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AIR FORCE

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MAGAZINE



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Headwinds**

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AIR FORCE

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MAGAZINE

July 1993, Vol. 76, No. 7

- 4 Letters
- 8 Chart Page
- 10 Capitol Hill
- 18 Aerospace World
- 22 Senior Staff Changes
- 25 Index to Advertisers
- 89 Valor
- 90 AFA/AEF Report
- 92 Unit Reunions
- 95 Bulletin Board
- 96 There I Was . . .



About the cover: A production C-17 refuels during a test flight over Edwards AFB, Calif. For a look at the C-17 program, see p. 34. Photo by Ross Harrison Koty.

- 2 **Blood on the Rock**
Editorial by John T. Correll
Four Air Force officials were fired and their careers ruined on the basis of an IG report known to be full of holes.
- 12 **Washington Watch: Gay Horizons**
By John T. Correll
The activists' agenda goes far beyond "Don't Ask, Don't Tell."
- 26 **Testing the Limits of the Total Force**
By Bruce D. Callander
How much of the load can the Guard and Reserve carry?
- 34 **The C-17 Fights the Headwinds**
By David J. Lynch
Despite problems, the Air Force believes this is the airlifter of the future.
- 41 **The Infrared Battleground**
By James W. Canan
If the electronic endgame goes sour, here's where it is most likely to happen.
- 46 **The Dellums Agenda**
By Pat Towell
Mr. Aspin's successor at the House Armed Services Committee says he's antiwar, not antiwarrior.
- 52 **Bosnia Airdrop**
By Tony Capaccio
Not all the bundles fell into the right hands, but a great many of them did.
- 56 **Chinese Airpower Revs Up**
By Julia A. Ackerman and Michael Collins Dunn
As part of a notable military buildup, Beijing is buying Russian fighters and shopping for an aircraft carrier.



26

- 60 **The Case for the Academies**
By Peter Grier
Should we close West Point? Move Annapolis to Colorado Springs? The Air Force Academy Superintendent gives his views.
- 64 **Russian Military Almanac**
By Tamar A. Mehuron
The latest facts and figures about the Eurasian power.
- 70 **Weighing the Evidence on POWs**
By Robert S. Dudley
A Senate panel finds it "arithmetically impossible" that large numbers were left, but a Soviet document rekindles doubt.
- 75 **Gallery of US Navy, Marine Corps, and Army Aircraft**
By Kenneth Munson, Paul Jackson, and Bill Gunston

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By John T. Correli, Editor in Chief

Blood on the Rock

ON APRIL 29, Secretary of Defense Les Aspin fired three Air Force general officers and one senior civilian, effectively ending their careers, on the basis of an Inspector General's report that had been thoroughly discredited a week earlier. The report was released officially and publicly by the IG before the Air Force or the persons accused were given an opportunity to comment.

The report cited the four individuals—Lt. Gen. Edward P. Barry, Jr., Maj. Gen. Michael J. Butchko, Jr., Brig. Gen. John M. Nauseef, and A. Allen Hixenbaugh—for improprieties two years ago in management of the C-17 airlifter program and urged disciplinary action. Mr. Aspin acknowledged there was no evidence of "criminal conduct." What he could have said, but didn't, is that there was no evidence of misconduct of any kind.

The IG case was a total bust. Nevertheless, Mr. Aspin said he had "lost confidence" in the accused, relieved General Butchko from duty, and barred all four from further work in acquisition. His announcement ignored a fifth person, Darleen Druyun, whose reputation was smeared by the report. That left her unpunished but not explicitly exonerated either.

The report weaves a hairy tale of premature progress payments to help the contractor, failure to keep senior officials informed, and intimidation of those who tried to impede the wrongdoing. The Air Force rebuttal, submitted April 21, found 206 IG statements of "fact" not supported by the documents referenced and 100 instances of opinions and subjective conclusions mixed in with the "facts." If any of the charges in the 103-page IG report are valid, nobody has offered credible proof.

