	*Rear Admiral (Lower Half)*
O-6	
Colonel	Colonel
Captain (1st Class)	*Captain*
O-5	
Lieutenant Colonel	Lieutenant Colonel
Captain (2d Class)	*Commander*
O-4	
Major	Major
Captain (3d Class)	*Lieutenant Commander*
O-3	
Captain	Captain
Captain Lieutenant	*Lieutenant*
O-2	
Senior Lieutenant	First Lieutenant
Senior Lieutenant	*Lieutenant Jr. Grade*
O-1	
Lieutenant	Second Lieutenant
Lieutenant	*Ensign*

No Russian officer currently holds the rank of "Marshal of the Russian Federation." Four "Marshals of the Soviet Union" are alive today: S.L. Sokolov, V.G. Kulikov, V.I. Petrov, and D.T. Yazov. The first three are officially listed as "advisers to the Minister of Defense of the Russian Federation." Marshal Yazov was imprisoned for his role in the August 1991 coup attempt in Moscow but was released under the parliamentary amnesty granted in February 1994 to numerous political plotters.

External Deployments and Peacekeeping Forces

As of July 1, 1997

Angola (peacekeeping)	192
Armenia (group of forces)	4,500
Bosnia (peacekeeping)	2,600
Chechnya (occupation force)	41,000
Croatia (peacekeeping)	800
Cuba	800
Georgia/South Ossetia (peacekeeping)	3,000
Georgia (group of forces)	13,150
Iraq/Kuwait (peacekeeping)	15
Moldova/Dniester (peacekeeping)	4,900
Mongolia	500
Syria	50
Tajikistan (peacekeeping)	12,000
Vietnam	700
Western Sahara (peacekeeping)	27
Total	**84,234**

Strategic Nuclear Warheads, 1991–96

Nation	USSR 1991	1992	1993	1994	1995	1996
Russia		7,644	6,766	6,902	5,961	6,410
Ukraine		1,408	1,264	1,594	1,056	0
Kazakhstan		1,360	1,260	1,040	0	0
Belarus		54	54	36	18	0
Total	**11,159**	**10,466**	**9,344**	**9,572**	**7,035**	**6,410**

Strategic Nuclear Weapons of Russia and the Other Nuclear-Armed Former Soviet Republics, 1996

	Russia	Ukraine	Kazakhstan	Belarus	Total
ICBMs	747	91	0	0	**838**
Warheads	3,586	0	0	0	**3,586**
Bombers	69	44	0	0	**113**
Warheads	552	0	0	0	**552**
SSBNs	26	—	—	—	**26**
SLBMs	440	—	—	—	**440**
Warheads	2,272	—	—	—	**2,272**
Total vehicles	**1,256**	**135**	**0**	**0**	**1,391**
Total warheads	**6,410**	**0**	**0**	**0**	**6,410**

All data are current as of Dec. 31, 1996. On June 1, 1996, Ukraine returned all nuclear warheads to Russia. Adjustments in Russian strategic forces reflect START deployable delivery systems as noted in the January 1997 MOU on Data Notification.

It is thought by many analysts that all Delta I and Delta II SSBNs with their SS-N-8 SLBMs have been withdrawn from active deployments and are not counted as operational forces.

Zero indicates that that particular nuclear weapon type was deployed in that country at one time but is not deployed there now; a dash indicates that a weapon was never deployed in that country. All nuclear warheads have been returned from Ukraine, Belarus, and Kazakhstan.

Strategic Nuclear Forces, 1989–96: USSR and Russian Federation

	ICBMs	Long-range bombers	Submarine-launched ballistic missiles	Ballistic missile submarines
1989	1,378	150	954	70
1990	1,373	155	924	61
1991	1,393	141	912	59
1992	1,031	135	864	57
1993	884	74	788	52
1994	773	95	732	47
1995	671	69	524	33
1996	747	69	440	26

Moscow's Active-Duty Military Forces, 1989–96: USSR and Russian Federation

	Theater forces—ground, air, naval	Strategic forces—offensive/defensive	Command and rear services	Total forces
1989	2,690,000	890,000	1,450,000	**5,030,000**
1990	2,187,000	876,000	925,000	**3,988,000**
1991	2,150,000	755,000	650,000	**3,555,000**
1992	1,205,000	366,000	180,000	**1,751,000**
1993	1,082,000	230,000	100,000	**1,412,000**
1994	1,045,000	245,000	105,000	**1,395,000**
1995	923,500	279,200	176,000	**1,378,700**
1996	985,000	274,000	175,000	**1,434,000**

The active military population of the Soviet Union peaked in 1989, the year the Berlin Wall fell and the Warsaw Pact collapsed. Moscow initiated major force reductions. In late 1991, the USSR itself collapsed, leaving Russia with a portion of Soviet forces while large numbers of troops stayed in newly independent nations. Moscow's active-duty forces continued to decline during the first four years of the Russian Federation.

In this table, and in the table below, "strategic offensive forces" includes Strategic Rocket Forces and strategic nuclear elements of the Air Force and Navy. These tables do not include Border Guards and other nontraditional uniformed services.

According to MoD, Russia's armed services were staffed at 85 percent of authorized levels in 1996—a vast improvement over 1995's average manning level of 78 percent.

Active-Duty Military Population, 1996

As of Dec. 31, 1996

Force element	Authorized	Actual
Ground forces	800,000	670,000
Air forces	170,000	145,000
Naval forces	200,000	170,000
Strategic defensive forces	175,000	149,000
Strategic offensive forces	149,000	125,000
Command and rear services	206,000	175,000
Total	**1,700,000**	**1,434,000**

The USSR collapsed in late 1991. Russia retained all of the sea-based strategic weapons. Russia also retained most of the ICBM and bomber forces, though a significant number of these weapons came under control of Ukraine, Kazakhstan, and Belarus. None of the forces of these nations are counted in this table after 1991.

Gallery of Far East/Pacific Airpower

By John W.R. Taylor and Kenneth Munson

Attack Aircraft

A-4 Skyhawk

Principal Skyhawk operator in the region is the Republic of Singapore Air Force, which recently applied a succession of upgrades to survivors of the 75 surplus USN A-4s it acquired from 1974. All but the first eight were remanufactured by Singapore Aerospace. Phase I involved reengining with an F404 turbofan; Phase II upgraded the avionics with head-up/head-down displays, LN-93 INS, and other new equipment, leading to initial redesignation as **A-4S-1 Super Skyhawks**, before full upgrading as **A-4SU**s. About 50 are flown by Nos. 142, 143, and 145 Sqs. from Tengah. Also in service are 18 **TA-4SU** conversion trainers, unique in having separate tandem cockpits.

The Royal New Zealand Air Force has 14 **A-4K**s and five **TA-4K**s, upgraded with new wing spars, an AN/APG-66(NZ) radar, HUD/HDDs, a digital flight-control system, radar warning receivers, and a chaff/flare system, plus the capability of carrying Mavericks, AIM-9L Sidewinders, and GBU-16 laser-guided bombs. Serving with No. 75 Sq. at Ohakea, they form, with the MB-339s of No. 14 Sq., the small attack element of the RNZAF. Additional upgrade programs have included self-protection jammers, a laser designator, and (later) GPS navigation and new antiship missiles, to permit a further decade or more of useful service. With No. 12 Sq. of the Indonesian Air Force having recently re-equipped with Hawks, No. 11 Sq., with about 25 ex-Israeli **A-4E**s and four **TA-4** trainers, constitutes that country's last remaining Skyhawk unit.

Most of the Royal Malaysian Air Force's 30 **A-4PTM**s and five **TA-4PTM**s (for Peculiar to Malaysia) are currently in store pending disposal. Earlier, they were upgraded from ex–USN A-4C/Ls with an angle rate bombing set, AGM-65 Maverick ASM compatibility, and AIM-9 Sidewinder AAMs. However, six of the single-seaters are being retained as temporary "buddy" refueling tankers for the new Hawks of No. 6 Sq., pending the conversion of two RMAF C-130Hs to the tanker role. *(Data for A-4SU.)*

Contractors: McDonnell Douglas, USA; Singapore Aerospace (A-4SU).
Power Plant: one General Electric F404-GE-100D turbofan; 10,800 lb thrust.
Dimensions: span 27 ft 6 in, length 41 ft 8⅝ in, height 14 ft 11⅞ in.
Weights: empty 10,250 lb, gross 22,500 lb.
Performance: max speed at S/L 701 mph, ceiling 40,000 ft, T-O run 4,000 ft, landing run 4,500 ft, range with max weapon load 720 miles, with max internal/external fuel 2,356 miles.
Accommodation: pilot only, on zero/zero ejection seat.
Armament: two 20-mm guns in wing roots. Five external stations (one under fuselage, two under each wing) for bombs, rockets, gun pods, and (excl outboard wing points) drop tanks.

A-37B Dragonfly

Only South Korea, in this part of the world, still operates this small counterinsurgency aircraft based on USAF's T-37B Tweet trainer. Its Air Force still has about 25 of the 27 A-37Bs acquired in 1976 to replace its F-86D Sabres. Their J85 turbojets, giving nearly three times the power of the T-37's 1,025 lb thrust J69s, permit a better than doubled gross weight. Maximum speed and range are considerably greater. In addition, the A-37B has provision for in-flight refueling and can carry up to 4,100 lb of weapons and stores under wing.

Contractor: Cessna Aircraft Co., USA.
Power Plant: two General Electric J85-GE-17A turbojets; each 2,850 lb thrust.
Dimensions: span over tiptanks 35 ft 10½ in, length 29 ft 3½ in, height 8 ft 10½ in.
Weights: empty 6,211 lb, gross 14,000 lb.
Performance: max speed at 16,000 ft 507 mph, ceiling 41,765 ft, T-O run 1,740 ft, landing run 1,710–4,150 ft, max payload range 460 miles, ferry range 1,012 miles.
Accommodation: crew of two, side by side, on ejection seats.

A-4SU Skyhawk, Republic of Singapore Air Force *(Paul Jackson)*

AT-3 Tsu-Chiang, Taiwanese Air Force

F-111C, Royal Australian Air Force *(RAAF)*

Armament: one 7.62-mm Minigun in front fuselage. Eight under-wing stations for bombs, rocket packs, gun pods, cluster weapons, or other stores.

AT-3 Tsu-Chiang

The first of two **AT-3** prototypes flew Sept. 16, 1980, and most of the 60 production AT-3s delivered in 1984–89 were for use in their designed role of jet basic and advanced trainer. However, 20 were later converted for close air support duties to equip one Taiwanese Air Force squadron: No. 35 at Kangshan. Two others were modified for more capable offensive roles in 1989, both receiving a Smiths Industries nav/attack system and a Westinghouse AN/APG-66 fire-control radar. One, redesignated **AT-3A Lui-Meng**, was fitted with a single-seat cockpit, 30-mm under-fuselage gun, and a pair of Hsiung-Feng II antiship missiles; the two-seat **AT-3B** prototype remained in trainer configuration. Neither of these versions entered production. *(Data for basic standard AT-3.)*

Contractor: Aero Industry Development Center, Taiwan.
Power Plant: two AlliedSignal TFE731-2-2L turbofans; each 3,500 lb thrust.
Dimensions: span 34 ft 3¾ in, length 42 ft 4 in, height 14 ft 3¾ in.
Weights: empty 8,500 lb, gross 17,500 lb.
Performance: max speed at 36,000 ft 562 mph, at S/L 558 mph, ceiling 48,000 ft, T-O run 1,500 ft, landing run 2,200 ft, range on internal fuel 1,415 miles.
Accommodation: crew of two, in tandem.
Armament: provision for semirecessed machine gun pack under fuselage. Centerline pylon, two under each wing, and wingtip launch rails, for 6,000 lb of stores incl rocket packs, cluster and fire bombs, bombs, flare dispensers, and (on wingtips) close-range AAMs.

F-111C/G and RF-111C

Thirty-six of the 43 F-111s received by Australia are currently in service and are intended to continue until at least 2020. Deliveries of the first Royal Australian Air Force order for 24 **F-111C**s (RAAF designation **A8**) began in 1973. These were similar to USAF's F-111A but had the longer-span wings of the FB-111A and RAAF–specified avionics; four were converted to **RF-111C** strike/reconnaissance configuration, retaining attack capability but equipped with a Honeywell AN/AAD-5 infrared linescan, three film cameras, and a TV camera. Four ex–USAF F-111As were acquired in 1982 as attrition replacements, after refit with F-111C avionics. Capability of the F-111Cs was enhanced by purchase of 10 AN/AVQ-26 Pave Tack laser designation and ranging pods, carried on a rotating cradle in the aircraft's internal weapons bay, and more are now being acquired to equip all the F-111Cs.

Seventeen F-111Cs remain in RAAF service with Nos. 1 and 6 Sqs. at Amberley, near Brisbane, the former unit also accommodating the four RF-111Cs. Replacement of their analog avionics (Texas Instruments terrain-following radar, General Electric attack radar, com/nav, flight-control, and weapon delivery systems) with digital systems began some three years ago and is continuing. Meanwhile, in September 1993 Amberley received the first two of 15 ex–USAF **F-111G**s—which already have digital avionics—to augment the existing fleet. Allocating 13 of these to No. 6 Sq. brought the operational units back to full strength; the other two Gs provide spares and attrition backup. Over the next five years the RAAF will reengine the F/RF-111C fleet with more powerful TF30-P-109 turbofans; these will then also replace the 20,350 lb thrust P-107s in the F-111Gs. To extend their strike reach, the F-111s are also to get 57-mile-range Popeye standoff ASMs. *(Data for F-111C.)*

Contractor: Lockheed Martin, USA.
Power Plant: two Pratt & Whitney TF30-P-103 turbofans initially; each 18,000 lb thrust with afterburning. Currently refitting with 20,840 lb thrust TF30-P-109 turbofans.
Dimensions: span 70 ft 0 in spread, 33 ft 11 in swept, length 33 ft 11 in, height 17 ft 1½ in.
Weights: empty 45,200 lb, gross 92,500 lb.
Performance (P-103 engines): max speed at 40,000 ft Mach 2.2, ceiling more than 60,000 ft, T-O and landing distance approx 3,000 ft, max range (internal fuel) more than 3,800 miles.
Accommodation: crew of two, side by side in zero/zero escape module.
Armament: internal weapons bay used for Pave Tack pod; eight under-wing stations (inboard four pivoting as wings sweep) for up to 30,000 lb of free-fall or guided bombs, Harpoon or HARM ASMs, or AGM-142 Popeye standoff missiles.

Hawk

Purely training versions of the BAe Hawk are described in the "World Gallery of Trainers" (*Air Force* Magazine, December 1996). Export variants have had progressively greater capability for light attack, air defense, and reconnaissance; dedicated combat versions sold in the Far East/Pacific region are as follows:

50 Series. Combat-capable tandem two-seat trainer; 5,200 lb thrust Adour 851 turbofan; gross weight 16,200 lb. Indonesian Air Force received 20 Mk 53s in 1980–84, of which 14 continue to equip the Java-based No. 103 Sq.

60 Series. Development of 50 Series; 5,700 lb thrust Adour 861; gross weight 20,061 lb; modified wing leading edges and flaps, strengthened landing gear, and provision for wingtip AAMs. Disposable load increased to 6,614 lb and range by 30 percent; improved field performance, acceleration, rate of climb, and turn rate. Twenty Mk 67s (hybrids of Series 60/100) delivered 1992–93 for No. 216 Tactical Control Sq., South Korean Air Force; 17 remain.

100 Series. Enhanced ground-attack development of 60 Series. Basically two-seater but flown solo on combat missions. Adour 871 turbofan. New combat wings for improved lift and maneuverability. Taller tail fin. Provision for extended nose for FLIR and laser range finder. Head-up display/weapon aiming computer, radar warning system, HOTAS (hands on throttle and stick) controls, multipurpose color CRTs, provision for ECM. External load and max T-O weight as for 60 Series. Nine of the 10 Mk 108s, delivered to Malaysia 1994–95, equip No. 3 Flying Training Center at Kuantan; eight Mk 109s to Indonesia as conversion trainers for Mk 209. Brunei negotiating for about 10 Series 100/200.

200 Series. Single-seat multirole combat aircraft; 80 percent airframe commonality with Series 100. Modified wing leading edge; new front fuselage with provision for AN/APG-66H radar, FLIR, and laser range finder. All five pylons cleared for 8g maneuvers with 1,100-lb loads. Malaysia has 18 Mk 208s with wingtip Sidewinders (also fitted to its Mk 108s) and flight refueling nose probe, delivered 1994–95, which equip Nos. 6 and 9 Sqs. Deliveries currently in progress of 32 Mk 209s ordered by Indonesia for Nos. 1 and 12 Sqs. *(Data for Series 200.)*

Contractor: British Aerospace, UK.

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

Dimensions: span 30 ft 9¾ in, length 37 ft 2½ in, height 13 ft 6¾ in.

Weights: empty 9,810 lb, gross 20,061 lb.

Performance: never-exceed speed at height Mach 1.2, max speed at S/L 621 mph, ceiling 45,000 ft, T-O run 2,070 ft, landing run 1,960 ft, radius of action 120–765 miles.

Accommodation: pilot only, on zero/zero ejection seat.

Armament: four under-wing pylons for bombs of up to 2,000 lb, pods of 18 x 2.75-in air-to-surface rockets, Sea Eagle antiship missiles, Sky Flash, Sidewinder, or other AAMs, laser-guided munitions, reconnaissance or EW pods. Wingtip Sidewinders optional. Max external load 6,614 lb.

J-5

Jet fighter production in China began when Moscow provided design drawings of the MiG-17F, two completed examples, 15 knocked-down kits, forgings and raw materials for 10 aircraft, and parts for 15 more. The first of 757 MiG-17s built subsequently at Shenyang flew July 19, 1956, under the designation **J-5**. The basic J-5 is equivalent to the MiG-17F (NATO "Fresco-C") day fighter. The **J-5A** is the Chinese–built MiG-17PF ("Fresco-D"), with Izumrud radar. Possibly around 400 of these elderly aircraft remain available to China's Air Force and Navy, most likely in a combat training role. At least 100 others are deployed by the North Korean Air Force for ground attack. *(Data for J-5.)*

Contractor: Shenyang Aircraft Corp., China.

Power Plant: one Liming WP5 turbojet (Klimov VK-1F derivative); 7,450 lb thrust with afterburning.

Dimensions: span 31 ft 7 in, length 37 ft 3¼ in, height 12 ft 5¾ in.

Weights: empty 8,664 lb, gross 13,393 lb.

Performance: max speed at 10,000 ft 711 mph, ceiling 54,450 ft, T-O run 1,935 ft, landing run 2,690–2,790 ft, range 870 miles.

Accommodation: pilot only, on ejection seat.

Armament: one 37-mm N-37D and two 23-mm NR-23 guns in nose; under-wing pylons for four eight-rocket packs or total of 1,100 lb of bombs.

J-6

China's counterpart of the MiG-19, the **J-6** outnumbers any other type of aircraft in its Air Force. Well over 3,000 were delivered from Shenyang and Nanchang, far exceeding the total built in the former USSR. Most are single-seat, similar to the MiG-19SF day fighter (NATO "Farmer-C") and MiG-19P limited all-weather fighter ("Farmer-D"). The Guizhou aircraft factory delivered a small number of **J-6As**, with all-weather radar, PL-2 IR-homing AAMs similar to the Russian AA-2 ("Atoll"), a rocket ejection seat, and other changes. Around 2,500 J-6/6As are believed to serve with China's Air Force and 250 with its Navy, for both interception and ground attack. Shenyang also built tactical reconnaissance **JZ-6**s, with an IR linescan/camera pack in the front fuselage, and 634 **JJ-6** tandem-seat fighter-trainers. Perhaps 100 JZ-6s and 200 JJ-6s remain in service.

North Korea's Air Force operates about 100 J/JJ-6s (export designations **F-6** and **FT-6**). *(Data for J-6 day fighter.)*

Contractors: Shenyang Aircraft Corp., Nanchang Aircraft Manufacturing Co., and Guizhou Aircraft Industrial Corp., China.

Power Plant: two 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 832 mph, ceiling 58,725 ft, T-O run 2,953 ft, landing run with brake chute 1,970 ft, combat radius with two drop tanks 426 miles, max range on internal fuel 863 miles.

Accommodation: pilot only, on ejection seat.

Armament: three 30-mm NR-30 guns, in nose and each wing root. Two pylons under each wing, inboard of hardpoint for external 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.

Hawk Mk 208, Royal Malaysian Air Force

MB-339AM, Royal Malaysian Air Force *(Paul Jackson)*

JH-7

At least one prototype of this advanced Chinese warplane flew for the first time in late 1988 or early 1989. In much the same role class as Russia's Sukhoi Su-24 "Fencer," the **JH-7** was designed for a main all-weather interdictor/strike function in China's Air Force (with a secondary role of air defense interceptor) and as a maritime strike aircraft with its Navy. Design features include shoulder-mounted swept wings and an all-moving tailplane; avionics are said to include terrain-following radar.