In February 1992, Rep. John Conyers, Jr. (D-Mich.), chairman of the House Government Operations Committee and a foe of the C-17 program, asked the Defense IG to look into cash flow to the contractor, McDonnell Douglas. It began as an "administrative inquiry," so the inspectors did not follow strict "audit standards" in collecting evidence.

Somewhere along the line, the investigation took on criminal overtones, but the looser administrative standards still applied. At one point, the IG said a witness had characterized a particular action as "a trick." What happened was that the investigator introduced that word in an interview, then led the witness to agree to it. That is small potatoes, however, compared with the rest of it.

As a multitude of experts attest, the IG relied on assumptions—many

Four Air Force officials were fired and their careers ruined on the basis of an IG report known to be full of holes.

of them incorrect—about contracting rules. The report indicates the accused for following a formal written policy established by the Defense Department in 1989. (The IG office disagrees with this policy, but had been told previously by Defense Department officials that the IG interpretation is wrong.) In another instance, according to contracting experts, the C-17 program officials would have been on dangerous legal ground had they taken the actions the IG thought proper.

The IG reported a nefarious "plan," in effect a conspiracy to conceal problems and do evil deeds. There is no evidence that any such plan existed. Senior officials, including the under secretary of Defense for Acquisition, were kept very well informed. Furthermore, people who disagreed with the supposed conspirators were regularly filing documents called "Bellringer" reports with a clear channel

to the top levels of the Pentagon. Then there is the matter of intimidation. The report is fuzzy on the specifics. Two of the presumed intimidees were not present at a meeting where the most dramatic instance supposedly happened. A third, who was there, filed a sworn statement saying he was not intimidated.

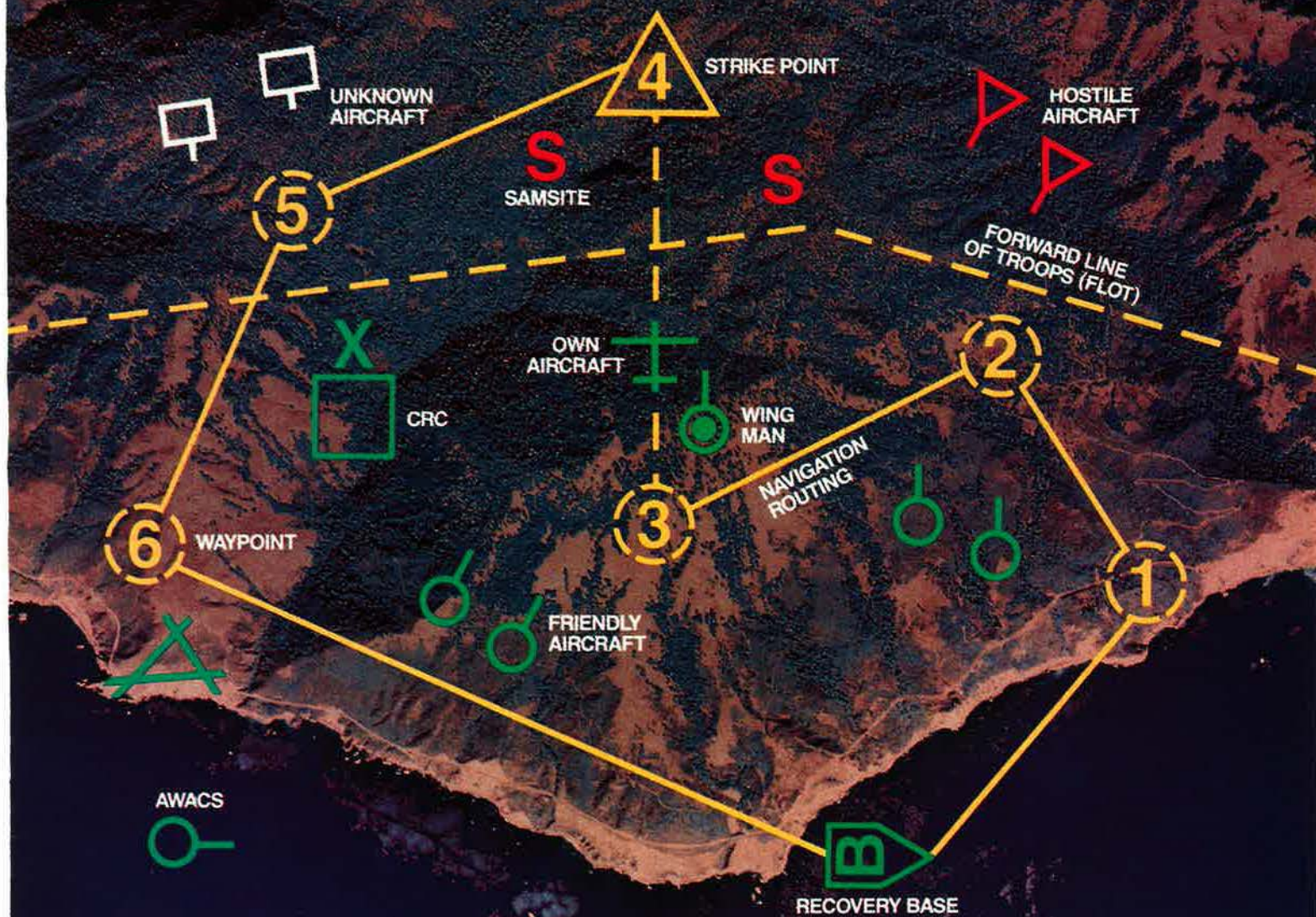
After publishing the IG report, the Defense Department allowed the Air Force and the accused eight weeks to reply. For six of those eight weeks, Deputy Inspector General Derek Vander Schaaf refused to let the Air Force make copies of testimony from some witnesses, saying he feared reprisals against them. The Air Force legal team said that "a major impediment to exhaustive study is that many of the allegations by DoD IG are simply too vague to be susceptible to meaningful legal analysis."