It is believed that service entry was originally scheduled for the early 1990s, but this has been delayed for reasons as yet unknown. However, evidence emerged earlier this year that a number of JH-7s were undergoing operational evaluation with one or more units of China's Navy. These are thought to be from a preproduction batch of possibly 24 aircraft. Some unconfirmed reports have indicated that Russian engines may be imported and that China's Air Force may have lost interest in the JH-7 following its acquisition of Su-37s.

Contractor: Xian Aircraft Manufacturing Co., China.

Power Plant (prototypes): two Xian WS9 (license Rolls-Royce Spey Mk 202) turbofans; each 20,515 lb thrust with afterburning. Intended production engines believed to be Liming turbofans of 31,085 lb afterburning thrust.

Dimensions: span 42 ft 0 in, length (excl nose probe) 68 ft 10¾ in, height 20 ft 4⅞ in.

Weights: max weapon load 11,023 lb, gross 60,439 lb.

Performance: max speed at height Mach 1.6–1.7, ceiling (clean) 50,850 ft, T-O run 3,020 ft, landing run 3,445 ft, combat radius 559 miles.

Accommodation: crew of two, on tandem zero/zero ejection seats.

Armament: 23-mm twin-barrel gun in nose. Four under-wing hardpoints for various external weapons (incl C-801 sea-skimming antiship missiles in maritime configuration), drop tanks, or other stores; rail for close-range AAM at each wingtip.

MB-339A/C

First flown Dec. 17, 1985, the MB-339C is an upgraded model of Aermacchi's earlier **MB-339A**, which equips the Italian and several foreign air forces as a basic/advanced trainer and ground-attack aircraft (see "World Gallery of Trainers" in the December 1996 *Air Force* Magazine). Malaysia's No. 3 Flying Training Center has 11 AMs (of an original 13, delivered from 1983) for advanced and weapons training; these could provide a light attack capability if required. The **MB-339C** features a more powerful engine, modified nose shape, larger permanent wingtip fuel tanks, and a digital nav/attack system with a HUD in each cockpit, enabling either crew member to instigate air-to-ground weapon delivery. In May 1990, the Royal New Zealand Air Force ordered 18 MB-339Cs (known locally as **MB-339CB**s) to replace its elderly BAe Strikemasters. Deliveries began in March 1991, and the 17 remaining equip No. 14 Sq. at Ohakea, one of the RNZAF's two light attack squadrons. *(Data for MB-339C.)*

Contractor: Aermacchi, Italy.

Power Plant: one Rolls-Royce Viper Mk 680-43 turbojet; 4,400 lb thrust.

Dimensions: span 36 ft 9¾ in over tiptanks, length 36 ft 10½ in, height 13 ft 1¼ in.

Weights: empty 7,562 lb, gross 10,983–14,000 lb.

Performance (at 10,983 lb clean gross weight): max speed at S/L 558 mph, at 30,000 ft 508 mph, ceiling 46,700 ft, T-O run 1,610 ft, landing run 1,510 ft, range 1,266 miles with two 86-gal drop tanks and 10 percent reserves.

Accommodation: two crew in tandem, on zero/zero ejection seats.

Armament: three hardpoints under each wing for up to 4,000 lb of stores incl 12.7-mm or 30-mm gun pods (inboard pair only), single or cluster bombs, rocket launchers, ASMs or antiship missiles, or (outboard pair only) AAMs.

MiG-23

The only confirmed MiG-23 operator in the Pacific/Far East region is North Korea, which received the first of some 60 variable-geometry single-seat interceptors and a number of **MiG-23UB** (NATO "Flogger-C") tandem two-seat fighter-trainers in 1984—the first non–Warsaw Pact nation to do so. The first small batch consisted of **MiG-23MF**s ("Flogger-Bs"), with R-23R ("Apex") AAMs instead of the less-effective R-3S ("Atoll") of the Air Force's earlier MiG-21s, a 23-mm twin-barrel GSh-23 gun, Sapfir-23D ("High Lark") radar with a search range of 43 miles and tracking range of 34 miles, under-nose IR sensor pod, and RWR as standard. They were followed by a larger number of **MiG-23ML**s ("Flogger-Gs"), with R-35 turbojet in place of the MF's 27,540 lb thrust R-29-300, lighter-weight Sapfir-23ML ("High Lark II") radar, and distinctive small dorsal fin. Estimated current strength is 45 single-seaters and 10 two-seaters. *(Data for MiG-23ML.)*

Contractor: Mikoyan OKB, Russia.

Power Plant: one Soyuz/Khachaturov R-35-300 turbojet; 28,660 lb thrust with afterburning.

Dimensions: span 45 ft 9¾ in spread, 25 ft 6¼ in swept, length incl nose probe 54 ft 9⅞ in, height 15 ft 9¾ in.

Weights: empty 22,485 lb, gross 32,405–39,250 lb.

Performance: max speed at height Mach 2.35, at S/L Mach 1.1, ceiling 60,700 ft, T-O run 1,640 ft, landing run 2,460 ft, combat radius with six AAMs 715 miles, with 4,410 lb of bombs 435 miles.

Accommodation: pilot only, on zero/zero ejection seat.

Armament: one twin-barrel 23-mm GSh-23L gun, with 200 rds, in belly pack; six external hardpoints for up to 6,615 lb of R-60T ("Aphid") and R-23R/T ("Apex") AAMs, bombs, rocket packs, or other stores.

OV-10 Bronco

Until late last year, Indonesia still operated 12 of the 16 **OV-10F** Bronco counterinsurgency aircraft that it received in 1976–77 to replace F-51D Mustangs. They had been used during campaigns to subdue unrest in parts of the world's fifth most populous nation but were withdrawn as No. 1 Sq. began to receive its Hawk Mk 109/209s. This has left the Philippine Air Force, which acquired 24 ex–USAF **OV-10As** as AT-28D Trojan replacements in the early 1990s, as the only OV-10 operator in the region. Two PAF Broncos have been lost; the remainder equip No. 16 Sq. of its 15th Strike Wing at Daniel Atienza AB for counterinsurgency duties. *(Data for OV-10A.)*

Contractor: Rockwell, USA.

Power Plant: two AlliedSignal T76-G-416/417 turboprops; each 715 ehp.

Dimensions: span 40 ft 0 in, length 41 ft 7 in, height 15 ft 2 in.

Weights: empty 6,969 lb, gross 9,908–14,444 lb.

Performance: max speed at S/L 281 mph, ceiling 24,000 ft, T-O run (9,908 lb gross weight) 740 ft, landing run 740 ft, combat radius with 3,600-lb weapon load 228 miles.

Accommodation: crew of two, in tandem.

Armament: two short sponsons each house two 0.30-in M60C machine guns, with 500 rds per gun. Four pylons under sponsons each have a capacity of 600 lb; a centerline fifth pylon can carry 1,200 lb. Stores can incl bombs, fire bombs, cluster bombs, rocket packs, 7.62-mm Minigun and 20-mm gun pods, flares, smoke canisters, and Sidewinder AAMs.

Q-5/A-5

The original **Q-5**, a much-redesigned attack version of the J-6 fighter, first flew June 4, 1965. It had a 13-ft internal bay for two 551-lb or 1,102-lb bombs, with two more under the fuselage, plus four under-wing stations for other weapons, including early Chinese nuclear bombs. In the **Q-5 I**, which replaced it in production

from late 1981, the bomb bay was blanked off and used for additional fuel, all four fuselage bombs being hung underneath. Other features included improved engines and pilot seat and a relocated brake chute. The **Q-5 IA,** approved for production in January 1985, had two more under-wing stations (increasing external load by 1,102 lb), pressure refueling, improved warning and ECM systems, and other refinements. Current version in Chinese service is the **Q-5 II,** similar to the IA but fitted (or retrofitted) with a radar warning receiver. Some 500–600 Q-5s of all versions are thought to be in Chinese service, including about 100 with its Naval Air Force, and limited production to replace attrition may be continuing. The latter can carry two under-fuselage torpedoes or C-801 antiship missiles.

The first Far East/Pacific export customer was North Korea, which received 40 Q-5 IAs in the 1980s. *(Data for Q-5 IA.)*

Contractor: Nanchang Aircraft Manufacturing Co., China.

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

Dimensions: span 31 ft 9 in, length (incl nose probe) 51 ft 4¼ in, height 14 ft 2¾ in.

Weights: empty 14,054 lb, gross 20,913–26,080 lb.

Performance (clean): max speed at 36,000 ft 740 mph, at S/L 758 mph, ceiling 52,000 ft, T-O run 2,300–2,460 ft, landing run with brake chute 3,480 ft, combat radius with max external stores 248–373 miles, range with max internal/external fuel 1,240 miles.

Accommodation: pilot only, on low-speed/zero height ejection seat.

Armament: one 23-mm Norinco 23-2K gun in each wing root (100 rds/gun); 10 external stations (four under fuselage, three under each wing) for more than 20 different combinations of bombs, rockets, antiship or AAMs, ECM pods, or drop tanks, up to max load of 4,410 lb.

Su-7 and Su-20/22

The 923d "Yen The" and 937th "Hau Giang" Fighter-Bomber Regiments of Vietnam's Air Force, based at Tho Xuan, fly about 34 variable-geometry **Su-22M-3**s (NATO "Fitter-Js"), plus half a dozen tandem two-seat **Su-22UM-3K** ("Fitter-G") trainers. Their primary mission is ground attack, but some aircraft carry reconnaissance pods.

The Su-22M-3 is supersonic at both high and low altitude. It has a laser range finder in its air intake centerbody but no fire-control radar. Its equipment includes a radar warning system with 360° cover, chaff/flare and decoy dispensers. Only the outer 13 ft 9 in of each wing is pivoted, with manually selected sweep angles of 30°, 45°, and 63°. Like the Su-22s supplied to North Korea, it has a Soyuz/Khachaturov R-29BS-300 turbojet; but North Korea also has some earlier **Su-20**s ("Fitter-Cs") with 24,800 lb thrust Saturn/Lyulka AL-21F-3 engine, as well as about 30 original fixed-wing **Su-7BMK**s ("Fitter-As"). *(Data for Su-22M-3.)*

Contractor: Sukhoi OKB, Russia.

Power Plant: one Soyuz/Khachaturov R-29BS-300 turbojet; 25,350 lb thrust with afterburning.

Dimensions: span 44 ft 10½ in spread, 32 ft 10¾ in swept, length incl probes 62 ft 5 in, height 16 ft 10 in.

Weight: empty approx 23,900 lb, gross 42,990 lb.

Performance: max speed at height Mach 1.74, at S/L (clean) Mach 1.1, ceiling 49,865 ft, T-O run (clean) 4,925 ft, landing run 3,610 ft, max range with drop tanks 870 miles at S/L, 1,585 miles at height.

Accommodation: pilot only, on zero/zero ejection seat.

Armament: two 30-mm NR-30 guns, each with 80 rds, in wing roots; up to 8,820 lb of external stores, incl Kh-23 ("Kerry") and antiradiation Kh-28 ("Kyle") ASMs, rocket packs, and bombs.

Su-25

North Korea's ground-attack force is spearheaded by 18 **Su-25K** (NATO "Frogfoot-A") single-seat, close-support aircraft and a pair of **Su-25UBK** ("Frogfoot-B") tandem-seat operational conversion and weapons trainers. Deliveries began in 1988. First flown in 1975 and blooded in Afghanistan in the 1980s, the Su-25 was designed to battle through to its targets at low level, with a heavy weapon load, against heavy opposition. The pilot sits in an armored cockpit of welded titanium almost an inch thick, which, with other survivability features, accounts for 7.5 percent of the aircraft's normal takeoff weight. The engines, based on the MiG-21MF's well-proven R-13 turbojet, will run on any fuel likely to be found in a combat area, including MT gasoline and diesel oil. *(Data for Su-25K.)*

Contractor: Sukhoi OKB, Russia.

Power Plant: two Soyuz/Gavrilov 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 level speed at S/L 606 mph, max attack speed, air brakes open, 428 mph, ceiling 22,965 ft, T-O run typically 1,970 ft, with max weapons from unpaved strip 3,935 ft, landing run 1,315–1,970 ft, range with max combat load at S/L 466 miles, at height 776 miles.

Accommodation: pilot only, on zero/zero ejection seat.

Armament: one AO-17A twin-barrel 30-mm gun in port side of nose, with 250 rds. Eight under-wing pylons for 9,700 lb of air-to-surface weapons, incl Kh-23 ("Kerry"), Kh-25 ("Karen"), and Kh-29 ("Kedge") ASMs, SPPU-22 pods for 23-mm guns with twin barrels that pivot downward, 57-mm to 330-mm rockets, laser-guided rocket-boosted bombs, and 1,100-lb incendiary, antipersonnel, and other cluster bombs. Two small outboard pylons for R-3S ("Atoll") or R-60 ("Aphid") self-defense AAMs.

Bombers and Maritime

E-2C Hawkeye

With the decision earlier this year to upgrade its 13 Group 0 Hawkeyes to Group II standard, the Japan Air Self-Defense Force will bring its E-2C fleet, acquired between 1982 and 1993, up to the same equipment level as the US Navy's standard carrier-based Airborne Early Warning and Control aircraft. This combines a Randtron AN/APA-171 radar, with antennas that provide both radar and IFF data and a General Electric AN/APS-145 radar processing system, enabling the E-2C to detect and assess more than 2,000 targets over a radius of more than 345 miles, from 30,000 ft, and to control more than 40 intercepts simultaneously. Smaller targets, such as cruise missiles, can be detected at well over 100 miles range, the movement of ships and land vehicles can be monitored, and friendly aircraft can be helped to elude enemy defenses by a Litton AN/ALR-73 passive detection system that locates hostile radar emitters over twice the range of the radar. Most of the upgrade work will be done in Japan by Kawasaki and Toshiba.

Two smaller Hawkeye fleets operate in the region and, like those of Japan, are land based. Singapore received four Group 0 E-2Cs, with AN/APS-138 radar, in 1987. Taiwan received four Group II aircraft in 1995. *(Data for Group II E-2C.)*

Contractor: Northrop Grumman, USA.

Power Plant: two Allison T56-A-427 turboprops; each 5,100 shp.

Dimensions: span 80 ft 7 in (folded 29 ft 4 in), length 57 ft 9 in, height (rotodome raised) 18 ft 4 in.

Weights: empty 40,484 lb, gross 54,426 lb.

Performance: max cruising speed 374 mph, patrol speed 299 mph, ceiling 37,000 ft, T-O run 1,850 ft, landing run 1,440 ft, time on station 200 miles from base 4 hr 24 min, endurance 6 hr 15 min.

Accommodation: crew of five, comprising pilot, copilot, combat information center officer, air control officer, and radar operator.

Armament: none.

F27/F50 Maritime and Enforcer

The **F27 Maritime** is an unarmed reconnaissance variant of the Fokker F27 Friendship transport. When the F27 was succeeded by the upgraded F50, with more powerful PW125B engines instead of 2,050 shp Darts, Fokker continued to offer unarmed **F50 Maritime Mk 2**s, for coastal surveillance or search and rescue, and **Maritime Enforcer Mk 2**s for antisubmarine warfare (ASW), antisurface vessel (ASV), or armed surveillance missions, weapon selection and installation being done by the operator rather than the manufacturer.

Singapore's Air Force has five Maritime Enforcer Mk 2s, with a 230-mile-range Texas Instruments APS-134(V)7 ventral search radar, MAD (magnetic anomaly detector), FLIR imaging turret, ESM, and other specialized equipment. Its No. 121 Sq. achieved initial operational capability (IOC) with three aircraft in September 1995. The three F-27 Maritimes acquired by the Philippine Air Force from mid–1982 are now reduced to a single example serving with the 221st Airlift Sq., and up to six new maritime patrol aircraft are a high PAF priority. *(Data for Maritime Enforcer Mk 2.)*

E-2C Hawkeye, Japan MSDF *(Katsumi Hinata)*

Contractor: Fokker Aircraft, Netherlands.

Power Plant: two Pratt & Whitney Canada PW125B turboprops; each 2,500 shp.

Dimensions: span 95 ft 1¾ in, length 82 ft 10 in, height 27 ft 3½ in.

Weights: empty 32,620 lb, gross 45,900–47,500 lb.

Performance: normal cruising speed at 20,000 ft 298 mph, typical search speed 172 mph, ceiling 25,000 ft, T-O distance 5,000 ft, landing distance 2,500 ft, max radius of action with two under-wing drop tanks 1,956 miles; max time on station 14 hr 20 min.

Accommodation: flight crew of two, plus six systems operators.

Armament: Fokker-installed stores management system only: weapons (selected and fitted by operator) can be carried on two fuselage stations and three under each wing, and can incl two or four homing torpedoes and/or depth bombs for ASW, or four AGM-84D Harpoon antiship ASMs.

H-5/Il-28

After receiving up to 500 **Il-28** bombers (NATO "Beagle") from the Soviet Union, China decided to build the aircraft in series at Harbin as the **H-5** (Hongzhaji-5: "Bomber 5"). About 40 percent of the airframe was redesigned, and many components, including the tail gun turret, were made common with those of the H-6 (Tu-16). The radar, bombsight, and IFF were new. A prototype flew for the first time Sept. 25, 1966; production began seven months later. Although virtually obsolete, at least 200 H-5s and Il-28s, including up to 40 **H-5Z** reconnaissance variants, are believed to still be used for training in China's Air Force, plus about 100 serving as torpedo bombers with its Navy. North Korea may still have up to 50 H-5s. *(Data for Il-28; H-5 generally similar.)*

Contractors: Ilyushin OKB, former USSR; Harbin Aircraft Manufacturing Corp., China.

Power Plant: two Klimov VK-1A turbojets, each 5,952 lb thrust. (Chinese WP5 equivalent in H-5.)

Dimensions: span 70 ft 4½ in, length 57 ft 11 in, height 21 ft 11¾ in.

Weights: empty 28,417 lb, gross 46,738 lb.

Performance: max speed at 14,760 ft 560 mph, ceiling 40,350 ft, T-O run 2,870–3,775 ft, landing run 3,840 ft, range 1,490 miles.

Accommodation: crew of three, comprising pilot, navigator/bombardier in nose compartment, and radio operator/gunner in tail turret.

Armament: two 23-mm NR-23 guns, each with 100 rds, in nose; two more, each with 225 rds, in tail turret. Up to 6,614 lb of stores in internal weapons bay, typically four 1,100-lb or eight 550-lb bombs. Naval version carries one large or two smaller torpedoes, mines, or depth charges.

H-6

China's strategic bomber force, now in serious need of modernization, consists of around 120 license-built copies of the intermediate-range Russian Tupolev Tu-16 (NATO "Badger"). The **H-6** Chinese prototype first flew at Harbin on Sept. 27, 1959, and an H-6 assembled that year from a knocked-down component kit was modified to carry China's first atomic bomb, which was dropped successfully in 1965. Internal difficulties delayed manufacture, but, following transfer of the program to Xian, the **H-6A** production prototype eventually flew there Dec. 24, 1968.

The H-6A's Xian-built WP8 turbojets are generally similar to the Tu-16's RD-3M engines. Chinese-developed avionics comprise a computer, automatic navigation system, Doppler radar, heading and attitude system, autopilot, and bombing radar. About 30 of a version designated **H-6D**, first flown Aug. 29, 1981, are operated by the Naval Air Force as a carrier for China's C-601 antiship missile. An enlarged cylindrical undernose fairing houses associated missile guidance radar. Other variants are in service as ECCM aircraft and, in small numbers, as launch aircraft for high-speed, high-altitude drones. Production ended in the late 1980s. *(Data for H-6D.)*

Contractor: Xian Aircraft Manufacturing Co., China.

Power Plant: two Xian WP8 turbojets; each 20,944 lb thrust.

Dimensions: span 112 ft 2 in, length 114 ft 2 in, height 33 ft 11¾ in.

Weights: empty 84,944 lb, gross 158,733–167,110 lb.

Performance: max cruising speed 488 mph, ceiling 39,370 ft, T-O run 6,890 ft, landing run 5,050 ft, max range 2,672 miles.

Accommodation: crew of six.

Armament: six guns, in pairs, in dorsal, ventral, and tail turrets. Two C-601 antiship missiles under wing. Nuclear or conventional bombs in weapons bay. Chute for flares and marine markers to rear of weapons bay.

N22 Searchmaster

Like the Missionmaster transport, the maritime Searchmaster is based on the N22B short-fuselage version of the Australian-designed Nomad short-range STOL utility transport.

The basic coastal patrol **Searchmaster B** has a Bendix/King RDR 1400 search radar, with an 18-in forward-looking flat-plate antenna in a nose radome, and carries a four-man crew. Four equip the Papua New Guinea Defense Force but, in common with the rest of the PNGDF's aircraft, were grounded in spring 1996 when funds for spares and maintenance ran out. The other operator in this region is the Indonesian Navy's No. 800 Sq., which has nine Bs and about six of the more-sophisticated **Searchmaster L**s. The latter have a Litton APS-504(V)2 search radar, with a 360° scan, 40-in flat-plate phased-array antenna in an under-nose "lozenge" radome; Doppler, Omega, or inertial long-range navigation; and a crew of five. *(Data for Searchmaster L.)*

Contractor: Government Aircraft Factories, Australia.
Power Plant: two Allison 250-B17C turboprops; each 420 shp.
Dimensions: span 54 ft 2 in, length 41 ft 3 in, height 18 ft 2 in.
Weights: empty 5,897 lb, gross 9,100 lb.
Performance: normal cruising speed 193 mph, ceiling 21,000 ft, T-O run 970 ft, landing run 780 ft, range 841 miles.
Accommodation: crew of five.
Armament: provision for four under-wing hardpoints, each for a 500-lb store, incl gun and rocket pods.