Inadvertently, the review team handed Mr. Aspin the tool he eventually used. It said that while no misconduct took place, some management decisions by two of the officials were "questionable"—but that such a conclusion is apparent only with "twenty-twenty hindsight" and that the decisions made were within the range of normal management discretion. Mr. Aspin pounced on this as an excuse to fire all four.

The most plausible explanation is from a Pentagon official who says Mr. Aspin needed to put "blood on the rock" to appease Mr. Conyers and other critics in Congress. Indeed, the harsh action was applauded by some on Capitol Hill who believe the program is managed badly and that anyone making decisions about the C-17 two years ago must be guilty of something.

If the people dismissed did anything wrong, it was not established by the innuendo-laden IG report. Nor has it been established by additional evidence brought forth since. Mr. Aspin says the General Counsel will now develop procedures to ensure that the IG deals fairly with persons who are the subject of such reports in the future. For at least four individuals, that correction comes a little late. ■

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Letters

Nothing Relative About It

Capt. Herman Reinhold's comments on "It Really Was an Evil Empire" [February 1993, p. 79] in his letter "Relatively Evil" [May 1993, p. 8] show that he has fallen victim to a fallacy that many others have believed, particularly during the Vietnam War. This fallacy equates democracy with dictatorship because democracies are not perfect.

From his comments, it is obvious that Captain Reinhold has never had the misfortune of living under a dictatorship. It is true that democracies, the US included, have been involved in activities that they are not proud of. We must recognize that many of these undesirable activities were the product of individuals and not of government policy. Where they were government policy, they represented the exception, not the rule.

Having lived in the German Third Reich as a member of a persecuted minority, I quickly learned that, in a dictatorship, evil is the rule, not the exception. This was true of the former Soviet Union, and it is just as true of Cuba and North Korea today. Such countries are run by a small, powerful elite who will do whatever they deem necessary to stay in power. The rights or wishes of the individual are not considered. The evil that results from such systems has been understated, not exaggerated. For example, history shows that the peace activists who tried to equate the former South Vietnamese regime with the Politburo in Hanoi were dead wrong.

The best cure for this recurring fallacy of moral equivalence is for its believers to live in a dictatorship or talk to people who have.

Col. William Bruenner,
USAF (Ret.)
Dawson, Ga.

Capt. Herman Reinhold's assertion that, even considering the terrible things Communists did, he was "much more horrified by what we did in the name of democracy" struck a raw nerve.

Apparently Captain Reinhold has been persuaded by apologists for com-

munist that the two systems, democracy and communism, are morally equivalent in most respects and there is little to choose between them.

Where has this guy been? It is even more astounding to me to see these opinions expressed by an active-duty member of the Air Force.

I was unfortunate enough to be a Korean POW for a bit more than twenty months—613 days to be exact—and I saw firsthand the utter moral depravity of the Communist system. For example, the Chinese Communists cynically pursued a totally false international campaign to persuade the world that UN forces in Korea were engaging in germ warfare. To make their campaign credible, they subjected many USAF POWs to unspeakable conditions, physical torture, and interminable interrogation to force false germ-warfare confessions from them.

Some POWs died under this intense effort to break their will. Others suffered disabling injuries, frostbite, psychological trauma, and other long-term physical and mental disabilities. This campaign continued even after the cease-fire was signed, right up to the last few days of the prisoner exchange.

That example is only one small blip on the huge screen of Communist horror.

Look at the captive nations of eastern Europe. If communism isn't much different from democracy, why have thousands of people risked their lives to escape to the West? In Asia, hordes of boat people left their homelands

on makeshift craft to escape what they knew was a living hell. To anyone with eyes to see and a mind to understand, it should be obvious that communism, in its twentieth-century manifestation, has been the epitome of amorality—anything is permissible, anything is acceptable. Any crime, any lie, any depredation can be justified to meet the desired end.

The millions whose lives have been sacrificed, whose liberty has been forfeited, whose property has been destroyed or confiscated, or whose lot has been only despair and suffering eloquently attest to the evils of communism.

Now that the system has collapsed and its decades of misery and exploitation have been fully exposed, it appalls me beyond measure that anyone, especially a USAF officer, would seriously compare such a demonstrably corrupt, evil system with our own democratic government. Of course, no man-made system is perfect, and no one realistically claims that is the case. Even with all the defects Captain Reinhold cited, democracies are light years ahead of communism by any measure, especially human rights, and the gap continues to widen.

In short, Captain, take off those blinders and look at the real world. Communism is not and never has been anything but a cynical, self-serving, cunningly contrived means to achieve ultimate power for the few at great cost to the many.

Col. John P. Streit,
USAF (Ret.)
Fort Walton Beach, Fla.

Capt. Herman Reinhold's letter really missed the point about the Soviet Union as an "Evil Empire." The "evil" of the former USSR had nothing to do with it being a "terrible place to live" (as he put it). There are plenty of places in the US where the same would be true. Rather, the evil of the system was that it was a terrible way to live. Captain Reinhold's argument is a case of ethical relativism gone haywire: Identical ends do not impute identical motivations or value systems.

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

TIMES CHANGE. SO DO F-16S.

The world has seen some dramatic changes since the first F-16 was introduced. The Berlin Wall has come down. The Soviet Union and Warsaw Pact have been dissolved. And new potential trouble spots have emerged.

Dramatic

changes in weapon technology have also taken place. Fighter aircraft have improved radar capabilities, faster computers and more advanced weapons.

Through the years the F-16 has proven it can truly stay ahead of the threat.

Its ability to continually adapt new avionics and weaponry has led to an incredible service record, including 65 aerial dog-fight victories, with no losses.



F-16 (Night Attack) Cockpit

The F-16 was the work-horse of Desert Storm. It flew

13,500 missions and had the highest readiness rate of any fighter in theater.

With LANTIRN and GPS, F-16s were the premiere scud hunters.

The F-16 we're building today incorporates literally hundreds of new state-of-

Pratt & Whitney F100-PW-229

the-art technologies. The entire cockpit has been modernized. Engine thrust has been increased 25%, and there is a choice of the world's two best

fighter engines manufactured by Pratt & Whitney and General Electric.