P-3 Orion

Five **P-3K**s (for Kiwi, and equivalent to the USN's P-3B) were delivered to the Royal New Zealand Air Force in 1966. Augmented by a sixth (ex–Australian) example in 1985, they underwent an avionics upgrade (Project Rigel) in the mid–1980s and equip No. 5 Sq. at Whenuapai, near Auckland. A second upgrade, now approved, involves partial wing and tail component replacement (Project Kestrel) and a further avionics improvement program (Project Sirius), which will enable them to remain in service until at least 2015.

Australia replaced its original 10 P-3Bs by 10 Update II and 10 Update II.5 standard **P-3C**s. These were designated **P-3W** by Lockheed; Royal Australian Air Force designation is **A9**. Equipment differences in the P-3Ws, 19 of which still equip Nos. 10 and 11 Sqs. at Edinburgh AB, include an AQS-901 processing system for Australian Barra sonobuoys. A recent new mission and avionics suite includes an Elta EL/M-2022A(V)3 radar, ASQ-504 MAD, Computing Devices of Canada UYS-503 acoustic processor, Loral data management system, Honeywell ring-laser gyro inertial navigation system with GPS positioning, and Magnavox radios. The RAAF also has three ex–USN P-3Bs as **TAP-3B** crew trainers. In 1995–96, the South Korean Navy received eight Update III P-3Cs to replace its older S-2 Trackers of No. 613 Sq. at Pohang. These were the last P-3s built by Lockheed Martin.

Japan is now the only country building P-3s. This country acquired three US–built P-3C/Update II.5s before local production (starting with four CKD kits) was initiated by Kawasaki for the JMSDF, which has so far ordered 110, of which more than 100 have been delivered, including 69 Update II.5s; they equip nine JMSDF patrol squadrons of the 1st, 2d, and 4th Fleet Air Wings at Atsug (two), Hachinohe (two), Kanoya (two), Naha (two), and one at Iwakuni, plus three miscellaneous units. Five of those ordered are electronic surveillance **EP-3**s (NEC/Mitsubishi suite with 230-mile capture range; first delivery March 1991); three others are **UP-3D** ECM trainers; one is a **UP-3C** for use as a test bed, and five are to be equipped with SLAR as surveillance **UP-3E**s. *(Data for P-3C/Update III.)*

Contractors: Lockheed Martin, USA; Kawasaki Heavy Industries, Japan.
Power Plant: four Allison T56-A-14 turboprops; each 4,910 ehp.
Dimensions: span 99 ft 8 in, length 116 ft 10 in, height 33 ft 8½ in.
Weights: empty 61,491 lb, gross 135,000–142,000 lb.
Performance: econ cruising speed at 110,000 lb gross weight at 25,000 ft 378 mph, patrol speed at 1,500 ft at same weight 237 mph, ceiling 28,300 ft, T-O run 4,240 ft, landing distance 2,770 ft, mission radius (3 hr on station at 1,500 ft) 1,550 miles.
Accommodation: normal crew of 10, incl five in tactical compartment in main cabin; up to 13 additional relief crew or passengers optional.
Armament: one 2,000-lb or three 1,000-lb mines, or up to eight depth bombs or torpedoes, or depth bomb/torpedo combinations (incl nuclear depth bombs) in internal weapons bay. Ten under-wing pylons for torpedoes, mines, rockets, or other stores. Total max weapons load 19,250 lb.

S-2 Tracker and Turbo Tracker

The fleet of about two dozen Tracker antisubmarine and maritime patrol aircraft operational in South Korea has begun to diminish as this country received its new P-3 Orions. South Korea has both the original **S-2A** and **S-2E** piston-engine versions, restricted to shore-based operation. Standard equipment includes AN/APS-38 search radar in a retractable ventral radome, AN/ASQ-10 MAD in a retractable tail sting, a 70-million-candlepower searchlight on the leading edge of the starboard wing, and sonobuoy stowage in the rear of the engine nacelles. The S-2E differs from the A primarily in having added AQA-3 Jezebel passive acoustic search equipment and Julie explosive echo-sounding equipment.

The Taiwanese Air Force contracted with Grumman to have its 32 S-2Es, **S-2F**s, and **S-2G**s converted into **S-2T Turbo Trackers,** with 1,645 shp AlliedSignal TPE331-15AW turboprops. An updated avionics/ASW package includes a MAPADS 902F acoustic processor, AN/ASQ-504(V) MAD, AN/APS-509 radar, AN/ARR-84 acoustic receivers, and an AN/ASN-150 tactical navigation system integrated with the INS. Max speed is increased to 3[illegible]1 mph at 5,000 ft, with an 1,100-lb increase in payload and generally improved field and climb performance. The first two S-2Ts, converted by Grumman, were delivered in 1992; the remainder were modified in Taiwan by AIDC, using kits supplied by Grumman. Some or all of the S-2Ts, formerly with Nos. 33 and 34 Sqs. of the Air Force are being transferred to a newly formed Taiwanese Navy unit. *(Data for S-2E.)*

Contractor: Grumman, USA.
Power Plant: two Wright R-1820-82WA piston engines; each 1,525 hp.
Dimensions: span 72 ft 7 in, length 43 ft 6 in, height 16 ft 7½ in.
Weights: empty 19,033 lb, gross 26,867 lb.
Performance: max speed at 5,000 ft 253 mph, ceiling 22,000 ft, T-O run 1,300 ft, range 1,150 miles.
Accommodation: crew of four, comprising pilot, co-pilot, and two radar operators.
Armament: one depth bomb or two torpedoes in weapons bay. Depth bombs, torpedoes, or rockets on six under-wing hardpoints. Max weapon load is 4,810 lb.

SH-5

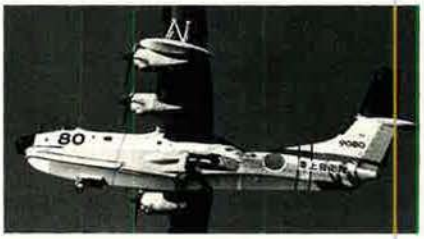
China's SH-5 (Shuishang Hongzhaji 5: "Maritime Bomber 5") was designed in the late 1960s, the first flying prototype being completed in December 1973. However, it did not begin water taxi tests until late 1975; first flight was made April 3, 1976. The program then languished until 1984–85, when six more were built and flown. Four of these were handed over to China's Navy in September 1986 for service at Tuandao NAS, Qingdao. Another was successfully used in a fire-fighting (water-bombing) trials program, but no further SH-5s have been built.

Primary roles intended for the SH-5 were antisubmarine and antiship warfare and maritime patrol and surveillance. It can also be used for mine laying, SAR, or carriage of bulk cargo. The hull is unpressurized but fully amphibious; wingtip stabilizing floats are non-retractable. Doppler search radar is installed in the nose "thimble" and MAD in the tail sting. SAR gear, sonobuoys, and other maritime equipment can be carried internally. A reported Chinese order in mid–1996 for up to eight Racal-Thorn Searchwater maritime surveillance radars and associated equipment has fueled suggestions that these may be intended for fitment to the SH-5 and/or the maritime patrol version of the Y-8 transport.

Contractor: Harbin Aircraft Manufacturing Co., China.
Power Plant: four Dongan WJ5A turboprops; each 3,150 ehp.
Dimensions: span 118 ft 1¼ in, length 127 ft 7½ in, height 32 ft 2 in.
Weights: empty (ASW) 58,422 lb, gross 99,208 lb.
Performance: max cruising speed 280 mph, min patrol speed 143 mph, ceiling 33,630 ft, T-O run (water) 1,582 ft, landing run (water) 2,143 ft, max range 2,951 miles, endurance (on two engines) 12–15 hr.
Accommodation: flight crew of five, plus systems/equipment operators (normally three) according to mission.
Armament: twin-gun remotely controlled dorsal turret. Four under-wing hardpoints for C-101 sea-skimming antiship or other missiles (one on each inboard pylon), lightweight torpedoes (up to three on each outer pylon), or other stores. Internal bay in rear of hull for depth charges, mines, or bombs.

Kawasaki-built EP-3, Japan MSDF

Surveiller (modified Boeing 737), Indonesian Air Force



US-1A, Japan MSDF *(Katsumi Hinata)*

Surveiller

The Surveiller, a unique military version of the Boeing 737-200, is characterized by its Motorola SLAMMR (side-looking airborne modular multimission radar) installation, which requires a 16-ft antenna fairing on each side of the upper rear fuselage. With this equipment, it can spot small ships in heavy seas up to 115 miles away, from a patrol altitude of 30,000 ft. Three were delivered to the Indonesian Air Force from 1982, and in 1993–94 these were redelivered after undergoing an avionics refit to enhance their long-range overwater patrol capability. The upgrade package included a real-time SLAMMR display, a new nose-mounted search radar, IFF interrogator, long-focal-length camera, improved mission avionics, a five-console data processing and display system derived from the system developed by Boeing for the P-3 Update IV, and GPS–based nav/com equipment. Currently equipping No. 5 Sq. at Hasanuddin, all three continue to double as government transports, with 14 first-class and 88 tourist-class seats. *(Data for standard 737-200.)*

Contractor: Boeing, USA.
Power Plant: two Pratt & Whitney JT8D-17A turbofans; each 16,000 lb thrust.
Dimensions: span 93 ft 0 in, length 100 ft 2 in, height 37 ft 0 in.
Weights: empty 61,630 lb, gross 124,500 lb.
Performance: max cruising speed at 33,000 ft 532 mph, ceiling approx 40,000 ft, T-O field length 5,300 ft, landing field length 4,500 ft, max range approx 2,900 miles.
Accommodation: crew of two; 102 passengers in main cabin.
Armament: none.

US-1A

This amphibian development of the Japan Maritime Self-Defense Force's PS-1 antisubmarine flying boats, which retired in 1989, continues in service as a long-range SAR aircraft. The JMSDF has so far received 16 US-1As, and one more is on order, although attrition and phaseout of older aircraft have reduced the in-service total to seven. Deliveries (as US-1s with less powerful -10 engines and earlier avionics) began in March 1975, but those now in service with detachments of No. 71 (Air Rescue) Sq. at the Iwakuni and Atsugi naval bases are to US-1A standard with nose-mounted AN/APS-115(2) search radar and AN/APN-187C Doppler navigation radar; SAR equipment includes flares, a rescue hoist, marine markers, a loudspeaker, life rafts, a powered lifeboat, and droppable rescue kits. Refit with more powerful Allison AE 2100 turboprops is planned. Upgraded avionics will include Thomson-CSF Ocean Master surveillance radar.

Contractor: ShinMaywa Industries, Japan.
Power Plant: four Ishikawajima-Harima (GE license) T64-IHI-10J turboprops; each 3,400 ehp.
Dimensions: span 108 ft 9 in, length 109 ft 9¼ in, height 32 ft 7¾ in.

Weights: empty 56,218 lb, gross 94,800 lb (water T-O), 99,200 lb (land T-O).
Performance: cruising speed at 10,000 ft 265 mph, ceiling 23,600 ft, T-O distance (water) 2,410 ft, landing distance (water, at 79,365 lb weight) 1,840 ft, max range 2,370 miles.
Accommodation: crew of three or four; up to 20 seated survivors, or 12 litters and up to three medical attendants or observers, in main cabin.
Armament: none.

Fighters

Ching-Kuo

Lockheed Martin (General Dynamics), AlliedSignal, and various US avionics manufacturers cooperated with Taiwan's Aero Industry Development Center in designing an indigenous defensive fighter (IDF), and the influence of the F-16 on the IDF airframe is clear. The first prototype made its initial flight May 28, 1989. Four prototypes were followed by 10 preproduction aircraft, the first four of which were handed over to Taiwan's Air Force in March 1992. AlliedSignal developed an afterburning version of its TFE731 turbofan jointly with Taiwan's Chung Shan Institute of Science and Technology. Avionics include a 93-mile-range Golden Dragon 53 multimode pulse-Doppler radar, based on Lockheed Martin's AN/APG-67(V) but embodying features of Westinghouse's AN/APG-66; Honeywell INS; and one head-up and three multifunction cockpit displays by Bendix/King. A Lear Astronics fly-by-wire control system is used, with a side stick controller.

Plans to produce 250 Ching-Kuos (named after the late president of Taiwan) were virtually halved following the US decision to allow Taiwan to buy 150 F-16s, and total procurement is now set at 130 (102 single-seat and 28 two-seat), including the preproduction 10. Deliveries began in early 1994 and totaled 80 by the beginning of this year. The first three squadrons are Nos. 7, 8, and 28, forming the 3d Tactical Fighter Wing at Ching Chuan Kang AB, where they replaced F/TF-104G Starfighters. A fourth squadron was commissioned in March 1997; this forms part of the 2d TFW (also a former F-104 Wing), which is reequipping its two other active squadrons with newly arrived Mirage 2000s.

Contractor: Aero Industry Development Corp., Taiwan.
Power Plant: two AlliedSignal/AIDC TFE1042-70 turbofans; each 9,500 lb thrust with afterburning.
Dimensions: span over wingtip missiles 31 ft 0½ in, length (excl nose probe) 43 ft 6 in, height 15 ft 3 in.
Weights: empty 14,300 lb, gross 21,000–27,000 lb.
Performance (estimated): max speed at height Mach 1.06, ceiling 54,000 ft.
Accommodation: pilot only, on zero/zero ejection seat.
Armament: one 20-mm M61A gun in port side of fuselage, with 511 rds; two medium-range Sky Sword II radar homing AAMs under fuselage and four close-range IR homing Sky Sword Is on two under-wing and two wingtip pylons. For attack role, up to 8,600 lb of bombs, cluster bombs, rockets, or ASMs may be carried, incl three Hsiung Feng II sea-skimming antiship missiles, plus wingtip Sky Sword Is.

F-1

First interceptor/close air support jet fighter designed by the Japanese aerospace industry, the single-seat Mitsubishi F-1 was derived from the company's T-2 two-seat trainer, the first supersonic aircraft to be designed in Japan. Design was an industrywide effort, and in 1973 work began to convert two T-2s as F-1 prototypes, deletion of the second cockpit allowing such additional avionics as an inertial navigation system, radar homing and warning system, and J/ASQ-1 bombing computer, to be installed in its stead. Other equipment includes nose-mounted Mitsubishi Electric J/AWG-12 fire-control radar, Ferranti INS, and license-built Thomson-CSF HUD.

The F-1 first flew in June 1975 and entered service with the Japan Air Self-Defense Force in the fall of 1977. The last of 77 production aircraft, nearly all of which are still in service, was delivered in March 1987. F-1s currently equip the 3d Sq. of the 3d Air Wing at Misawa and the 6th Sq. of the 8th Air Wing at Tsuiki. They are expected to serve until replaced by the F-2 in the late 1990s. The 8th Sq. of the 3d Air Wing has already converted from F-1s to the F-4 Phantom, pending the arrival of the F-2.

Contractor: Mitsubishi Heavy Industries, Japan.
Power Plant: two Ishikawajima-Harima TF40-IHI-801A (license Rolls-Royce Turbomeca Adour) turbofans; each 7,305 lb thrust with afterburning.
Dimensions: span 25 ft 10¼ in, length (incl nose probe) 58 ft 7 in, height 14 ft 5 in.
Weights: empty 14,017 lb, gross 28,219–30,203 lb.
Performance: max speed (clean) at 36,000 ft Mach 1.6, ceiling 50,000 ft, T-O run 4,200 ft, landing run 2,800 ft, combat radius (hi-lo-hi) 218–345 miles.
Accommodation: pilot only, on zero/zero ejection seat.
Armament: one JM61 multibarrel 20-mm gun in port side of front fuselage. Up to 6,000 lb of ordnance on four under-wing hardpoints, with multiple carriers, plus one under fuselage. Weapon loads can include two Mitsubishi ASM-1 ASMs; up to 12 500-lb or eight 750-lb bombs (incl IR- or laser-guided); four pods of 70-mm or 125-mm under-wing rockets; four AIM-9 Sidewinder AAMs (two under wing and two at wingtips); or up to three drop tanks.

Ching-Kuos, Taiwanese Air Force

First Prototype F-2, Japan ASDF *(JASDF)*

F-2

Like the Ching-Kuo from Taiwan, Japan's **F-2** support fighter exhibits clear signs of its design connections with the US F-16C, despite having a 25 percent larger wing with wider root strakes, a mid-fuselage plug, reshaped nosecone, and clipped tailplane trailing edges. Internally, however, it has significant differences, not least in having the first screens-only cockpit (four multifunction displays and a holographic HUD) without any backup analog instrumentation. These, as well as the F-2's fire-control radar, mission computer, laser-based inertial reference system, and EW equipment, are all Japanese nonderived items, in which Mitsubishi's US partner Lockheed Martin will share through a technology transfer agreement. Lockheed also shares in production of the fighter's cocured, composites wing, another Japanese development.

Originally designated FSX and TFSX while in the design stage, the single-seat **F-2A** and combat-capable tandem-seat **F-2B** are based on the F-16C and D, but funded entirely by Japan. The two XF-2A prototypes first flew Oct. 7 and Dec. 13, 1995, followed by the XF-2Bs during 1996; all four were handed over to the Japan Defense Agency during that year for user trials, and orders were placed in FY96 and FY97 for the first 19 of a planned 130 production F-2s. Deliveries, mainly to replace the JASDF's now-elderly F-1s, are scheduled to begin in 1999. First recipient will be the 3d Sq. of the 3d Wing at Misawa.

Contractor: Mitsubishi Heavy Industries, Japan.
Power Plant: one General Electric F110-GE-129 turbofan; 29,600 lb thrust with afterburning.
Dimensions: span over wingtip missile rails 36 ft 6¼ in, length 50 ft 11 in, height 16 ft 3¼ in.
Weights: empty 26,455 lb, gross 48,722 lb.
Performance: max speed at height (clean) approx Mach 2.0; no other details released.
Accommodation: pilot only, on zero/zero ejection seat.
Armament: one M61A1 multibarrel 20-mm gun in port wing root; one under-fuselage, 10 under-wing, and two wingtip stations for various combinations of Sparrow, Sidewinder, or Mitsubishi ASM-1 and -2 antiship missiles, single or cluster bombs, or rocket launchers.

F-4 Phantom II

Mitsubishi built 136 **F-4Es** under license in the 1970s (local designation **F-4EJ**) for the Japan Air Self-Defense Force. Optimized for air defense, they lacked the bombing computer and slatted wings of USAF's multirole F-4E. Under a Service Life Extension Program begun in 1987, 86 were upgraded to **F-4EJKai** (modified) standard, redelivery to the 6th Air Wing at Komatsu beginning in November 1989. Nos. 8, 301, 302, and 306 Sqs. of the JASDF currently fly this version. In addition to some structural changes, the upgrade included a Mitsubishi (Westinghouse license) AN/APG-66J radar; Japanese license-built Litton LN-39 INS, Kaiser HUD, Hazeltine AN/APX-79A IFF, and a locally developed fire-control system and radar warning receiver. Missile capability includes AIM-7E/F Sparrows, AIM-9P/L Sidewinders, and Mitsubishi ASM-1 and -2 antiship weapons. Seventeen other F-4EJs were converted to reconnaissance **RF-4EJs**.

The South Korean Air Force received more than 130 new-build or ex–USAF **F-4Ds** (66) and F-4Es (67), of which about 115 (60 + 55) remain in service. Of these, at least 32 are equipped with target designation systems (24 Ds with Pave Spike and eight or more Es with Pave Tack). South Korea contracted with Rockwell North American (now part of Boeing) for an avionics upgrade, along similar lines to that of the JASDF, to achieve greater commonality with its recently acquired F-16s. This is intended to include radar/HUD/INS/mission computer modernization, linked through a MIL-STD-1553B data bus. Radars on offer are the Hughes AN/APG-65 and Northrop Grumman AN/APG-68. *(Data for standard F-4E.)*

Contractor: McDonnell Douglas, USA.
Power Plant: two General Electric J79-GE-17A turbojets; each 17,900 lb thrust with afterburning.
Dimensions: span 38 ft 7½ in, length 63 ft 0 in, height 16 ft 5½ in.
Weights: empty 30,328 lb, gross 41,487–61,795 lb.
Performance: max speed at 40,000 ft Mach 2 class, ceiling 54,400 ft, T-O run at max gross weight 4,390 ft, landing run with brake chute 3,040–3,120 ft, combat radius 494 miles (defensive counterair) to 786 miles (area intercept).
Accommodation: pilot and weapon systems operator in tandem on zero/zero ejection seats.
Armament: one M61A1 multibarrel 20-mm gun; provision for up to four AIM-7 Sparrow or AIM-9 Sidewinder AAMs semisubmerged under fuselage; or seven hardpoints (one under fuselage, three under each wing) for up to 16,000 lb of bombs, rocket pods, gun pods, or flares and ECM/camera pods.