We've added beyond-visual-range firepower with Sparrow and AMRAAM radar missiles, night/all weather attack and autonomous precision attack with LANTIRN, IIR Mavericks, and laser guided bombs; anti-radar attack with HARM; and anti-ship with Penguin.

While the

F-16's combat capability has been significantly enhanced, it was not done at the expense of operation and support costs. In terms of reliability, maintainability, readiness and lifecycle cost, the F-16 remains the best frontline fighter in the world.

And that's something we never intend to change.



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Letters

It's true that the World War II treatment of Japanese-Americans and historical mistreatment of Indians and African-Americans represent failures of our ideals. The point is that we have ideals. We have legal and political mechanisms for fighting for civil liberties and human worth.

I recently listened to Lt. Gen. Benjamin O. Davis, Jr., USAF (Ret.), relate his experiences as the only black cadet at West Point and as a combat commander in the segregated military. He endured harassment that would have ended a lesser person's career. He fought the system by fighting within the system. The system allowed it. This is not a "relative" difference between the US and the former USSR. It's an absolute difference.

Capt. (Maj. selectee) Rick Tallarigo,
USAF
Patrick AFB, Fla.

Captain Reinhold's letter blew steam out of my ears. The Soviet Union really was an "Evil Empire," with sixty million of its own people killed (Alexander Solzhenitsyn's estimate). These were not war dead. The US goals were national security for itself and freedom and democracy for others. The Soviet goals were world conquest and power for the *nomenklatura*. The differences were not subtle.

It is true that we often played rough and sometimes dirty during the long struggle against communism, but ultimately we and our ideals prevailed.

A reporter from *National Review* once traveled to post-cold war Russia with a *New York Times* reporter who had the same assignment: interview Russian intellectuals. The *National Review* reporter was amused by his colleague's dismay when virtually every intellectual they met quoted from Ronald Reagan's "Evil Empire" speech. They considered it a moral watershed for themselves and for their country.

Captain Reinhold is simply repeating the discredited "two superpower theory," also known as "the doctrine of moral equivalence." William F. Buckley, Jr., laid that nonsense to rest with a vengeance with this analogy: To say that moral equivalence is valid "is to say that a man who pushes a little old lady out of the way of an onrushing bus and a man who pushes a little old lady into the path of an onrushing bus are both men who push little old ladies around."

John Cody
Pittsford, N. Y.

In Captain Reinhold's letter, he equates the murder of multimillions in

the former Soviet Union, Cuban total repression, Chernobyl's devastation of a huge area, and other totalitarian excesses with those of an implied similarly evil US empire. This comparison will provoke some understandably harsh reactions.

Why is he willing to remain in the military service of a country he seems to despise? Why would AIR FORCE Magazine print such patently faulty comparisons? For example, Chernobyl was total devastation, while residents of homes just across from Three Mile Island live happily and quite securely. Rebuttal almost seems unnecessary.

Reinhold's letter unwittingly proves a point. If permitted, its publication in TASS or a Cuban periodical would have entitled him to a joyless lifelong existence in a Siberian gulag or a rat-infested jail in Castro's Cuba. Not by intent, he demonstrates that, in an imperfect world, the levels of imperfection between totalitarian and free nations vary enormously. His letter underscores our national freedoms, diversity, excessive permissiveness, and constant self-airing. How comforting that Captain Reinhold and others who might espouse negativism can take advantage of a free press without danger to their lives, liberties, or the pursuit of a dubious happiness. We can and do strive for improvement—not an elusive perfection that no one ever achieves.

In a way, therefore, publication of reader opinion, however divergent from the mainstream, underscores these unique freedoms, which are editorially routine in AIR FORCE Magazine. Try that on for size in Iraq, Cuba, Libya, or North Korea.

Jack Gross
Harrisburg, Pa.

Tooling for the F-22

In an otherwise factual depiction of the F-22 program in "The F-22's Triple Challenge" [*March 1993, p. 34*], there seems to be a misunderstanding regarding my comments on our plans for tooling construction.

The article says that Lockheed will be building two sets of tools—one set for our shops and one set for the Air Force's logistics depot. This is slightly misleading.

As part of the Integrated Product Team process during the development of the F-22, depot tool requirements are being identified early in the design process. However, the depot tools will not be ordered until several years later. Only those tools required for fabrication and assembly of the F-22 will be ordered first.

The benefits of this plan are that the tool designs are reviewed early enough in the development process to ensure future compatibility with depot needs. The use of the tools during manufacturing allows for refinement and verification of depot requirements before those tool types are actually needed.

I hope this clarifies any misconceptions.

J. A. Blackwell
Marietta, Ga.

Building a Better Bullet

In reference to "Fighting in Fours" [April 1993, p. 60] and specifically your comments with regard to squeezing the trigger of the 20-mm cannon at closing ranges of less than 2,000 feet, USAF has adopted new 20-mm ammunition that more than doubles the effective range of the standard 20-mm gun system in the F-15 and F-16.

The Air Force has documented that this new ammunition, the PGU-28/B, is lethal at well over 5,000 feet. In addition, there is a recommendation to increase training to change the mindset from the old range of 2,500 feet to more than 5,000 feet for the PGU-28/B. This includes the transition from AIM-9 missile attack at minimum range to long-range gun attack.

The PGU-28/B Semi-Armor Piercing High-Explosive Incendiary (SAPHEI) cartridge greatly improves ballistic characteristics and terminal effectiveness for enhanced probability of hit and, therefore, probability of kill at these extended ranges. There are also two training cartridges, the PGU-27/B TP and PGU-30/B TP-T, that are ballistically matched to the PGU-28/B SAPHEI combat cartridge.

In addition to use in F-15s and F-16s, this ammunition is used in the Navy's F/A-18, F-14, A-7, and AH-1 helicopter. The F/A-18 had great success with this 20-mm ammunition in Operation Desert Storm, achieving confirmed kills against Soviet-type tanks.

To gain this added capability by simply upgrading a bullet for the existing gun system warrants some recognition. The gun continues to prove its worth and necessity in these multimillion-dollar platforms. The lowest-cost, least visible ordnance item—ammunition—has taken a monumental leap with the PGU-28/B to make these aircraft systems much more capable without major expense.

T. M. McAuliffe
Olin Ordnance
St. Petersburg, Fla.

William Tell Weapons Directors

"Shooting With Style at William Tell" [February 1993, p. 32], would leave

most readers with the impression that weapons director teams were some part of maintenance and really not an important part of the competition. That was the impression I received from your article, and I was on a William Tell weapons director team.

Weapons director teams are part of operations, not maintenance. The weapons director teams competed in Profiles I, III, and IV. Their role in these profiles was significant enough that an air weapons director represented his team on the stage to receive the profile winner's trophies.

As stated in the article, Profile III was a concert of actions. For most teams, the weapons directors were the conductors of the concert. Weapons director teams used jointly created commit plans/criteria and a god's-eye radar view to target fighters on bandits (both above and below the teams' radarscopes), to manage available weapons, and to orchestrate combat air patrol manning—all of this while using perfect or nearly perfect radio communications during the forty-five-minute profile. As in all profiles, a team effort was necessary. The 18th Wing won Profile III on a tie-breaker—the weapons director team score.

The article did an injustice by not including the Top Scope winners with the Top Guns. At a minimum, the 1st Fighter Wing's Capt. Scott Fischer and SSgt. John P. Bosmans should have been included for their superior performance as Top Scope winners.

The article should have included all parts of the teams (aircrew, maintenance, and weapons director teams). Instead, you relegated the weapons director teams to a confusing paragraph rather than mention them for their role during the three profiles.

Capt. Daniel J. Simonsen,
USAF
Kadena AB, Japan

KC-10s Omitted

I would like to correct an oversight in the March 1993 "Chart Page" [p. 8]. "Airlifters Lend a Hand" failed to mention the roles of AMC and ACC KC-10s and our civilian air carriers in the humanitarian missions.