F-5E Tiger II

Six countries in the Far East/Pacific region continue to operate Northrop's **F-5E** Tiger II and its **F-5F** two-seat combat trainer counterpart, and most of them have initiated modernization programs.

Both South Korea and Taiwan manufactured these versions under license. The South Korean Air Force received 159 Es and 64 Fs, of which Korean Air Lines built 48 and 28, respectively, in the 1980s under the Korean name **Chegoong-ho** ("Air Master"). South Korea also still operates nearly 50 **F-5A/Bs** from earlier deliveries. In Taiwan, AIDC produced 248 Es and 60 Fs for Taiwan's Air Force, most of which remain in service with some 15 squadrons. Singapore Aerospace (SAe) is to convert eight or more to RF-5E TigerEye reconnaissance configuration. Singapore's own 30 Es and eight Fs, in three squadrons, are currently being upgraded as **F-5S** and **F-5T** by SAe and Israel's Elbit. The refit program includes HOTAS controls, FIAR Grifo radar, and Israeli HUD, mission computer, multifunction displays, and a radar warning receiver. The Singapore aircraft have dual air-defense/ground-attack duties, with the ability to carry TV-guided Mavericks and laser-guided bombs.

Other regional operators are the air forces of Indonesia (eight Es, four Fs, being upgraded by new nav/attack kits supplied by SABCA of Belgium) and Malaysia (17 Es, four Fs). The latter had planned to retire its F-5s on receiving MiG-29s but is now considering upgrading them instead. The Philippine Air Force recently had its older F-5A/Bs augmented by the gift of three F-5As from South Korea and one from Taiwan, increasing its inventory to 14 and four, respectively. Late last year the PAF was bidding to acquire up to 18 refurbished ex–Canadian CF-5A/Bs. *(Data for F-5E.)*

Contractor: Northrop, USA.
Power Plant: two General Electric J85-GE-21B turbojets; each 5,000 lb thrust with afterburning.
Dimensions: span 26 ft 8 in (27 ft 11⅞ in over wingtip AAMs), length (incl nose probe) 47 ft 4¾ in, height 13 ft 4¼ in.
Weights: empty 9,723 lb, gross 24,722 lb.
Performance: max speed at 36,000 ft Mach 1.64, 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, on ejection seat.
Armament: two 20-mm M39A2 guns in nose; AIM-9 Sidewinder AAM at each wingtip; one under-fuselage and four under-wing stations for up to 7,000 lb of bombs, cluster bombs, rocket packs, napalm tanks, missiles, or other stores.

F-15J Eagle

Japan is the only country outside the US to be granted a manufacturing license for the F-15. The

Armament: range of possible weapons can incl a tripod-mounted 7.62-mm gun with 1,000 rds aft of pilot's seat, or a 20-mm gun with 480 rds, turret-mounted on port side of cabin. Instead of guns, can carry two or four wire-guided missiles on external rails, or 68-mm rocket pods. ASW version can carry two torpedoes, or one torpedo and a MAD bird.

SA 321 Super Frelon and Z-8

During 1977–78, the Chinese Navy received 10 or more **Super Frelons,** similar to the antisubmarine SA 321G developed for the French Navy but less fully equipped. Some reportedly have French-built search radar; all were delivered with an early type dipping sonar, but at least three later received more modern Thomson-Sintra HS-12 for an SSBN escort role. China's Helicopter Design and Research Institute claims to have developed the virtually identical **Z-8** (first flight Dec. 11, 1985), and Changhe had delivered 12 to the Navy by the end of last year. It remains uncertain whether the Z-8s are new-production aircraft or merely upgrades of the original Super Frelons. Equipment options include search radar, sonar and sonobuoys, or minesweeping gear. *(Data for Z-8.)*

Contractor: Changhe Aircraft Industries Corp., China.
Power Plant: three Changzhou WZ6 turboshafts; each 1,550 shp.
Dimensions: rotor diameter 62 ft 0 in, fuselage length 65 ft 10¾ in, height 21 ft 10¼ in.
Weights: empty 16,645 lb, gross 23,351–26,618 lb.
Performance: max cruising speed at S/L 154 mph, ceiling 10,000 ft, range 497 miles.
Accommodation: crew of two or three, 27–39 troops, 15 litters plus a medical attendant, or payloads of 8,818 lb (internal) or 11,023 lb (on external hook).
Armament (ASW Super Frelon): four homing torpedoes or two Exocet antiship missiles. Z-8 can carry similar weapons and/or eight 550-lb mines.

SA 330 Puma

This workhorse military assault and civilian transport helicopter first flew April 15, 1965. The Indonesian Air Force still has seven **SA 330Js** from Anglo-French production (with No. 8 Sq.) plus, with No. 17 Sq., one **NSA-330L** and a pair of VVIP **NSA-330L1s** from the 11 that were assembled locally from knocked-down component kits by Nurtanio (now IPTN). Two **SA 330Ls** serve with the Presidential Airlift Wing of the Philippine Air Force. *(Data for SA 330L.)*

Contractors: Aerospatiale, France; IPTN, Indonesia.
Power Plant: two Turbomeca Turmo IVC turboshafts; each 1,575 shp.
Dimensions: rotor diameter 49 ft 2½ in, fuselage length 46 ft 1½ in, height 16 ft 10½ in.
Weights: empty 7,970 lb, gross 16,315 lb.
Performance: max cruising speed at S/L 160 mph, ceiling 15,750 ft, range 341 miles.
Accommodation: crew of two; 16 fully equipped troops, six litter patients and six seated persons, or internal or external cargo.
Armament: provisions for side-firing 20-mm gun, two 7.62-mm machine guns, rocket packs, and other weapons.

Sea King and Nuri

Principal Far East/Pacific operator of Sikorsky's venerable submarine hunter/killer helicopter is the Maritime Self-Defense Force of Japan, which still has about 70 of the 167 built under license by Mitsubishi. These correspond to the basic US Navy **SH-3A,** although Japan still uses their pre–1962 US designation of **HSS-2.** About 55 **HSS-2Bs** (equivalent to the USN's SH-3H) continue in JMSDF service. Their primary mission is ASW, singly or in three-aircraft flights from destroyers; this role is progressively being assumed by the SH-60Js now being delivered. The JMSDF also has some 15 S-61A or AH Sea Kings for utility missions. The Royal Malaysian Air Force received 38 **S-61A-4 Nuris** from 1968–78, of which 32 remain in service with Nos. 3, 5, 7, and 10 Sqs. and a training unit. These have since been upgraded with Honeywell Primus 500 radar and AN/APN-209(V) radar altimeter and GEC-Marconi ANV-301 Doppler nav system.

Westland-built **Advanced Sea Kings,** with 1,660 shp Rolls-Royce Gnome H.1400-1T turboshafts, more advanced ASW equipment, and other improvements, included 10 **Mk 50s** in 1974 and two **Mk 50As** in 1983 for the Royal Australian Navy, of which six, plus a former Royal Navy HAS. Mk 5 brought up to Mk 50 standard, remain in service with No. 817 Sq., now mainly for general utility duties. Westland has recently completed extending their service life until 2008 with a major avionics upgrade plus new cargo floors, increased cabin volume, extra seats, and FOD (foreign object damage) protection. *(Data for S-61A.)*

Contractor: Sikorsky Aircraft, USA.
Power Plant: two General Electric T58-GE-8B turboshafts; each 1,250 shp.
Dimensions: rotor diameter 62 ft 0 in, fuselage length 54 ft 9 in, height 16 ft 10 in.

SA 321G Super Frelon, Chinese Navy

S-61A-4 Nuri (Sea King), Royal Malaysian Air Force *(Paul Jackson)*

Weights: empty 9,763 lb, gross 21,500 lb.
Performance: cruising speed at S/L 136 mph, ceiling 14,700 ft, range with max fuel 625 miles.
Accommodation: crew of four; up to 28 survivors in SAR role.
Armament (ASW): provisions for up to 840 lb of weapons, incl antiship missiles, up to four homing torpedoes, four depth charges, sonobuoys, smoke floats, marine markers, and other weapons and equipment.

SH-2F/G Seasprite

To augment its S-70C(M)-1 Thunderhawk ASW helicopters, the Taiwanese naval air arm is slated to receive a dozen **SH-2F** Seasprites from surplus USN stocks. Its upgraded successor, the **SH-2G Super Seasprite,** has for the past two years been in strong contention with Westland's Super Lynx for orders in the Far East and elsewhere. Success came early this year when Australia (in January) and New Zealand (in March) selected the SH-2G for their respective navies, both countries signing contracts in June. The RAN will receive 11 SH-2G(A)s from early 2001, and the RNZN four SH-2G(NZ)s slightly earlier, all upgraded from stored US Navy SH-2Fs. As an interim Wasp replacement, the RNZN will acquire four standard SH-2Fs until its Super Seasprites are ready.

Features of the SH-2G include "glass cockpit" digital avionics and HOTAS controls. Australia's helicopters will carry Penguin Mk 2 antiship missiles, while New Zealand's will be armed with the AGM-65 Maverick. Major mission equipment (radar, FLIR, ESM, etc.) had still to be selected at the time of writing.

The RAN has requested a further 18 SH-2Fs, to operate from offshore patrol vessels. Kaman has also offered the Australian Army a transport derivative of the Seasprite as a UH-1H/JetRanger replacement. *(Data for standard SH-2G.)*

Contractor: Kaman Aerospace Intl., USA.
Power Plant: two General Electric T700-GE-401 turboshafts; each 1,723 shp.
Dimensions: rotor diameter 44 ft 4 in, fuselage length 40 ft 0 in, height 15 ft 0½ in.
Weights: empty 7,600 lb, gross 13,500 lb.
Performance: max speed at S/L 159 mph, normal cruising speed 138 mph, ceiling 23,900 ft, max range with external fuel 500 miles.
Accommodation: crew of three (pilot, copilot/tactical coordinator, and sensor operator); space for four passengers or two litters in main cabin with sonobuoy launcher removed.
Armament: one or two torpedoes, or antiship or other ASMs. Provision for pintle-mounted 7.62-mm gun in each cabin doorway.

Super Lynx

Compared with earlier versions, this upgraded export version of the multirole Lynx has advanced technology composites main rotor blades, a reversed-direction tail rotor that reduces noise and improves hovering ability for extended periods at high weights, all-weather day/night capability, and extended payload/range performance. Twelve **Lynx Mk 99s,** ordered by South Korea for operation in antiship/ASW roles from its ex–USN Sumner- and Gearing-class destroyers and future HDF-3500 class, were delivered in 1990–91. Their equipment includes Racal Doppler 71/TANS N navigation avionics, 360° GEC-Marconi Seaspray Mk 3 radar, Bendix/King AN/AQS-18 dunking sonar, and Sea Skua antiship missiles. Thirteen more, with Mk 3000 Seaspray and new FLIR and ESM, were ordered by the South Korean Navy earlier this year, and the Mk 99s (now reduced to 11) will be upgraded to the same standard.

Malaysia has reportedly issued a letter of intent to buy up to six Super Lynxes to replace its present nine Wasps.

Contractor: Westland Helicopters, UK.
Power Plant: two Rolls-Royce Gem 42-1 turboshafts; each 1,120 shp.
Dimensions: rotor diameter 42 ft 0 in, length (main rotor blades and tail folded) 35 ft 7¼ in, height (main rotor blades and tail folded) 10 ft 8 in.
Weights: empty 7,255 lb, gross 11,300 lb.
Performance: max cruising speed 159 mph, radius of action (dunking sonar, one torpedo, 2 hr on station) 23 miles.
Accommodation: crew of two; secondary capability for carrying up to nine survivors in SAR role, or three litter patients and an attendant.
Armament: four Sea Skua or two Penguin antiship missiles, or two torpedoes or depth charges. Provision for wide range of podded gun and rocket installations.

UH-1 Iroquois/Model 205

Sole production source for these single-engine workhorse members of the original "Huey" family is now Fuji in Japan, which has been building the type since 1973. The Japan Ground Self-Defense Force operates about 120 **UH-1Hs** and more than 50 upgraded **UH-1Js.** Other operators, with approx numbers in service, include Australia (Army 25 UH-1H), Indonesia (Army 32 x 205A-1), South Korea (Army 20 UH-1H, Air Force five UH-1H), New Zealand (Air Force 13 UH-1H), Papua New Guinea (Defense Force five UH-1H), Philippines (Air Force 10 x 205A-1 and 19 UH-1H), Singapore (Air Force eight 205A/A-1 and 16 UH-1H), and Taiwan (Army 90 UH-1H). Most "Hueys" serve in general utility roles, but some are configured as assault transports (Taiwan) or for SAR (New Zealand and Philippines). *(Data for Fuji-built UH-1H.)*

Contractors: Bell Helicopter Textron, USA; Fuji Heavy Industries, Japan.
Power Plant: one Kawasaki-built AlliedSignal T53-K-13B turboshaft; 1,400 shp.
Dimensions: rotor diameter 48 ft 0 in, fuselage length 41 ft 10¾ in, height 14 ft 5½ in.
Weights: empty 5,270 lb, gross 9,500 lb.
Performance: max cruising speed 127 mph, ceiling 12,600 ft, range 290 miles.
Accommodation: pilot and 11–14 troops, or six litters and a medical attendant, or 3,880 lb of cargo.
Armament: normally none.

Wasp

Now in the twilight of a long career, the Wasp remains in small numbers with the navies of Indonesia (four) and Malaysia (nine) and the Royal New Zealand Air Force (five), but all are destined for early replacement. To fulfill their ASW needs, New Zealand has ordered the US Super Seasprite, while Indonesia and Malaysia have opted for the British Super Lynx.

Contractor: Westland Helicopters, UK.
Power Plant: one Rolls-Royce Bristol Nimbus Mk 503 turboshaft; derated to 710 shp.
Dimensions: rotor diameter 32 ft 3 in, fuselage length 30 ft 4 in, height 11 ft 10 in.
Weights: empty 3,452 lb, gross 5,500 lb.
Performance: max speed 120 mph, ceiling 12,500 ft, range 270 miles.
Accommodation: crew of two; can carry up to three more persons on rear seat.
Armament: two Mk 44 torpedoes or up to 550 lb of depth charges.

Z-9 Haitun/AS 365N Dauphin

China acquired an Aerospatiale license in 1980 to build 50 Dauphins (completed 1992) for civil and military use. The version built at Harbin is designated **Z-9** and has the Chinese name **Haitun,** also meaning "dolphin." Initial Z-9s were equivalent to the French (now Eurocopter) **AS 365N,** later **(Z-9A)** examples to the improved **AS 365N$_1$.** About 25 Z-9/9As serve with at least two group armies (Beijing and Shenyang military regions) and include some equipped for an antitank role; a similar number serve on shipboard duties, and reportedly as commando transports, with the Navy. Chinese production, now with much-increased locally made content (more than 70 percent of the airframe and 90 percent of the engine), is continuing as the **Z-9A-100** (first flight Jan. 16, 1992). The Royal Cambodian Air Force has a single French-built Dauphin. *(Data for Z-9A.)*

Contractor: Harbin Aircraft Manufacturing Corp., China.
Power Plant: two Zhuzhou WZ8A (license Turbomeca Arriel 1C1) turboshafts; each 724 shp.

Dimensions: rotor diameter 39 ft 2 in, fuselage length 38 ft 1⅞ in, height 11 ft 6½ in.
Weights: empty 4,519 lb, gross 9,039 lb.
Performance: max cruising speed at S/L 177 mph, ceiling 19,685 ft, range at 161 mph (standard fuel) 534 miles, (with auxiliary tank) 621 miles.
Accommodation: up to 10 (normal) or 14 (max) persons, incl one or two pilots.
Armament: some Chinese Army Z-9/9As equipped with door- or externally mounted machine guns and/or "Red Arrow 8" antitank missiles.

Reconnaissance and Special Mission Aircraft

E-767

The **E-767,** an airborne warning and control system (AWACS) aircraft based on Boeing's 767-200ER airliner, was planned as a successor to the 707–based E-3 used by USAF, NATO, and others. It features a similar Northrop Grumman APY-2 surveillance radar, mounted in a 30-ft rotating dome atop the fuselage, and mission avionics to the latest E-3 standard. However, payload/range capability is greatly enhanced, since the 767 airframe offers 46 percent more floor space and nearly 90 percent more volume than the older 707.

First customer (although South Korea is among other countries to have shown interest) is Japan's Air Self-Defense Force, which ordered two in late 1993 and two more a year later. First flight with rotodome installed took place Aug. 9, 1996, and the first pair of E-767s are due to be delivered to the JASDF in March 1998. They will be based at Hamamatsu.
Contractor: Boeing, USA.
Power Plant: two General Electric CF6-80C2B6FA turbofans; each 61,500 lb thrust.
Dimensions: span 156 ft 1 in, length 159 ft 2 in, height 52 ft 0 in.
Weights: empty approx 186,000 lb, gross 385,000 lb.
Performance: max cruising speed more than 500 mph, ceiling 40,100 ft, range 5,755 miles, time on station 8 hr at 1,150 miles radius, 10 hr at 345 miles.
Accommodation: crew of two; up to 19 mission specialists.
Armament: none.

OV-1D Mohawk

In 1993, the South Korean Air Force took delivery of an unspecified number of ex–US Army OV-1D Mohawk battlefield surveillance and target acquisition aircraft. Rapidly interchangeable sensors and cockpit displays enable the OV-1D to be used for either infrared or radar reconnaissance. An on-board processor provides the observer with developed photographs seconds after SLAR (side-looking airborne radar) film has been exposed. Panoramic and serial frame cameras, with 104 upward-firing flares in removable wing-root pods, are standard for night missions. Operation is possible from unprepared fields.
Contractor: Grumman, USA.
Power Plant: two AlliedSignal T53-L-701 turboprops; each 1,400 shp.
Dimensions: span 48 ft 0 in, length 41 ft 0 in, height 12 ft 8 in.
Weights: empty 12,054 lb, gross 17,912–18,109 lb.
Performance: max speed at 5,000 ft 289–305 mph, ceiling 25,000 ft, T-O to 50 ft 1,145–1,175 ft, landing from 50 ft 1,060 ft, range 944–1,011 miles.
Accommodation: crew of two, side by side, on ejection seats.
Armament: provision for 2,700 lb of under-wing ordnance or stores, incl fuel tanks and ECM pods.

RF-4C/E/EJ Phantom II

The 18 ex–USAF **RF-4C** Phantoms still operated by the 131st Tactical Reconnaissance Sq. of the South Korean Air Force have CAI/Fairchild/Itek forward, oblique, and high/low altitude panoramic cameras in the nose, plus a TEREC (tactical electronic reconnaissance) system that includes AN/UPD-8 side-looking airborne radar, RS-700 infrared linescan (IRLS), and AN/ALQ-131 jammer pods. The 14 **RF-4E**s originally acquired by Japan's Air Self-Defense Force are also to RF-4C standard. Operated by the JASDF's No. 501 Sq. at Hyakuri, the 12 survivors were modernized as **RF-4EKai**s with AN/APQ-172 forward-looking radar, inertial navigation, an IR reconnaissance system, digital displays, and VHF (replacing UHF) radio. The JASDF also converted 17 of its F-4EJ fighters to **RF-4EJ**s, with digital avionics, radar warning receivers, and a radar altimeter. Podded reconnaissance systems include a LOROP (long-range oblique photographic) pod, Israeli-based side-looking radar, and a Mitsubishi elint/ESM system derived from the French Thomson-CSF Astac. These aircraft retain the fighters' internal gun and APQ-120 fire-control radar. *(Data for RF-4E.)*
Contractor: McDonnell Douglas, USA.
Power Plant: two General Electric J79-GE-17A turbojets; each 17,900 lb thrust with afterburning.
Dimensions: span 38 ft 4⅞ in, length 62 ft 11 in, height 16 ft 6 in.
Weights: empty 28,276 lb, gross 58,000 lb.
Performance: max speed (clean) at 36,000 ft Mach 2.25, at S/L Mach 1.18, ceiling 59,400 ft, combat radius 840 miles.
Accommodation: crew of two, in tandem, on zero/zero ejection seats.
Armament: none.

RF-5E TigerEye

In addition to its F-5E Tiger II fighters, the Royal Malaysian Air Force has two **RF-5E** TigerEye day/night reconnaissance aircraft, combining the F-5E airframe with interchangeable nose pallets containing either standard cameras or an IRLS. Eight of Singapore's F-5Es have been converted to the same standard, with up to four vertical and oblique 70-mm cameras, for operation by No. 141 Sq. South Korea's Air Force still operates five older **RF-5A**s.
Contractor: Northrop, USA.
Power Plant: two General Electric J85-GE-21B turbojets; each 5,000 lb thrust with afterburning.
Dimensions: span 26 ft 8 in (27 ft 11⅞ in over wingtip AAMs), length (incl nose probe) 48 ft 0¾ in, height 13 ft 4¼ in.
Weights and Performance: essentially as F-5E, except combat radius 282–685 miles.
Accommodation: pilot only, on ejection seat.
Armament: one 20-mm M39 gun, with 280 rds; two AIM-9 Sidewinder AAMs and up to three drop tanks.