Here is a summary of the KC-10s' contributions to Restore Hope as of March 16, 1993: 134 total missions flown, 4,714 tons of cargo and 554 passengers delivered, 266 tons of cargo and 192 passengers returned.

The civil carriers play a major role not only in times of crisis but also during peacetime missions, such as those listed on your chart.

Maj. Edward M. Breen,
USAF
O'Fallon, Ill.



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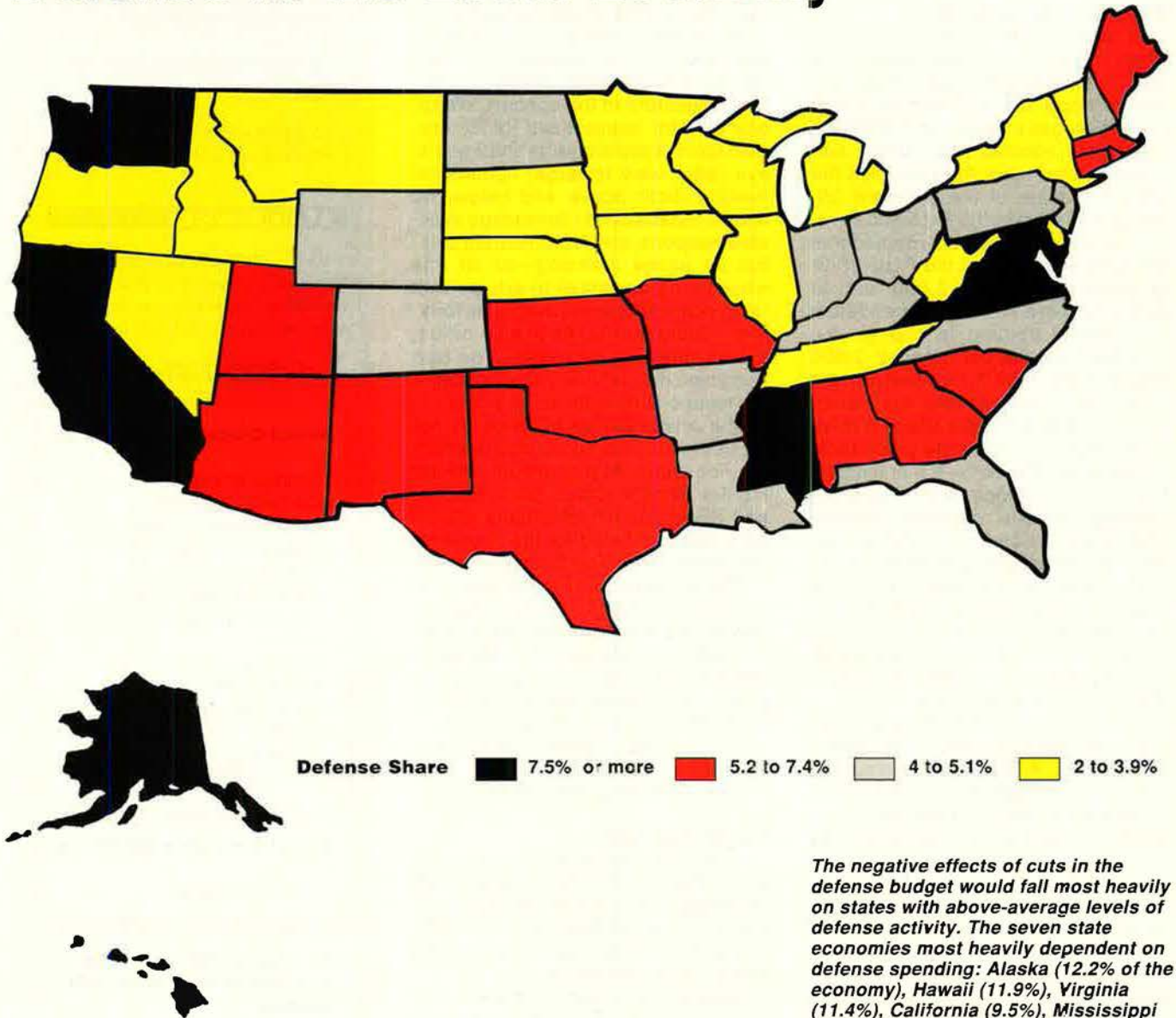
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The Chart Page

By Tamar A. Mehuron, Associate Editor

Defense in the Local Economy



Source: Congressional Budget Office, "Effects of Alternative Defense Budgets on Employment," April 1993.