RF-104G Starfighter

Although Taiwan's three squadrons of F-104G Starfighters have now nearly all been withdrawn from use, No. 12 Sq. of Taiwan's Air Force continues to operate half a dozen of the photo-reconnaissance RF-104Gs it has had since the early 1960s. *(Data for F-104G; RF-104G similar.)*
Contractor: Lockheed, USA.
Power Plant: one General Electric J79-GE-11A turbojet; 15,800 lb thrust with afterburning.
Dimensions: span 21 ft 11 in, length 54 ft 9 in, height 13 ft 6 in.
Weights: empty 14,082 lb, gross 28,779 lb.
Performance: max speed at 36,000 ft Mach 2.2, ceiling 58,000 ft, T-O run 2,960 ft, landing run 2,280 ft, combat radius (max fuel) 745 miles.
Accommodation: pilot only, on ejection seat.
Armament: one M61 Vulcan multibarrel 20-mm gun in forward fuselage. Stations under fuselage (one) and wings (one each side) and at each wingtip for up to 4,310 lb of AIM-9 Sidewinder AAMs, ASMs, bombs, rocket pods, or drop tanks.

U-125/Hawker 800

The **Hawker 800** is the ultimate production version of the British Aerospace (originally de Havilland) 125 executive jet. In 1989, Japan ordered three **800FI**s (flight inspection) as **U-125**s, outfitted by Sierra Research, for an airways navaid calibration role. Delivery began in December 1992. The JASDF has also ordered 14 of a planned 27 **800SM**s, about 10 of which have been delivered, as **U-125A** SAR aircraft to replace the Mitsubishi MU-2E. These have a Japanese-built Texas Instruments 360° search radar, a Mitsubishi IR imager in a retractable ventral turret, air-droppable marker flares, a deep "patio" observation window on each side of the front fuselage, a small ventral fin, and dinghy/rescue/survival kits. Deliveries are expected to continue through 2003. South Korea ordered eight (four comint/elint **800SIG**s and four radar-equipped **800RA**s) in mid–1996. *(Data for standard Hawker 800MP.)*
Contractor: Raytheon, USA.

RF-5E TigerEye, Royal Malaysian Air Force *(Paul Jackson)*

Power Plant: two AlliedSignal TFE731-5R-1H turbofans; each 4,300 lb thrust.
Dimensions: span 51 ft 4½ in, length 51 ft 2 in, height 17 ft 7 in.
Weights: empty 16,000 lb, gross 27,400 lb.
Performance: max cruising speed at 29,000 ft 525 mph, ceiling 43,000 ft, T-O distance 5,620 ft, landing distance 4,500 ft, range (max payload) 2,969 miles, (max fuel) 3,251 miles.
Accommodation: crew of two; up to 14 passengers or equivalent weight of mission equipment or cargo.
Armament: none.

Transports and Tankers

An-2/Y-5

Nearly 18,000 of these large, anachronistic biplanes (NATO "Colt") have been built in the former USSR, Poland, and China since Antonov's prototype flew for the first time Aug. 31, 1947. Most An-2s are used for agricultural and other civilian tasks, but the Chinese Air Force has about 250 and the Navy up to 40. Others serve with the air forces of Laos (10), North Korea (200), and Mongolia (five or more). The basic version is the **An-2P** general-purpose transport; others in military use include the **An-2S** ambulance, **An-2TD** paratroop transport and training version with six tip-up seats along each side of the cabin, and **An-2V/An-2M** floatplanes. All Chinese versions have the basic designation **Y-5** (Yunshuji-5: "Transport 5"). Latest of these is the **Y-5C,** which has three vanes or "tipsails" attached to each wingtip. *(Data for An-2P.)*
Contractors: WSK-PZL Mielec, Poland, and Shijiazhuang Aircraft Manufacturing Corp., China.
Power Plant: one PZL Kalisz ASz-62IR piston engine (Zhuzhou HS5 in Y-5); 986 hp.
Dimensions: span 59 ft 7¾ in, length 40 ft 8¼ in, height 13 ft 2 in.
Weights: empty 7,605 lb, gross 12,125 lb.
Performance: max speed at 5,750 ft 160 mph, ceiling 14,425 ft, T-O run 492–558 ft, landing run 558–607 ft, range 560 miles.
Accommodation: crew of two and 12 passengers, 2,735 lb of freight, or six litters plus attendants.
Armament: none.

An-24/26/30 and Y-7

The prototype 50-passenger **An-24** twin-turboprop airliner (NATO "Coke") flew for the first time in 1960. The **An-26** ("Curl") differs from the An-24 mainly in its redesigned "beaver-tail" rear fuselage, auxiliary turbojet in the rear of the starboard engine nacelle, fewer cabin windows, and more powerful turboprops. It was the first type to use Antonov's unique rear-loading ramp. This forms the underside of the rear fuselage when retracted but can be slid forward under the rear of the cabin to facilitate direct loading onto the floor of the hold, or when cargo is to be air-dropped. An extensively glazed nose, to give the navigator a wide field of view, and a raised flight deck identify the **An-30** ("Clank"), which carries cameras and equipment in its cabin for aerial survey and other photographic duties.

Manufacture by Antonov has ended; but in China the Xian Aircraft Co. still produces "reverse engineered" developments of the An-24/26 series under the designation **Y-7.** China's Air Force has about 12 An-26s, eight An-30s, and 30 Y-7s, with a further 10 or so Y-7s in China's Navy. Most recent military version is the **Y7H** cargo transport, first flown in 1988 and currently in production. Features include an An-26-type rear-loading ramp, rough-field landing gear, modern avionics, and 2,790 shp Dongan WJ5E turboprops. Other data are generally as for the An-26.

Other military operators of these transports in the Far East/Pacific region include Cambodia (three An-24s), Laos (three An-24s and five Y-7s), Mongolia (six An-24s, one An-26), North Korea (12 An-24s), and Vietnam (30 An-26s, two An-30s). *(Data for An-26.)*
Contractor: Antonov OKB, Ukraine.
Power Plant: two Ivchenko AI-24VT turboprops, each 2,820 ehp; plus 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 9½ in, length 78 ft 1 in, height 28 ft 1½ in.
Weights: empty 32,518 lb, gross 50,706–52,911 lb.
Performance: cruising speed at 20,000 ft 270 mph, 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; 12,125 lb payload. Provision for

carrying 40 paratroops or 24 litters and an attendant.
Armament: provision for pylons on the sides of the fuselage for 4,409 lb of weapons or supply containers.

Boeing 707

At Richmond AB, New South Wales, No. 33 Sq. of the Royal Australian Air Force operates five ex-airline Boeing 707-338Cs (RAAF designation **A20**) as tanker/transport combis, converted by Hawker de Havilland using kits supplied by Israel Aircraft Industries. The upgrade involved structural strengthening and interior refit and installation of new avionics, a centerline boom-type refueling system, plus a Flight Refuelling Mk 32B hose-and-drogue pod at each wingtip. Each converted aircraft can carry up to 190,000 lb of transferable fuel, equivalent to approx 28,350 gallons. The flight deck upgrade includes Litton LN-92 ring-laser INS, Bendix/King multifunction displays, IFF, and Tacan.

Singapore is to acquire four ex–USAF KC-135As, after refit to **KC-135R** standard with F108 (CFM56) turbofans and twin hose/drogue units, to replace No. 122 Sq.'s 20-year-old KC-130Bs. No. 17 Sq. of the Indonesian Air Force operates one 707-320 as a VIP transport.
Contractors: Boeing, USA: HDH Victoria, Australia.
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 version): empty 145,000 lb, gross 335,000 lb.
Performance: max cruising speed at 25,000 ft 605 mph, ceiling 39,000 ft, T-O to 35 ft 10,020 ft, landing from 50 ft 6,250 ft, max range 3,625 miles.
Accommodation: crew of two or three; main cabin can accommodate up to 219 passengers or combinations of passengers/cargo (max payload approx 89,000 lb) when transferable fuel not carried.
Armament: none.

C-1

The first of two NAMC–built XC-1 prototypes flew in November 1970. Kawasaki then delivered two pre-production and 27 production **C-1**s between 1974 and 1981. The last five were longer-range models, with an additional fuel tank in the wing center section. Current operators are Nos. 402 and 403 Sqs. One C-1 was delivered in 1986, in **EC-1** configuration, to the JASDF's electronic warfare training unit. Equipped with Mitsubishi ALQ-5 ECM, it features bulbous nose and tail radomes, large blister fairings each side of the forward and rear fuselage, and under-fuselage antennas. The Japan Defense Agency has launched a C-X competition to find a C-1 replacement.
Contractor: Kawasaki Heavy Industries, Japan.
Power Plant: two Mitsubishi-built (Pratt & Whitney license) JT8D-M-9 turbofans; each 14,500 lb thrust.
Dimensions: span 100 ft 4¾ in, length 95 ft 1¾ in, height 32 ft 9¾ in.
Weights: empty 53,572 lb, gross 85,320–99,210 lb.
Performance: econ cruising speed at 35,000 ft 408 mph, ceiling 38,000 ft, T-O run 2,100 ft, landing run 1,500 ft, max range 2,084 miles.
Accommodation: crew of five, incl loadmaster; main cabin accommodates up to 60 troops or 45 paratroops; 36 litters with medical attendants; artillery pieces or small vehicles; or equivalent palletized or other cargo (payload 17,416 lb normal, 26,235 lb max overload).
Armament: none.

C-47 Skytrain/Li-2

Douglas' military **C-47** and its Soviet license-built counterpart, the Lisunov **Li-2** (NATO "Cab"), have outlived many of their modern successors on day-to-day operations in the Far East/Pacific area. Most recently, China had the largest fleet, with 30–50 Li-2s still flying with its Air Force and 10–20 with its Navy, but most of these are now thought to have been retired. Remaining C-47 operators are Indonesia's Air Force with four **C-47A/B**s, the Royal Australian Air Force (four, used for research), and Taiwan's Air Force (five). *(Data for C-47B except where indicated.)*
Contractor: Douglas, USA.
Power Plant: two Pratt & Whitney R-1830-90C radial piston engines; each 1,200 hp.
Dimensions: span 95 ft 6 in, length 63 ft 9 in, height 17 ft 0 in.
Weights: empty 18,135 lb, gross 26,000 lb (normal), 31,000 lb (max overload).
Performance: max speed at 10,000 ft 224 mph, ceiling 26,400 ft, T-O field length 4,000 ft, range 1,600 miles.
Accommodation: crew of two; up to 27 troops, 18–24 litters, or 10,000 lb of cargo in main cabin.
Armament: none.

C-119 Flying Boxcar

The most-produced version of Fairchild's classic rear-loading (twin-boom/podded fuselage) transport, first flown in 1947, was the **C-119G,** of which 484 were delivered by Fairchild and Kaiser, with others upgraded from **C-119F**s. They saw war service in Korea and, notably as gunships, in Vietnam. Forty **C-119L**s (Gs refitted with three-blade propellers) are operated by No. 103 Sq. of the 10th Transport Group from Pingtung, Taiwan, and are expected to remain in service into the next century. *(Data for C-119L.)*
Contractor: Fairchild, USA.
Power Plant: two Wright R-3350-89W piston engines; each 3,400 hp.
Dimensions: span 109 ft 3 in, length 86 ft 6 in, height 26 ft 4 in.
Weights: empty 39,982 lb, gross 74,400 lb.
Performance: max speed at 17,000 ft 296 mph, ceiling 21,580 ft, range 2,280 miles.
Accommodation: crew of six, incl loadmaster; up to 62 troops, or 35 litters and four attendants, or freight, incl vehicles.
Armament: none.

C-130 Hercules

Most of the 130-plus Hercules now operating in the Far East/Pacific region are of the **C-130H** series, introduced in 1964 with uprated engines and more modern avionics. The standard-length C-130H is operated by the air forces of Australia (12, RAAF designation **A97**), Indonesia (three), Japan (16), South Korea (eight), Malaysia (five), New Zealand (five), Philippines (two), Singapore (five, plus one tanker **KC-130H**), and Taiwan (21, including one equipped as an electronic warfare test bed). Malaysia's No. 4 Sq. also has three maritime patrol **C-130H-MP**s.

Stretched Hercules include the 106-ft-1-in-long **L-100-20** commercial model, and the 112-ft-9-in **C-130H-30** and **L-100-30.** These serve with Indonesia (seven H-30s and one L-100-30), South Korea (four H-30s), Malaysia (six H-30s), and Philippines (three L-100-20s).

Older Hercules in the region include eight **C-130B**s and two **KC-130B** tankers of the Indonesian Air Force, five Philippine C-130Bs, and four Singapore KC-130Bs, all now overdue for replacement, and 12 **C-130E**s of the Royal Australian Air Force. The RAAF has ordered 24 new **C-130J Hercules II**s, with 24 more on option, to replace its E models from next year, and New Zealand has options for up to eight of this model to succeed its C-130Hs. *(Data for standard C-130H; C-130J in parentheses.)*
Contractor: Lockheed Martin, USA.
Power Plant: four Allison T56-A-15 (AE 2100D3) turboprops; each 4,508 (4,591) shp.
Dimensions: span 132 ft 7 in (both), length 97 ft 9 in (both), height 38 ft 3 in (38 ft 10 in).
Weights: empty 76,469 (75,562) lb, max payload 49,318 (41,790) lb, gross 155,000–175,000 lb (both).
Performance (at 155,000 lb gross weight): max cruising speed 362 (400) mph, ceiling 26,500 (30,560) ft, T-O run 4,000 (3,050) ft, landing run 1,500 (1,400) ft, range with 40,000-lb payload 2,238 (3,262) miles.
Accommodation: crew of four (two), plus provision for loadmaster; up to 92 troops, 64 paratroops, 74 litters and two medical attendants, or equivalent weight of vehicles, artillery pieces, or cargo in main cabin.
Armament: none.

C-160NG

The original **C-160** was a European joint venture, produced initially for the air forces of France (50), (West) Germany (110), and South Africa (nine). Production ended in 1972 but was restarted at the end of that decade with 29 improvec **C-160NG**s (*Nouvelle Génération,* with increased fuel and updated avionics). Six civil equivalents of the NG model—the only civil Transalls built—were operated by Pelita Air Service of Indonesia, and these have recently been acquired by the Indonesian Air Force to add to its growing and increasingly diverse transport fleet.
Contractor: Transall (Transporter Allianz), a Franco-German consortium.
Power Plant: two Rolls-Royce Tyne RTy. 20 Mk 22 turboprops; each 6,100 ehp.
Dimensions: span 131 ft 3 in, length 106 ft 3½ in, height 38 ft 2¾ in.
Weights: empty 63,935 lb, max payload 35,275 lb, gross 112,435 lb.
Performance: max speed at 15,000 ft 319 mph, ceiling 27,000 ft, T-O run 2,346 ft, landing run 1,800 ft, range with max payload 1,151 miles, with max fuel and 17,640-lb payload 3,166 miles.
Accommodation: crew of three; up to 93 troops, 88 paratroops, 62 litters and four attendants, or equivalent cargo.
Armament: none.

C-47 Skytrain, Royal Australian Air Force (RAAF)

CN-235 M/MPA

Although set up as a joint Spanish/Indonesian design and production venture, CASA production of this "mini-Hercules" has far outstripped that of its Far East partner. National prototypes flew in November and December 1983, followed by the first CASA production CN-235 on Aug. 19, 1986. Military deliveries (**CN-235 M**) began in February 1987 and by the beginning of 1997 totaled 118 of 173 then on order.

The Indonesian Air Force received six of the small initial **Series 10,** with lower-powered CT7-7A engines. Main production version to date is the Series **100** (from CASA) or **110** (from IPTN); a strengthened airframe, higher operating weights, and modified wing leading edges and rudder characterize the Series **200** and **220,** introduced by CASA in 1992. Series 100 customers include South Korea (12) and Papua New Guinea (two), though the latter may currently be inactive. Malaysia has ordered six Series 220s, with options on a further 12. South Korea also has recently ordered eight Series 220s.

The **CN-235 MPA** is being developed by IPTN for ASW missions, with search radar in a large nose fairing; three, plus a single transport from CASA, have been ordered by the Royal Air Wing of Brunei. CASA is developing a similar ASW version as the **CN-235 MP Persuader.** The Indonesian Air Force and Navy have a long-standing order for 18 more CN-235s, including six MPAs. *(Data for CN-235 M Series 100/110.)*
Contractor: Aircraft Technology Industries (Airtech: CASA, Spain, and IPTN, Indonesia).
Power Plant: two General Electric CT7-9C turboprops; each 1,870 shp, flat-rated to 1,750 shp for takeoff.
Dimensions: span 84 ft 8 in, length 70 ft 2½ in, height 26 ft 10 in.
Weights: empty 19,400 lb, gross 35,273 lb.
Performance: max cruising speed at 18,000 ft 262 mph, ceiling 22,500 ft, T-O distance 4,235 ft, landing run with propeller reversal 1,306 ft, range 932 miles with max payload, 2,704 miles with 7,826-lb payload.
Accommodation: crew of two or three; up to 48 troops, 46 paratroops, 24 litters and four attendants, or 13,227 lb of cargo, loaded via rear ramp. Cabin can be equipped for ASW/maritime patrol, EW, or photographic duties, with seats for systems operators according to mission.
Armament: three hardpoints under each wing; max weapon load 7,716 lb. Indonesian CN-235 MPA can carry two Exocet antiship missiles or two Mk 46 torpedoes.

DHC-4A Caribou

This first-generation STOL transport first flew in 1958 and has been out of production since 1973, but Australia still has 14 of the 29 Caribous it received from 1964, equipping Nos. 35 and 38 Sqs. at Townsville, Queensland. Contract award for 12 to 18 replacements is expected in early 1999; candidates currently shortlisted are variants of the CN-235 and G222. Malaysia's last six Caribous are thought to have been retired in anticipation of their replacement by CN-235s.
Contractor: The de Havilland Aircraft of Canada Ltd.
Power Plant: two Pratt & Whitney R-2000-7M2 Twin Wasp piston engines; each 1,450 hp.
Dimensions: span 95 ft 7½ in, length 72 ft 7 in, height 31 ft 9 in.
Weights: empty 18,260 lb, gross 28,500–31,300 lb.
Performance: max cruising speed at 7,500 ft 182 mph, ceiling 24,800 ft, T-O run 725 ft, landing run 670 ft, range 242 miles with 8,740-lb max payload, 1,307 miles with max fuel.
Accommodation: crew of two; up to 32 troops, 22 litter patients, or equivalent cargo, incl light wheeled vehicles, in main cabin.
Armament: none.

DHC-5D Buffalo

More than a dozen countries operated this version of de Havilland Canada's turboprop development of the Caribou tactical transport. None of them was in the Far East/Pacific region, but this omission was rectified in 1996–97 when Indonesia accepted five from the United Arab Emirates (Abu Dhabi) in part payment for the latter's order for IPTN–built CN-235s. Two of the Buffalos have gone to the Indonesian Navy and three to the Army.
Contractor: The de Havilland Aircraft of Canada Ltd.
Power Plant: two General Electric CT64-820-1 turboprops; each 3,055 ehp.
Dimensions: span 96 ft 0 in, length 79 ft 0 in, height 28 ft 8 in.
Weights: empty 23,157 lb, gross 41,000 lb.
Performance: max cruising speed at 10,000 ft 271 mph, ceiling 30,000 ft, T-O run (on grass) 1,040 ft,

landing run (on grass) 1,020 ft, range with 13,843-lb max payload 507 miles, with max fuel and 4,000-lb payload 2,171 miles.
Accommodation: crew of three; up to 41 combat troops, light artillery pieces, a ¾-ton truck, or equivalent cargo.
Armament: none.

F27 Friendship/Troopship and F50

Most military sales of this short-haul transport were either **Mk 200s**, similar to the basic commercial airline model, or **Mk 400M** dedicated military transports. Pacific/Far East operators are Indonesia, Philippines, Singapore, and Taiwan. The Indonesian Air Force received 12 Mk 400Ms, seven of which remain in service with No. 2 and No. 17 Sqs. Seven remaining Mk 200s equip the Philippine Air Force's No. 221 Airlift Sq. Singapore and Taiwan have, respectively, four and three examples of the improved F50. *(Data for F27 Mk 400M.)*
Contractor: Fokker Aircraft, Netherlands.
Power Plant: two Rolls-Royce Dart Mk 552 turboprops; each 2,210 shp.
Dimensions: span 95 ft 1¾ in, length 77 ft 3½ in, height 27 ft 11 in.
Weights: empty (according to mission) 25,307–26,240 lb, gross 45,900 lb.
Performance: normal cruising speed at 20,000 ft 298 mph, ceiling 30,000 ft, T-O distance 2,310 ft, landing distance 1,900 ft, max range 2,727 miles.
Accommodation: crew of two or three; up to 46 paratroops, 24 litters with nine sitting casualties/medical attendants, or 13,283 lb of cargo.
Armament: none.

HS 748 and Andover

The Royal Australian Air Force continues to operate all 10 of its **HS 748 Series 2s** (RAAF designation **A10**). Based on the standard transport, with 2,105 ehp Dart RDa.7 Mk 531 turboprops, eight serve as aircrew trainers at the School of Air Navigation and two as VIP transports with No. 32 Sq. Two **Series 2As**, with RDa.8 Dart engines, are used for EW training by the Royal Australian Navy. The South Korean Air Force uses two standard Series 2As for communications duties. Five of the nine **Andover C. Mk 1** transports of No. 42 Sq., Royal New Zealand Air Force, were retired in mid–1996, and the remaining four are expected to be withdrawn next year. *(Data for Series 2A.)*
Contractor: Hawker Siddeley Aviation, UK.
Power Plant: two Rolls-Royce Dart Mk 532-2L/S turboprops; each 2,280 ehp.
Dimensions: span 98 ft 6 in, length 67 ft 0 in, height 24 ft 10 in.
Weights: empty 26,700 lb, gross 44,495 lb.
Performance: max cruising speed 278 mph, ceiling 25,000 ft, T-O run 2,750 ft, landing run 1,255 ft, max range 1,987 miles.
Accommodation: crew of two; up to 58 passengers in main cabin.
Armament: none.

Il-76

Comparable with USAF's C-141 Starlifters, Il-76s (NATO "Candid") are the standard medium/long-range airlifters of the CIS and many other air forces and commercial operators worldwide. A rear-loading ramp and advanced mechanical handling systems facilitate the transport of containerized and other freight. The entire interior can be pressurized, making possible the carriage of personnel or perishable supplies.

Air Koryo of North Korea operates two or three civil-registered **Il-76TDs** ("Candid-A") on behalf of the country's air force. Earlier this year, Russian approval was given for China to acquire one Il-76 (variant unknown) to be equipped by Israel Aircraft Industries as an AEW platform, with its Elta radar mounted in a dorsal dome similar to that of the Beriev A-50 ("Mainstay") described on p. 71 of the March 1997 *Air Force* Magazine. *(Data for standard military Il-76MD "Candid-B.")*
Contractor: Ilyushin OKB, Russia.
Power Plant: four Aviadvigatel D-30KP-2 turbofans; each 26,455 lb thrust.
Dimensions: span 165 ft 8 in, length 152 ft 10¼ in, height 48 ft 5 in.
Weights: empty 196,210 lb, max payload 103,615 lb, gross 418,875 lb.
Performance: cruising speed at 29,500–39,350 ft 466–484 mph, T-O run 5,580 ft, landing run 3,280 ft, nominal range with max payload 2,361 miles, max range 4,846 miles.
Accommodation: crew of seven, incl two freight handlers; up to 140 troops, 125 paratroops, or equivalent cargo.
Armament: two 23-mm twin-barrel GSh-23L guns in tail turret.

Islander/Defender

The **Islander** was designed as an easy-to-manufacture and maintain STOL transport. By the beginning of this year, deliveries exceeded 1,200, including military **Defenders** sold to more than 20 export customers. The

YS-11C, Japan ASDF *(Katsumi Hinata)*

Islanders supplied to the Philippine Air Force were retired in 1993, but nine are still flown by the Philippine Navy on transport and SAR duties; these were built on a PADC license assembly line at Pasay in Metro Manila. One Islander flies with an Indonesian Army communications squadron and two Defenders with the Air Force of Cambodia.
Contractors: Pilatus Britten-Norman Ltd, UK; Philippine Aerospace Development Corp., Philippines.
Power Plant: two 260 hp Textron Lycoming O-540-E4C5 or 300 hp IO-540-K1B5 piston engines.
Dimensions: span 49 ft 0 in, length 35 ft 7¾ in, height 13 ft 8¾ in.
Weights (300 hp engines): empty 4,244 lb, gross 6,600 lb.
Performance (300 hp engines): max cruising speed at 7,000 ft 164 mph, ceiling 17,200 ft, T-O run 866 ft, landing run 460 ft, range 1,220 miles with under-wing tanks.
Accommodation: pilot, and up to nine passengers, eight parachutists and a dispatcher, three litter patients and two attendants, or freight.
Armament: none.

N22/24 Missionmaster

The Missionmaster is a military version of the short-fuselage, 13-passenger **N22B** Nomad, used for personnel and equipment transport, forward area support, surveillance, and maritime patrol. The Philippine Air Force's 220th Airlift Wing has 13 for utility, tactical transport, and weather reconnaissance duties. Twenty ex–Australian Army aircraft (14 N22Bs and six stretched **N24Bs**) were acquired earlier this year by the Indonesian Navy, for conversion to Searchmaster configuration. Two of the N24Bs will double as VIP transports. *(Data generally as for Searchmaster: See "Bombers and Maritime" section.)*

NC-212 Aviocar

NC-212 is the designation of Indonesian-built versions of the Spanish-designed CASA STOL utility light transport. IPTN in Jakarta built 29 **Series 100s** before switching to the **Series 200,** which continues in production. The only current operator in the area is Indonesia itself, whose Air Force has four Series 200s, Navy 10 Series 100/200s, and Army six Series 200s. The IAF aircraft equip No. 4 Sq.; those of the Navy serve with No. 600 Sq., and the Army aircraft with No. 2. Six of the Navy Aviocars are configured for maritime patrol and elint.

The Aviocar's rear ramp/door can be opened in flight for LAPES (low-altitude parachute extraction system) and other types of airdrop. The Series 200, which first flew in April 1978, has more powerful TPE331 engines and higher max T-O weight than the Series 100. *(Data for Series 200.)*
Contractor: Industri Pesawat Terbang Nusantara (IPTN), Indonesia, under license from CASA, Spain.
Power Plant: two AlliedSignal TPE331-10R-511C turboprops; each flat-rated at 900 shp.
Dimensions: span 62 ft 4 in, length 49 ft 8½ in, height 20 ft 8 in.
Weights: empty 9,700 lb, gross 16,975 lb.
Performance: max cruising speed at 10,000 ft 227 mph, ceiling 28,000 ft, T-O run 1,445 ft, landing run 656 ft, max range 1,094 miles.
Accommodation: crew of two; up to 24 troops (or 23 paratroops and a jumpmaster), or 12 litters and four medical attendants, light vehicles, or 5,952 lb of containerized or other cargo, in main cabin.
Armament: none.

Y-8

Except for more pointed nose transparencies and a rear-loading ramp/door, the Chinese **Y-8,** which first flew in December 1974, is outwardly indistinguishable from the Antonov An-12BP. It is manufactured without a license, and its redesigned Chinese turboprops have a higher rating than the An-12's AI-20K. Shaanxi is thought to have delivered about 25 to China's Air Force. Basic military version is the **Y-8A,** which can carry helicopters as large as the S-70 Black Hawk. The Y-8B, Y-8F, and pressurized Y-8C are civil models; export Y-8s are designated **Y-8D,** and a **Y-8E** drone carrier has been developed specifically for Chang Hong 1 reconnaissance UAVs.

The prototype of a maritime patrol version, designated **Y-8X,** with a large, drum-shaped under-nose radome, made its first flight Sept. 4, 1985. Its equipment includes Western avionics, infrared camera, infrared submarine detection gear, and sonobuoys. An upgrade with one of the recently ordered Racal Searchwater surveillance radars may be in prospect. *(Data for standard Y-8A.)*
Contractor: Shaanxi Aircraft Co., China.
Power Plant: four Zhuzhou WJ6 turboprops; each 3,825 shp.
Dimensions: span 124 ft 8 in, length 111 ft 7¼ in, height 36 ft 7½ in.
Weights: empty 76,060 lb, max payload 44,090 lb, gross 134,480 lb.
Performance: max cruising speed at 26,250 ft 342 mph, ceiling 34,120 ft, T-O run 4,170 ft, landing run 3,445 ft, range 791 miles with max payload, 3,489 miles with max fuel.
Accommodation: crew of five and 14 passengers in pressurized forward section of fuselage; unpressurized main cabin for 96 troops, 80 paratroops, 92 casualties plus three attendants, or two army trucks.
Armament: provision for two 23-mm guns in manned tail turret.

Y-11 and Y-12

China's Air Force is thought to operate about 15 examples of the Harbin **Y-11,** a small seven/eight-passenger utility transport designed in the mid–1970s and powered by two 285 hp Zhuzhou HS6A radial piston engines. Both the payload (less than a ton) and range (less than 250 miles) of the Y-11 were disappointing, and only about 40 were completed. Instead, HAMC embarked on the **Y-12,** of similar design configuration but substantially larger and powered by turboprop engines. This made its first flight in July 1982, and the **Y-12 (II)** production version received Chinese certification in December 1985. Total orders for the Y-12 (II), which exceed 100, are mainly from civil operators, but Far East/Pacific military operators include China's Air Force (two or more) and the air forces of Cambodia (two) and Laos (seven), the latter being flown in Lao Aviation civil colors. FAA certification of an improved **Y-12 (IV)** model, with a further 17 percent increase in payload, was awarded in March 1995. *(Data for Y-12 (II).)*
Contractor: Harbin Aircraft Manufacturing Corp., China.
Power Plant: two Pratt & Whitney Canada PT6A-27 turboprops; each 620 shp.
Dimensions: span 56 ft 6½ in, length 48 ft 9 in, height 18 ft 7½ in.
Weights: empty 6,261 lb, max payload 3,748 lb, gross 11,684 lb.
Performance: max cruising speed at 9,850 ft 181 mph, ceiling 22,960 ft, T-O run 1,115 ft, landing run with propeller reversal 660 ft, range with max fuel and 45 min reserves 838 miles.
Accommodation: crew of two; up to 17 passengers, 15 paratroops, or equivalent cargo in cabin.
Armament: none.

YS-11

This Japanese-designed twin-turboprop transport first flew in August 1962, the first of 180 production aircraft following in October 1964. Aircraft of the first batch were designated **YS-11-100.** Those of subsequent batches, differing only in operating weights and equipment fit, were **YS-11A** followed by dash numbers -200 through -700. Twenty-three were delivered to the Japanese armed forces. The JASDF still has two 60-seat **YS-11Ps** (YS-11A-100), three flight calibration **YS-11FCs** (-200), one passenger/cargo **YS-11PC** (-300), two all-cargo **YS-11Cs** (-400), two **YS-11E** ECM trainers (-400), two **YS-11EL** elint aircraft (-400), and a **YS-11NT** navigation trainer (-400). Principal transport operators are Nos. 402 and 403 Sqs. One YS-11E was converted by Nippi as a **YS-11E Kai** electronic support measures aircraft, refitted with 3,493 ehp General Electric T64 engines and equipped with J/ALQ-7 ECM, increasing gross weight to 56,659 lb and ceiling to 27,000 ft.

All 10 delivered to the JMSDF remain in service. These comprise two **YS-11Ms** (-100), two **YS-11M-As** (-300/-400), and six **YS-11T-As** (four -200/two -600). The first four are currently allocated to the 61st Sq. at Atsugi for transport duties; the other six, which serve with the 205th Air Training Sq. at Shimofusa, are employed as ASW trainers for the service's P-3 crews. *(Data for YS-11A-200.)*
Contractor: Nihon Aeroplane Manufacturing Co., Japan.
Power Plant: two Rolls-Royce Dart Mk 542-10K turboprops; each 3,060 ehp.
Dimensions: span 104 ft 11¾ in, length 86 ft 3½ in, height 29 ft 5½ in.
Weights: empty 33,179 lb, max payload 15,322 lb, gross 54,010 lb.
Performance: max cruising speed at 15,000 ft 291 mph, ceiling 22,900 ft, T-O field length 3,650 ft, landing field length 2,170 ft, max range 2,000 miles.
Accommodation: crew of two; up to 64 passengers.
Armament: none. ■

An Air Force Association
National Symposium
and Annual Air Force Ball

National Security
The Space Dimension

November 14, 1997

The Beverly Hilton Hotel
Los Angeles, Calif.

The AFA Symposium

America's capabilities in air and space have been a unique source of national strength, enabling us to project power and influence around the world and to sustain our position of leadership in world affairs. Our symposium will examine the key security issues affecting the aerospace community during the next century with emphasis on space and the vulnerabilities of the "Information Age." Invited speakers include:

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Mr. Peter S. Hellman, President and COO, TRW, Inc.

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The cost to attend the Symposium is $325 for AFA members and $375 for nonmembers. The registration fee includes a continental breakfast, refreshments, and lunch. Additional luncheon tickets are available at $40 each. To register, call Jennifer Krause at (800) 727-3337 ext. 5838, E-mail: JKrause@afa.org, or, for information twenty-four hours a day, call ext. 2030. To have information faxed to you call AFA Fax Reply service at (800)-232-3563, order document #320. Visit our web site at: www.afa.org/lasymp.html.

The Air Force Ball

The twenty-sixth Annual Air Force Ball will also be held this year at the Beverly Hilton Hotel. We will celebrate the Golden Anniversary of the Air Force. In addition, the evening will include a special tribute to Hollywood's film and entertainment industry for its support of the military. For additional information on the Ball and to reserve tickets and/or a table, please call Henry Sanders at (310) 645-3982. E-mail: Sandersh@pacbell.net.

Beverly Hilton Hotel

Please identify yourself as an AFA member when you call the Hilton at (310) 274-7777 (or 800-Hiltons) to make reservations at the special rate plus tax of $150.00 per night, single, or $170.00 double. Reservations at this rate will be accepted through October 10, 1997.

Sponsorship

The Air Force Symposium and Air Force Ball are sponsored by the Air Force Association and its Los Angeles Chapters which include the General Bernard A. Schriever Los Angeles Chapter, the General Doolittle Los Angeles Area Chapter and the Orange County General Curtis E. LeMay Chapter.

USAFA's Outstanding Squadron, 1997

By James A. McDonnell Jr.

In May 1997, the United States Air Force Academy's 12th Cadet Squadron, also known as the "Dirty Dozen," was named winner of AFA's Outstanding Squadron Trophy. This award marked the 12th as the best of the Academy's 40 squadrons, based on military, academic, and athletic achievements. This was the 38th annual competition.

The black-tie dinner at which the award is announced is sponsored jointly each year by AFA and its Colorado Springs/Lance Sijan Chapter. (The chapter also sponsors a symposium as part of the predinner festivities that week.) Some 500 guests, including AFA and Air Force leaders as well as family and friends of the cadets, were in attendance to honor the 12th as it carried off its first Outstanding Squadron Trophy.

The spring cadet squadron commander, Cadet Lt. Col. Elizabeth A. Benson, highlighted for the audience the reasons the 12th was there that evening.

"There were three main factors—teamwork, motivation, and persistence in the face of challenges," she said, adding, "There was no one event or accomplishment that secured our position as Outstanding Squadron, but the combined efforts of every member of the Dozen made this possible. ... It was the team spirit in intramural competition, community service projects, or marching to lunch—even out of order, but together—that won this for us."

Benson said, "We were self-motivated and also motivated by our squadron mates to do the right thing. In pursuing that goal, we found ourselves contenders for the Outstanding Squadron."

The third quality she mentioned was persistence in the face of challenges. "We have each had our times this past year when we were ready to give up the fight," she noted. "Perhaps we had enough of the flying program, or restrictions, or academics, or morning marching practice, or any one of a number of other things that each person found challenging. But despite this,

we looked ahead to the ultimate goal we had set for our squadron—to do the right thing—and found that when we persisted, that became achievable."

Squadron members did persist in all of the three elements that contributed to the total success. Militarily, some of its members were in the national and international award-winning Academy Honor Guard. Others held wing and group staff positions, and one has been selected as group commander for the 1997–98 academic year.

In sports, members of the 12th contributed to USAFA national titles in karate, Nordic skiing, and triathalon. One, who lettered in basketball for four years, was the team captain in 1997. Individual squadron members were standouts in wing, triservice, and Western Athletic Conference competition.

Throughout the year, members of the Dirty Dozen were high in overall academics. Two of the number one ranking students in their majors for this academic year were 12th members. One was a Phi Beta Kappa selection.

At the dinner, this year's "returning cadet" was Air Force Reserve Col. Ronald M. Sega, dean of the College of Engineering and Applied Science, University of Colorado at Colorado Springs.

A distinguished graduate of the USAFA class of 1974 and holder of an M.S. in physics from Ohio State University and a doctorate in electrical engineering from the University of Colorado, he also taught in the Department of Physics at the Academy from 1979 to 1982. He became an astronaut in 1991 and flew on the first joint US–Russian space shuttle mission in 1994. In 1996 he was the payload commander for the third docking mission to the Russian space station Mir. He also served in 1994–95 as the NASA director of operations at the Gagarin Cosmonaut Training Center, Star City, Russia, responsible for managing NASA activities there. He was the first American to train in the Russian extravehicular activity suit.

Sega held the attention of cadets and audience alike with a visual presentation on his spaceflights, highlighting the daily activities of an astronaut in space. He also specifically addressed the cadets on what his Academy training meant to him as a foundation for his space activity and also his work in the Air Force where, as a command pilot, he amassed more than 4,000 hours. He observed that the priceless aspect of the Academy experience was the ability to welcome new experiences and adapt to changing circumstances. As he noted, having attended a military academy at the height of the Cold War, he never expected to be spending the 1990s working in space and in spaceflight preparation with Russian cosmonauts. But he realized, he said, that the Academy preparation gave him a strong foundation that allowed him to seize opportunities as they arose. He urged the cadets to be open to the new experiences that would undoubtedly await them as they go on to serve in the 21st century.

Benson, in her remarks, showed agreement in principle as she asked her fellow classmates to remember what brought them the award that night was not trying to win awards but rather trying to do "the right thing all the time." Quoting Gen. George S. Patton Jr., she said, "If I do my full duty, the rest will take care of itself." ■

AFA / AEF National Report

By Frances McKenney, Assistant Managing Editor

AFA Puts a Stamp on It

Working with the US Postal Service, AFA came up with its own "First Day of Sale" cover featuring the new commemorative 32-cent postage stamp that honors the Air Force's 50th anniversary as a separate service.

A first day cover, which is prized by stamp collectors, includes the envelope, stamp, "first day of sale" cancellation, and cachet or the printed design on the envelope. The AFA cover's envelope includes the American flag, a version of the USAF coat of arms, and the distinctive AFA logo, as well as the commemorative Air Force stamp. The postmark is Arlington, Va., where Orville Wright taught some early US military aviators.

The 50th-anniversary stamp was unveiled last December and features the USAF Thunderbirds in their famous diamond formation. It went on sale on Sept. 18, the official date for establishment of the Department of the Air Force. AFA's first day cover is also on sale.

AFA's First Day Cover showcases the US Air Force 50th-anniversary postage stamp. The collectible also features AFA's logo and the postmark of Arlington, Va., site of the first US military aviation trials.

Philatelists will note that the 1997 USAF stamp is not the first 50th-anniversary Air Force postage stamp. On Aug. 1, 1957, the Postal Service issued a golden-anniversary, six-cent, airmail-denomination stamp that marked a half-century since creation of the Aeronautical Division, US Signal Corps in 1907.

With help from former AFA Executive Director Russell Dougherty (left), current AFA Executive Director John Shaud (right) caught up with outgoing Chief of Staff Gen. Ronald R. Fogleman at home immediately before his departure from Washington and presented him with an Aerospace Education Foundation Jimmy Doolittle Fellowship.

To Remember Jimmy Stewart

The death of Jimmy Stewart in July brought a flood of phone calls and letters to the Aerospace Education Foundation from AFA members who wanted to establish a memorial fund named after the actor.

Already an Academy Award winner when World War II began, Stewart interrupted his film career to volunteer for military service and flew combat missions in the European Theater. He retired in 1968 as a brigadier general in the Air Force Reserve. He was one of AFA's 12 founders and had served as an AFA national director until his death.

In a letter to Stewart's children, AFA National President Doyle E. Larson wrote, "While others will certainly recognize your father for his achievements in the entertainment field, we will remember him as a great patriot."

Depending on the amount of the

Representing AFA at the opening of the American Air Museum in Britain, Ivan McKinney, national vice president (South Central Region) (center), met former British Prime Minister Margaret Thatcher, who expressed to him profound gratitude for the role of US airmen in World War II.

final endowment, the Jimmy Stewart Aerospace Education Fund will fund scholarships to encourage young people to seek careers in the Air Force or in science and technology. It may also fund grants to help teachers design and implement math, science, and technology programs.

Although the Jimmy Stewart Fund is brand-new, AEF Staff Director Darrell Hayes said several AFA members have already donated substantial amounts. "They feel so strongly about the values that this man had," he explained.

AFA at American Air Museum

The Aug. 1 opening of the American Air Museum in Britain offered a chance to chat with former British Prime Minister Margaret Thatcher, actor Charlton Heston, and other notables, along with some 4,000 US veterans. It was a chance of a lifetime, said Ivan L. McKinney.

National vice president for the South Central Region, McKinney represented AFA at the opening of the museum, dedicated by Queen Elizabeth II. Her husband, Prince Philip, son Prince Andrew, Air Force Secretary Sheila E. Widnall, and retired Adm. William J. Crowe Jr., US ambassador to Britain and former Chairman of the Joint Chiefs of Staff, also attended the ceremony. Heston, a sergeant in World War II, and Field Marshall Lord Bramall, former chief of the British Defense Staff, were co-chairmen of the museum's fundraising efforts.

McKinney told Thatcher that he represented the 160,000-member Air Force Association, many of whose members served in Britain during World War II. "She thanked me profusely," he said.

The American Air Museum in Britain, at Duxford, UK, houses 21 historic US combat aircraft, ranging from a WWI Spad XIII to an A-10 Thunderbolt. Some, such as a P-51 Mustang, U-2, and F-100 Super Sabre, are suspended from the ceiling in the 70,000–square foot building. The collection also includes an Avenger—stenciled with "Lt. j.g. George Bush"—representing an aircraft flown by former President George Bush in the Pacific in WWII, McKinney said.

Duxford served as a Battle of Britain fighter station and later as a 78th Fighter Group, 8th Air Force, base for strategic bombing missions against Germany. Duxford Airfield became part of London's Imperial War Museum in 1976 and broke ground for the American Air Museum in 1995 not only to exhibit its collection of US warplanes but to pay tribute to US airmen.

The A-2 Incentive

The original Type A-2 Summer Flying Jacket, first produced in 1931 and issued for flying duty during World War II, was seal-brown horsehide, lined with light brown spun silk. It became a highly coveted status symbol, often personalized with patches, insignia, and painted artwork on its back.

When a USAF 50th-anniversary version—made of goatskin, as is the current-day USAF jacket—appeared, authorized for sale to AFA members, the **Quad Cities (Ill.) Chapter** saw an opportunity.

In June, the chapter set up a booth at the Quad Cities Air Show at the Davenport Airport, Iowa, and put an A-2 jacket, donated by Litton Life Support, on display as a lure: Join AFA or renew membership and win the jacket in a drawing. Chapter President Richard W. Asbury said the jacket attracted at least four new members and several renewals.

Asbury, Chapter Vice President William C. Vickrey, and members Eugene S. Chaney and Edmond J. Arnould Jr. manned the booth at the two-day air show. Brian MacComber, commander of the cadets at Rock Island (Ill.) High School's JROTC program, also volunteered at the booth. His JROTC instructor is chapter member David Jirele.

Taking Action

Alerted by a Navy petty officer, two AFA chapters initiated actions to stop a "serious injustice" to one of the aircrew of the *Enola Gay,* the B-29 that dropped an atomic bomb on Hiroshima in 1945.

AFA National President Doyle Larson attended the California State Convention at March Field in August and spoke to the audience about the Quadrennial Defense Review. Maj. Gen. Eugene Tattini, Sacramento Air Logistics Center commander, was keynote speaker. The Bob Hope Chapter hosted the event.

The Karpeles Manuscript Library in Jacksonville, Fla., had been displaying a letter from Col. Thomas Ferebee, USAF (Ret.), the bombardier on the *Enola Gay,* among a group of nine letters and notes that it termed the "Madman Collection." The other letters were written by notorious killers, such as Charles Manson and the "Boston Strangler."

Petty Officer 1st Class Lanny W. Cusimano, assigned to the nuclear submarine USS *Maine* in Kings Bay, Ga., saw coverage of the exhibit in a Florida newspaper. He contacted **Savannah (Ga.) Chapter** President Edward I. Wexler, who in turn alerted Florida State President Robert E. Patterson of the **Eglin Chapter.**

Patterson immediately wrote to the director of the library, asking that the Ferebee letter be removed from the collection. "Including Colonel Ferebee with the killers does a serious injustice to all the US military men who fought against the Japanese and Germans in World War II," he wrote.

Within days, the director of the privately funded library wrote back to explain that they never meant for the Ferebee letter to be "seen in the same way as the others." The director also stated that after reading the newspaper article, they realized "that this was a problem." The director said the Ferebee letter had been removed from the exhibit and would not be included in any future "Madman" exhibits.

Field Trip

In June, **Lester W. Johnston (Ind.) Chapter** members visited the Grissom Air Museum, located next to Grissom ARB, Ind.

They toured an outdoor display of 15 historic aircraft, including World War II classics such as the B-17 and C-47; postwar examples like the B-47, KC-97, F-100, and C-119; Vietnam War "veterans" such as the F-105 and F-4; and an A-10 and EC-135 from Desert Storm. Also on display was a B-58 Hustler, one of only eight left in the world, according to the museum's director, John Marsh.

At the museum, chapter members, including Ted Heckman, president, and Edna M. Johnston, secretary-treasurer, also walked through the 6,000–square foot indoor displays of aviation equipment, armament, uniforms, memorabilia, and art.

Johnston said the visit to Grissom was especially meaningful to her because her husband, a Navy veteran who served in World War II and Korea, was a member of the first group to complete basic training at what was then NAS Bunker Hill. A public relations practitioner before he died in 1974, Johnston joined AFA's Logansport Chapter (later renamed for him) because he understood the importance of the Air Force to the community's economy.

Welcome, Y'All

Arthur L. Money, assistant secretary of the Air Force for acquisition, and Gen. Lloyd W. Newton, commander of Air Education and Training Command, were the main speakers at the Texas State Convention in July, hosted by the **Fort Worth Chapter.** Other special guests at the convention were former Speaker of the House Jim Wright, Rep. Kay Granger (R–Tex.), and AFA Chairman of the Board Gene Smith.

The Langley Chapter's annual "Salute to Air Combat Command" brought many distinguished guests to Langley AFB, Va. Left to right are Charles Durazo, national vice president (Central East Region), Margaret Durazo, and Gen. Richard Hawley, ACC commander. Other special guests included then–Chief of Staff Gen. Ronald Fogleman and Medal of Honor recipient Bernard Fisher.

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Charles Poyner (far right), vice president of the newly established United Kingdom Chapter, showed off the group's charter to (l–r) chapter member Col. Charles Royce, 627th AMSS commander; Roy Whitton, who was visiting from the Florida Highlands Chapter; and chapter member Col. Jeffrey Kohler, 100th Air Refueling Wing commander.

At the noon awards luncheon, Newton spoke about training issues, including the quality of new recruits and the success of Joint-service training. He also presented AFA awards to Lt. Col. George Nicolas Jr.; Capts. Keith P. Boone, R. Christopher Stockton, and Patrick M. Shortsleeve; TSgt. Michael S. Adams, SSgt. Clay C. Dublin, and Jeffrey M. Fortney. They are all from AETC.

An honored guest at the luncheon was Brig. Gen. Daniel James III. The Texas ANG adjutant general received the AFA Texas Benjamin Foulois First Flight Award. He is the son of the first African-American four-star, USAF Gen. Daniel "Chappie" James Jr.

Among the many award winners who received honors either at the luncheon or at the evening's banquet were the **Northeast Texas Chapter,** bagging three significant awards: Chapter of the Year, a membership award, and a Community Partner Membership Award. The **Aggieland Chapter** and **Alamo Chapter** also received membership and Community Partner membership awards, respectively.

Kaye H. Biggar of the **Alamo Chapter** was named 1996–97 Texas Person of the Year, in part to recognize the time and energy he devotes to the *USA Today*/AEF Visions of Exploration program in the state.

Virginia Convention

The Virginia State Convention in Alexandria, Va., in July featured a "Salute to the Airpower Caucus," with a keynote speech by Lt. Gen. Brett Dula, vice commander of Air Combat Command, and remarks by Rep. Saxby Chambliss (R–Ga.).

Chambliss and Rep. Norman D. Dicks (D–Wash.) had organized the bipartisan airpower caucus in the House of Representatives earlier this year, with an initial group of 21 other Republicans and 19 other Democrats.

Hosted by the **Donald W. Steele Sr. Memorial Chapter,** the state convention drew 200 guests.

During the convention's awards luncheon, George Aguirre of the **Leigh Wade Chapter** received a Chapter Leadership Award. George D. Golden, state president, also announced that Aguirre had won an Exceptional Service Award for 1997. Glen E. Thompson, chapter president, describes Aguirre as "the mover and shaker" of the 138-member group, centered in Petersburg, Va.

Golden also presented the Leigh Wade Chapter officers with an AFA flag. The state AFA organization gives the flag to a different chapter each year to recognize chapter growth and contributions.

Emerald City Gathering

With the **Lt. Erwin R. Bleckley Chapter** serving as host, Emerald City—the huge recreational complex on McConnell AFB—was the site for the Kansas State Convention in July.

AEF President Walter E. Scott conducted a workshop on the foundation's goals and activities and also was the luncheon speaker.

The evening's banquet featured a keynote speech by Brig. Gen. Robert F. Behler, director, C^4 systems, at US Strategic Command, Offutt AFB, Neb. He spoke about the Air Force's 50th anniversary and also contrasted older fighters with the F-22, which, when it enters the force, will be USAF's first new fighter in 30 years.

He also presented certificates of

At the Texas State Convention, Gen. Lloyd Newton (left), AETC commander, and Thomas Kemp (right), then state president, presented the Texas AFJROTC Cadet of the Year award to Sarah Schirmer of Samuel Clemens High School in Schertz, Texas.

appreciation to several members of the 22d Air Refueling Wing at McConnell. The 184th Bomb Wing (ANG) and the 931st Air Refueling Group (AFRC) from McConnell AFB were also recognized. Several members of the 190th Air Refueling Wing (ANG) at Forbes Field, Kan., were also named but will receive their awards at a later presentation ceremony.

For setting up the AFA Kansas home page on the World Wide Web and his service as chapter secretary and newsletter publisher, Donald G. Kohl of the Bleckley Chapter received the AFA Kansas Member of the Year Award. Kohl joined AFA in 1994 and immediately became an active volunteer.

Lt. Col. David W. Jensen, the Bleckley Chapter's communication's vice president and state vice president, received his chapter's Member of the Year Award.

Iowa State Convention

The **Gen. Charles A. Horner Chapter** hosted the Iowa State Convention in Des Moines in July, where Brig. Gen. Roger Schultz, the state's deputy adjutant general, gave a dynamic speech on integrity.

Marvin L. Tooman, Horner Chapter president, said the general's "uplifting speech" was especially inspiring to the ROTC cadets at the convention.

During the convention's business session, Louis Rapier was reelected state president, and Charles H. McDonald and Von L. Blunt were reelected as treasurer and secretary, respectively. John Politi, national vice president (Midwest Region), was among those who presented information at the session. He spoke on AFA's initiatives and future directions.

The convention's luncheon speaker, Lt. Col. John McDonald, director of operations at the 132d Fighter Wing (ANG), described the unit's operations. Last year, the 132d participated in Operation Provide Comfort II, flying out of Incirlik, Turkey. This fall they were headed for Kuwait to take part in Southern Watch.

Following lunch, the conventiongoers boarded buses to tour the unit's facilities at the Des Moines IAP. Tooman said shop supervisors gave short briefings on their missions, which helped make the tour a memorable highlight of one of the state's most successful conventions.

Donald E. Persinger, who was reelected state vice president at the convention, received the first AFA Member of the Year award given in Iowa. A member of the **Richard D. Kisling Chapter,** he was honored as a charter chapter member and also because he had added 30 Community Partners to the group's rolls.

Full House

Rep. Ray LaHood (R–Ill.) addressed a full house when he spoke at a **Land of Lincoln (Ill.) Chapter** meeting in July.

Rep. John M. Shimkus (R–Ill.) and Karen Hasara, mayor of Springfield, Ill., also attended the event, held in the dining hall of the 183d Fighter Wing at Capital MAP, Ill.

LaHood, a member of the House Committee on Veterans' Affairs, spoke about the significant role of the Air National Guard. He also helped present the chapter's Community Support Award to Hanson Engineering, a civil and structural engineering business that has been a steady supporter of Air Force and chapter activities. John Newman, chapter secretary, said that when visitors from the Polish Air Force

came to the area recently, Hanson Engineering hosted a citywide reception for them.

A first-term congressman, Shimkus spoke to the audience about his military service. He is a graduate of the US Military Academy and served for five years in the Army. Since 1985, he has been in the Army Reserve.

Fore and More

The **Tucson (Ariz.) Chapter's** 14th annual golf tournament attracted 128 players to the Davis-Monthan AFB golf course in May.

James I. Wheeler, chapter president, said Community Partners, city merchants, and other businesses sponsored players and events, including hole-in-one prizes on each par 3 hole, one of which was worth $5,000. Funds raised by the tournament will help the chapter support the Wright Flight and Visions of Exploration educational programs and its awards program for Davis-Monthan personnel.

Nearly 100 guests attended the most recent awards banquet at the base's officers' club, where 16 awards were presented to active-duty, Reserve, Guard, JROTC, and civilian honorees.

In his remarks at the banquet, Brig. Gen. (sel.) Barry W. Barksdale, who was the 355th Wing commander, praised the chapter and its Community Partners for their support of the wing's personnel and activities.

In June, Wheeler and Temple S. Robinson, chapter awards vice president, attended the Davis-Monthan commencement ceremony for the Community College of the Air Force, where eight AEF Eagle Grant Awards were presented. TSgts. Louis Anoff and Manuel Carbajal, SSgts. Laurance Messick and Nanci Pigeon, and Senior Airmen Kathryn Hooper, Steven Ostrov, Paulette Pereira, and Katie Piggott received the $250 scholarships.

AFA on Display

The **Lloyd Schloen–Empire (N.Y.) Chapter** set up an AFA display in the windows of an abandoned store in downtown Amityville, N.Y., as part of a community drive to revitalize the area.

The AFA showcase and others in the town's "Adopt-a-Window" program were officially unveiled during Amityville's Fourth of July celebration. William G. Birnbach, chapter president, Lorraine A. Birnbach, treasurer, and Maxine Donnelly, chapter vice president for aerospace education, were joined by Civil Air Patrol members at the windows to answer questions about their organizations and USAF's 50th anniversary.

Unusual memorabilia included the rib of a World War I aircraft, lent by the Cradle of Aviation Museum at Mitchel Field, N.Y. Among the scores of other items were a uniform from Vietnam War veteran Diane Maxwell, AFA awards and banners, and many toys with an Air Force theme.

Two weeks after AFA's windows debuted, the space was leased to a new store, and the display had to be disassembled. The new store owner, however, made a donation to the Air Force Memorial Foundation.

More Chapter News

Albuquerque (N.M.) Chapter President Edward S. Tooley attended the annual awards banquet for Espanola Valley High School in Espanola, N.M., to present an AFA citation and medal to AFJROTC Cadet LyAnn Villalobos.

For a two-month display commemorating Armed Forces Day, the chapter provided the commissary at Kirtland AFB, N.M., with an AFA poster and color prints of military airplanes.

Robert M. Robbins, a member of the **Gen. James R. McCarthy (Fla.) Chapter,** was one of 16 aviators selected for the 1997 Gathering of Eagles sponsored by the International Association of Eagles. As part of the event, Robbins autographed copies of a lithograph depicting a KC-97 refueling an RB-47. Proceeds from the sale of these signed prints benefitted AEF.

The **Colorado Springs/Lance Sijan (Colo.) Chapter** awarded Stuart C. Low, then a senior at Sierra High School in Colorado Springs, its Jim Irwin Memorial Scholarship. The $1,000 scholarship is named for Apollo 15 astronaut James B. Irwin, who had served at Air Defense Command in Colorado Springs and had been an AFA member before his death in 1991 of a heart attack.

Have AFA/AEF News?

Contributions to "AFA/AEF National Report" should be sent to *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Phone: (703) 247-5828. Fax: (703) 247-5855. ■

Unit Reunions

Arc Light/Young Tiger crew members. May 14–17, 1998, at the Harvey Hotel Dallas, DFW Airport in Irving, TX. **Contact:** Mike Vairo, 4509 Ocean Valley Ln., San Diego, CA 92130. 619-259-1536 (home) or 619-824-8908 (work) (mike_vairo@Lajolla.sparta.com).

Augusta Military Academy. May 1–2, 1998, at the Holiday Inn Golf and Conference Center in Staunton, VA. **Contact:** Ed Click, RR 1, Box 12, Fort Defiance, VA 24437-9703. 540-248-0507. Jim Councill, 103 Alanwood Dr., Ormond Beach, FL 32174-4605. 904-672-2217.

Chambley AB, France, personnel. April 17–20, 1998, in San Diego. **Contact:** C.R. Timms, PO Box 293, Fair Play, SC 29643. 864-972-2020.

SAC Airborne Command Control Assn. Oct. 7–11, 1998, in Colorado Springs, CO. **Contact:** R. Doolittle, 3714 E. Mineral Pl., Littleton, CO 80122. 303-741-6087.

17th Weather Sq Assn (WWII). June 24–28, 1998, in St. Louis. **Contact:** James F. Van Dyne, 725 N. Hawkins Ave., Akron, OH 44313. 330-867-3754.

Mail unit reunion notices well in advance of the event to "Unit Reunions," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information.

Pilot Class 48-A. Feb. 26–March 1, 1998, at Randolph AFB, TX. **Contact:** Jack Miller, 9604 Azalea Cir., San Antonio, TX 78266-2501. 210-651-6453.

Aviation Cadet Class 52-B. Oct. 5–8, 1998, at the Sheraton Myrtle Beach Hotel in Myrtle Beach, SC. **Contact:** Jack Lee, 14 Morrison Rd., Windham, NH 03087. 603-432-9632.

Pilot Training Class 52-F (Bartow AFB, FL). Sept. 20–23, 1998, at the Embassy Suites Resort, South Lake Tahoe, CA. **Contact:** R.I. Welch, 3419 Churin Dr., Mountain View, CA 94040. 415-965-1181.

Pilot Training Class 54-D (Bartow AFB, FL). Oct. 24–26, 1997, at the Quality Inn Heart of Charleston, Charleston, SC. **Contact:** Robert R. Neel, 7500 Gila Rd. N.E., Albuquerque, NM 87109. 505-821-4270.

55th Strategic Recon Wg Assn. May 21–23, 1998, in Colorado Springs, CO. **Contact:** Chuck Holte, 8025 Tally Ct., Colorado Springs, CO 80920. 719-572-8567.

Pilot and Navigator Class 57-L (Bryan and Reese AFBs, TX, and Mather AFB, CA). April 17–19, 1998, in Phoenix. **Contact:** Richard D. Jerome, 20432 N. 109th Dr., Sun City, AZ 85373. 602-566-0982 or 602-956-9666 (Dan Blanton).

60th/337th FIS (Westover AFB, MA). Oct. 9–12, 1997, in Phoenix. **Contact:** Norm Lockard, 4907

Books

Compiled by Chanel Sartor, Editorial Associate

Archer, Robert D., and Victor G. Archer. *USAAF Aircraft Markings and Camouflage 1941–47: The History of USAAF Aircraft Markings, Insignia, Camouflage, and Colors.* Schiffer Publishing Ltd., 4880 Lower Valley Rd., Atglen, PA 19310. 1997. Including photos, appendices, and index, 350 pages. $79.95.

Arkin, William M. *The US Military Online: A Directory for Internet Access to the Department of Defense.* Brassey's, Inc., 22883 Quicksilver Dr., Ste. 100, Dulles, VA 20172. 1997. Including index and tables, 240 pages. $29.95.

Avery, Max, with Christopher Shores. *Spitfire Leader: The Story of Wing Cdr. Evan "Rosie" Mackie, DSO, DFC and Bar, DFC (US), Top Scoring RNZAF Fighter Ace.* Grub Street, The Basement, 10 Chivalry Rd., London SW11 1HT, UK. 1997. Including photos, appendices, bibliography, and index, 188 pages. $29.95.

Bell, Dana. *Air Force Colors Vol. 3: Pacific and Home Front 1942–47.* Squadron/Signal Publications, 1115 Crowley Dr., Carrollton, TX 75011-5010. 1997. Including photos and appendix, 95 pages. $14.95.

Birdwell, Dwight W., and Keith William Nolan. *A Hundred Miles of Bad Road: An Armored Cavalryman in Vietnam 1967–68.* Presidio Press, 505 B San Marin Dr., Ste. 300, Novato, CA 94945-1340. 1997. Including glossary, appendix, and photos, 218 pages. $24.95.

Butrica, Andrew J., ed. *Beyond the Ionosphere: 50 Years of Communication.* US Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328. 1997. Including glossary, appendices, and index, 321 pages. $31.00.

Carroll, Warren. *Eagles Recalled: Air Force Wings of Canada, Great Britain, and the British Commonwealth, 1913–45.* Schiffer Publishing Ltd., 4880 Lower Valley Rd., Atglen, PA 19310. 1997. Including photos, glossary, and bibliography, 238 pages. $79.95.

Churchill, Jan. *Hit My Smoke!: Forward Air Controllers in Southeast Asia.* Sunflower University Press, 1531 Yuma, PO Box 1009, Manhattan, KS 66505-1009. 1997. Including references, appendices, glossary, and index, 220 pages. $25.95.

Corum, James S. *The Luftwaffe: Creating the Operational Air War, 1918–40.* University Press of Kansas, 2501 W. 15th St., Lawrence, KS 66049. 1997. Including photos, bibliography, index, and notes, 378 pages. $39.95.

Head, William, and Earl H. Tilford Jr., eds. *The Eagle in the Desert: Looking Back on US Involvement in the Persian Gulf War.* Praeger Publishers, 88 Post Rd. W., Westport, CT 06881. 1996. Including glossary, bibliography, and index, 350 pages. $24.95.

Huchthausen, Peter A., and Nguyen Thi Lung. *Echoes of the Mekong.* The Nautical & Aviation Publishing Company of America, 8 W. Madison St., Baltimore, MD 21201. 1996. 166 pages. $24.95.

McMaster, H.R. *Dereliction of Duty: Lyndon Johnson, Robert McNamara, The Joint Chiefs of Staff, and the Lies that Led to Vietnam.* HarperCollins Publishers, Inc., Special Markets Department, 10 East 53d St., New York, NY 10022. 1997. Including notes, bibliography, and index, 446 pages. $27.50.

Means, Louis S. *The Quality of Mercy.* Order from: Pelican Press, PO Box 1766, Aptos, CA 95001-1766. 1996. Including photos, 300 pages. $19.95.

Michel, Marshall L. III. *Clashes: Air Combat Over North Vietnam 1965–72.* Naval Institute Press, 118 Maryland Ave., Annapolis, MD 21402-5035. 1997. Including appendices, notes, bibliography, index, and photos, 340 pages. $32.95.

Shaw, Frederick J. Jr., and Timothy Warnock. *The Cold War and Beyond: Chronology of the United States Air Force, 1947–97.* US Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328. 1997. Including photos, 163 pages. $3.75.

Smith, Robert M. *With Chennault in China: A Flying Tiger's Diary.* Schiffer Publishing Ltd., 4880 Lower Valley Rd., Atglen, PA 19310. 1997. Including photos, appendices, bibliography, and index, 175 pages. $29.95.

Smith, Truman. *The Wrong Stuff: The Adventures and Mis-Adventures of an 8th Air Force Aviator.* Southern Heritage Press, Military and Local Histories, PO Box 10937, St. Petersburg, FL 33733. 1996. Including index and photos, 358 pages. $15.95.

Swancara, John W. *Project 19: A Mission Most Secret.* Honoribus Press, PO Box 4872, Spartanburg, SC 29305. 1996. Including photos, notes, references, glossary, and index, 302 pages. $19.95.

Ward, Don. *The Faces Behind the Names: The Vietnam War.* Order from: The Memorial Press, 2400 W. 102d Street, Bloomington, MN 55431. 1996. Including photos and appendices, 517 pages. $50.00

Wright, Bill. *Rearwin: A Story of Men, Planes, and Aircraft Manufacturing During the Great Depression.* Sunflower University Press, 1531 Yuma, PO Box 1009, Manhattan, KS 66505-1009. 1997. Including photos, appendices, and index, 300 pages. $26.95. ■

W. Royal Palm Rd., Glendale, AZ 85302. 602-931-2133.

80th FG "Burma Banshees." May 22–26, 1998, in Minneapolis. **Contact:** Hal Doughty, 3620 McElroy St., Eau Claire, WI 54701. 715-835-5866.

86th Fighter-Bomber Gp Assn. May 14–17, 1998, in Atlanta. **Contact:** R.P. Teeple, 5835 Riverwood Dr. N.W., Atlanta, GA 30328-3728. 404-255-2983 (ftwt08a@prodigy.com).

321st BW (McCoy AFB, FL). April 23–26, 1998, in Charleston, SC. **Contact:** John H. Bozard, 8607 River Oaks Dr., North Charleston, SC 29420. 803-552-5290.

862d Engineers Aviation Battalion (1942–57). May 28–29, 1998, at the Holiday Inn Southeast in Indianapolis. **Contact:** Sherl Hasler, RR 5, Box 25B, Bloomfield, IN 47424. 812-384-4666.

1938th Airways and Air Communications Systems Sq, 72d BW, and assigned units, Ramey AFB, PR. March 1–8, 1998. **Contact:** Ken Coombs, PO Box 422, East Wakefield, NH 03830. 603-522-8365. ■

Bulletin Board

Seeking **Worman and Fender** and other members of **Pilot Class 48-A** who graduated from Williams AFB, AZ. **Contact:** Luis E. Finol, 5242 Tennis Ln., Delray Beach, FL 33484-6637.

Seeking information on **TAC's AFETS. Contact:** David Trotter, 5045 S. Olathe Cir., Aurora, CO 80015-4187.

Seeking **Sonia Chapman** who married **Robert Cummings,** former MP, at RAF Ruislip, UK, 1957–60. **Contact:** Ann Simmons Pearson, 33 Dean Gardens, Portslade, Brighton, East Sussex BN41 2FW, UK.

Seeking photos or video of **Titan II launch/Titan missile complex,** Davis-Monthan AFB, AZ. **Contact:** Kermit Thompson, 104 Welcome View Dr., Greenville, SC 29611.

Seeking information and photos of B-24D ***The Squaw,*** #41-23795, 98th BG, 9th AF, North Africa, WWII. Also seeking 98th BG Assn members. **Contact:** P. Carr, 45 Dovecote, Lakes Ln., Newport Pagnell MK16 8BB, UK.

Seeking SAS members **Maj. Rooney, Capt. Walters, and Lt. Laws,** dropped in the Trois-Fontaines Forest, August 1944. **Contact:** Jacques Adnet, 4360 Diamondback Dr., Colorado Springs, CO 80921-2364 (JacquesAdnet @juno.com).

Seeking **Salvador Christopher Martinez,** paratrooper, 82d Airborne Div., Camp Pickett, VA, 1940s. **Contact:** Hazel Pitts Williams, 836 Allens Creek Rd., Gladstone, VA 24553.

Seeking **Lts. Walter Bachman and Thomas Clark and crew chief A3C Henry Larocue,** whose C-46 from Kansas to Delaware went down near Intercourse, PA, in 1956. **Contact:** Sam Stoltzfus, 3184-A West Mill Ln., Gordonville, PA 17529.

Seeking photos, memorabilia, and members of the **Alaskan Air Command Band** (752d AF Band). **Contact:** Robert P. Herndon, PACAF Band in Alaska, Bldg. 4-810 F St., Elmendorf AFB, AK 99506-2380.

Seeking **RAF cadets** and flight instructors based at **Carlstrom Field,** FL, March–July 1941. **Contact:** Edna M. Dawes, 2 Penrith Rd., Boscombe Manor, Bournemouth, Dorset BH5 1LT, UK.

Seeking photos, stories, and information on the **recognition and night fighter squadrons** and the **320th and 17th BG** B-26 Marauders, Dijon, France, September 1944–May 1945. **Contact:** Richard C. Mayerat, 97 Church St., East Aurora, NY 14052.

Seeking persons in **Vinh Long, Vietnam,** summer 1967, who witnessed the tail flying off a HAL-3 Det 3 Helo, UH-1B, during landing. **Contact:** David J. Capozzi, 402 Poplar St., Lakehurst, NJ 08733-2522.

Seeking **F-84F Thunderbird pilots,** Thunderbird history, and **patches** (originals and replicas) of squadrons flying B-25s or F-84s. **Contact:** George R. Bauer, PO Box 10129, Olathe, KS 66051.

Seeking two **P-38 pilots** who spared the life of a Bücker Jungmann pilot doing aerobatics near Würzburg, Germany, Nov. 18, 1944. **Contact:** Willi Matthiae, Alte Kieler Landstraße 87b, 24768 Rendsburg, Germany.

Seeking **Fred Pennington** or anyone else who was stationed at **Okeover Hall, UK,** WWII. **Contact:** Michael Gildersleve, 12, Stambers Close, Woodsetts, Worksop, Nottinghamshire S81 8RX, UK.

Seeking information on military use of **kites** in WWII. **Contact:** Ali Fujino, The Drachen Foundation, 1907 Queen Anne Ave. N., Seattle, WA 98109 (info@drachen.org).

Seeking **patches** from any unit stationed at RAF West Ruislip and RAF South Ruislip, UK. **Contact:** Vic Magyar, 29565 Tamarack Dr., Flat Rock, MI 48134-1322.

Seeking **Jean N. Deloach, Edward R. Dick, and John C. Lippincott,** in "snooper" training at Langley Field, VA. **Contact:** Ed Morris, 3426 W. 225th St., Torrance, CA 90505-2620.

Seeking **Pvt. Roger Pepin,** of Boston, stationed at Volk Field, WI, 1941–42. **Contact:** Mildred E. Schriver, 107 Sara Ln., #19, Mauston, WI 53948.

Seeking aerial pictures of **Clark Field and Florida Blanca AB,** Philippines, 1946. **Contact:** P.J. Mooser, 8 Big Stone Ct., Little Rock, AR 72227.

Seeking **Larry Reynolds,** of Texas, stationed in London, 1964, who knew Betty Franks. **Contact:** Marcus Hay, 16 Pawley Gardens, Eyres Monsell, Leicestershire LE2 9AE, UK.

Seeking information, photos, and drawings on the construction or use of the underground bunker of the **8th AF** at Wycombe Abbey School for Girls, Daws Hill, UK. **Contact:** J.F. Hadfield, 38 Glenham Rd., Thame, Oxfordshire OX9 3WD, UK.

Seeking **B-17** vertical fin and rudder from E, F, or G model, for WWII memorial in Poland. **Contact:** Alfred R. Lea, 5330 Indigo, Houston, TX 77096-1208.

Seeking **Robert James Hayer,** Riverside-Brookfield HS graduate, stationed at Barksdale AFB, LA, 25 years ago. **Contact:** Kay Horne Sherman, 1618 Fairfax Ln., Oakbrook Terrace, IL 60181.

Seeking information on **Sgt. George Serveld or Servelle,** 123d KY ANG, stationed at Manston Aerodome, UK, September 1950–November 1952. **Contact:** J.S. Serveld, 14 North Pl., Teddington, Middlesex TW11 0HN, UK.

Seeking designations of munitions maintenance or munitions support squadrons that worked with **CF-104** units in France and Germany, 1963–70, and information on the AWDC program to convert **F-101Bs** to **EF-101Bs.** Also seeking anyone involved in transfer or return of **66 Voodoos** between US and Canada, 1961–62 and 1970–71. **Contact:** Jeff Rankin-Lowe, PO Box 9044, Sub. 40, London, Ontario N6E 3P3, Canada (sirius@wwdc.com).

Seeking anyone who knew **2d Lt. James Newton Goe,** Randolph Field, TX, Langley Field, VA, and Rice AAF, CA, in 1943. **Contact:** George H. Goe, 1419 Chloe Terr., Sebring, FL 33870-2060.

Seeking information on **315th Sq,** 1040th AAF-BU, Guam, WWII, its B-29s, and aircraft with nose art "Butcher and his 7 Hams." **Contact:** Samuel J. Nance (samuel.j.nance @boeing.com).

Seeking personnel stationed with **2d Comm Gp,** Ramstein AB, Germany, May 1958–61. **Contact:** Ronald L. Tschohl, Rt. 1 Box 770, Wabeno, WI 54566-9628.

Seeking **Bill Fallon,** of Los Angeles, stationed in Calcutta, WWII. **Contact:** Lila Jacobs Rosier, 18 Dumas House, Rectory Ln., Byfleet, Surrey KT1H 7LW, UK.

Seeking **Sgt. Clifton More,** 1360th AF Comp Sq, Reims, France, 1945, who knew Simone Lefevre. **Contact:** Evelyne Doré, 5 rue Paul Gauguin, 94000 Créteil, France.

Seeking photos and crew members of **B-52D #55-117,** 1957–78. **Contact:** Vince Murphy, 109 San Marino Dr., Vallejo, CA 94589.

Seeking **B-25 photos** showing name, nose art, and tail number for 3d, 17th, 22d, 38th, and 43d BG. Also interested in copies of unit histories. **Contact:** Alex MacPherson, 1800 Sycamore Valley Dr., #304, Reston, VA 20190-4566 (macphera@gunet.georgetown.edu).

Seeking veterans of the **Berlin Airlift** who assisted in the evacuation of Berlin high school students to Frankfurt in 1948. **Contact:** Peter W. Menzel, 56 Dale Ave., Toronto, Ontario M4W 1K8, Canada.

Seeking **M. "Sleepy" Watkins or Watkinson,** from AL, possibly assigned to 81st TFW, RAF Bentwaters, or 20th FBW, RAF Woodbridge, UK, December 1958–January 1959. **Contact:** Julie Hickey, 50 Exeter Rd., Walton, Felixstowe, Suffolk 1P11 9AU, UK.

Seeking graduates of **Class 52-B** from OCS, Lackland, AFB, TX. **Contact:** John R. Dettre, 1076 Pete's Way, Sparks, NV 89434.

Seeking **Larry Lester Boyd,** stationed in Clovis, NM, 1959–63. **Contact:** Marianna Barneyback, 706 Henderson St., Canton, MO 63435.

Seeking **Capt. Donald E. Simanski,** F-105 pilot, 44th TFS, 388th TFW, Korat AB, Thailand, 1967–68. **Contact:** Harry Koning, Trondheimstraat 21, 7559 JE Hengelo, Netherlands.

Seeking **Capt. J.C. Brown,** Air Rescue Sq, **Lts. Bill Alford, Jim Linger, and John Thurman, and Sgt. Emmitt Pitts,** 5001st ABG, Ladd AFB, AK, 1954–57. **Contact:** Don Birchum, Rt. 3, Box 636-L, Whitney, TX 76692-9507.

Seeking **Glen Preston,** from Texas, who was possibly stationed near York, UK, 1943–44. **Contact:** Wendy Bull, 48 St. Georges Rd., Harnham, Salisbury, Wiltshire SP2 8LX, UK.

Seeking **photos and documents** signed by famous USAF and aviation personalities and about early aviation wings. **Contact:** Tom Shane, 6109 Bridlington Cir., Austin, TX 78745.

Seeking USAF **Model A10-A sexant** with accessories and case. **Contact:** R. Scott MacDonald, 2871 Verde Vista Dr., Santa Barbara, CA 93105.

If you need information on an individual, unit, or aircraft, or want to collect, donate, or trade USAF-related items, write to "Bulletin Board," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Items submitted by AFA members have first priority; others will run on a space-available basis. If an item has not run within six months, the sender should resubmit an updated version. Letters must be signed. Items or services for sale, or otherwise intended to bring in money, and photographs will not be used or returned.—THE EDITORS

Seeking information, photos, and maps of **San Vito Dei Normanni AB, Italy. Contact:** Salvatore Strangi, Viale Rimembranze n. 56, 89013 Gioia Tauro (R.C.), Italy (sstrangi@i-2000net.it).

Seeking **Lt. Col. L. Tarbutton,** who retired in the late 50s or early 60s and was stationed in West Palm Beach, FL, and Okinawa. **Contact:** John Lawton, Cresane, Timoleague, County Cork, Ireland.

Seeking **patches** from 442d Troop Carrier Gp, WWII. **Contact:** Donald A. Russell, 738 Hillside Ave., Lake Wales, FL 33853.

Seeking **aircraft mechanics** who were in Flt 2903, Sampson AFB, NY; Mechanic School at Amarillo AFB, TX, 1954; 41st and 43d TAC Recon. Sqs, Shaw AFB, SC, 1954–56; and 18th FIS and 5001st FMS, Ladd AFB, AK, 1956–57. **Contact:** Bill Dreisbach, 145 Pine Knott Rd., Fayetteville, GA 30214.

Seeking **Shirley West** of Brookley AFB, AL, 1952, and **William G. Martin,** RAF Molesworth, UK, 1953–56. **Contact:** Ralph L. Fore, 1504 Louisiana St., Tallulah, LA 71282-5318.

Seeking **1st Lt. Robert H. Hamilton Jr., SSgts. Johnny C. Elrod and Jack L. Woodrum, and Sgts. John A. Rappold and Earl A. Roberts,** 3917th ABG, RAF Stations Manston and East Kirkby, UK. **Contact:** George J. McNally, 123 School Rd., Bethel, PA 19507.

Seeking information on 8th AF B-17 ***McRoberts' Revenge.*** **Contact:** Bill McRoberts, 986 Bonita Ave. #A, Mountain View, CA 94040-2619.

Seeking USAF **helicopter flight engineers, mechanics and enlisted fliers** with time on Pedros, Hueys, Jollys, Paves, Blackhawks, H-19s, and -21s. **Contact:** Russ Griffith, PO Box 85, Preston, ID 83263.

Seeking information history of the **18th Transportation Sq** after July 1942. **Contact:** Walter Lockhoof, 607 Ave. H NW, Childress, TX 79201.

Seeking B-24 crew that crashed between **Bucharest and Ploesti,** Romania, spring/summer 1944. **Contact:** Cornell Illiescu, 2571 Orange Ave., Costa Mesa, CA 92627. ■

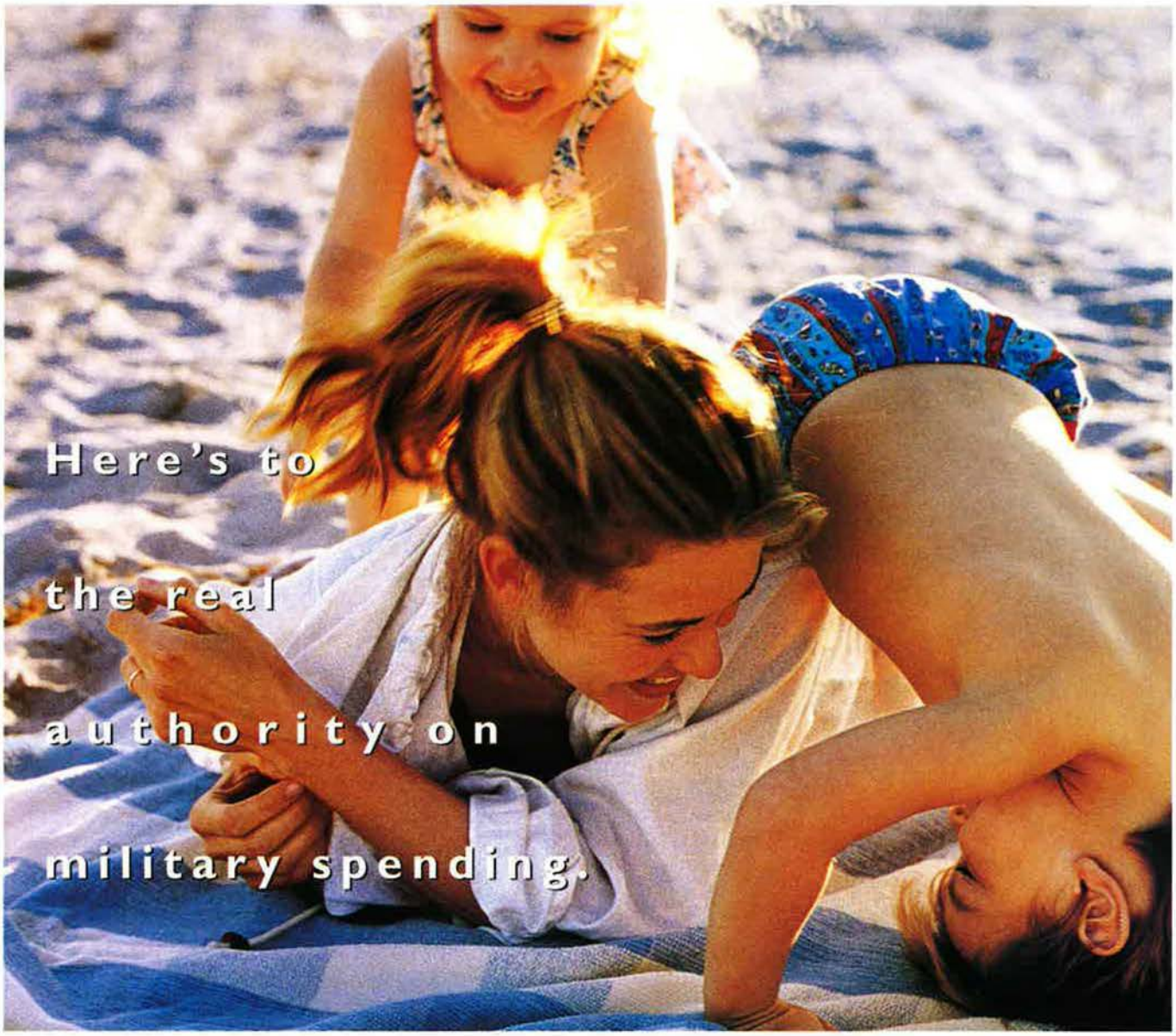
Pieces of History

Photography by Paul Kennedy

SAC

Memorabilia courtesy Eighth Air Force Museum, Barksdale AFB, La.

From creation in 1946 to deactivation on June 1, 1992, the Air Force's Strategic Air Command was the quintessential symbol of the US nuclear deterrent. These items from the Eighth Air Force Museum at Barksdale AFB, La., are reminders of SAC's heritage and legacy. With its bombers and ICBMs, crews who stood 24-hour alert, and various support troops, SAC provided two-thirds of the nation's strategic nuclear triad.



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