The negative effects of cuts in the defense budget would fall most heavily on states with above-average levels of defense activity. The seven state economies most heavily dependent on defense spending: Alaska (12.2% of the economy), Hawaii (11.9%), Virginia (11.4%), California (9.5%), Mississippi (8.1%), Washington (8.0%), and Maryland (7.8%). The next most dependent tier of state economies were: South Carolina (7.1%), New Mexico (7.0%), Maine and Connecticut (both 6.7%), Kansas (6.4%), Utah (6.3%), Oklahoma, Missouri, and Alabama (5.9%), Georgia (5.7%), Massachusetts (5.4%), Rhode Island (5.3%), and Arizona and Texas (5.2%). These states either have large defense installations (as in Alaska), major defense contractors, or both.

Pampa 2000: the low risk JPATS solution.

The Pampa 2000 is a proven trainer aircraft that would be built in the United States by Vought Aircraft.

More than 90 percent of the components on the aircraft will be produced in America.

Compared to other JPATS contenders, the Vought Pampa 2000 offers low risk without compromising performance.

In addition to a proven airframe, the Pampa 2000 offers the Garrett TFE 731-2 American-made engine and sophisticated AlliedSignal avionics that already have established solid records for reliability and low life cycle costs. The Garrett engine, for example, has a documented history with more than 10 million hours in commercial use and more than one million hours in training missions.

Result: A quality aircraft — from a company with a solid track record in integrated product

development and a successful history of managing total programs from start to finish. The Vought Pampa 2000 is the low risk JPATS option — ready today — to handle the training requirements of the 21st century.



By Brian Green, Congressional Editor

Recruiting Problems Are Back

For the first time in ten years, the services find difficulty in attracting recruits. Even worse, quality indicators have begun to slip.

FOR THE first time in more than a decade, Congress is getting steady, serious warnings about recruiting difficulties in the armed forces. The alarms are being sounded by top uniformed leaders and civilian officials at the highest levels of the Defense Department.

Not since the early 1980s has the US been saddled with this problem. Now, however, the evidence is that internal turmoil has undercut the military's ability to attract sufficient numbers of high-quality recruits. Numerical goals are getting harder to meet, and the trend is toward lower quality.

Secretary of Defense Les Aspin repeatedly told the Senate and House he intends to maintain readiness and prevent the emergence of a "hollow force" of the type seen in the late 1970s. For this, Mr. Aspin testified, strong recruiting is critical.

Nevertheless, warning signs abound.

Mr. Aspin noted that, even though the quality of recruits remains high, the trend is on the downside. The percentage of new recruits with high school diplomas is ninety-five percent in Fiscal Year 1993, down from more than ninety-nine percent during Fiscal Year 1992.

Air Force Lt. Gen. Robert Minter Alexander, the deputy assistant secretary of Defense for Military Manpower and Personnel Policy, said the percentage of recruits scoring above average in the qualification test dipped during the first half of 1993.

In terms of raw numbers, the Air Force met its recruiting goals over the past year, but only with some difficulty. The Air Force has also seen a jump in recruits scoring in the lower half of the qualifications test.

Uniformed and civilian defense officials attribute the spate of difficulties to several factors, including:

- Controversy about military pay.

The troops and their supporters have publicly expressed anger at the Clinton Administration's scheme to freeze military pay in Fiscal 1994, limit raises to less than the rate of inflation from Fiscal 1995 through 1998, and reduce the cost-of-living allowances for military retirees.

- The furor over homosexual rights. AFA Executive Director Monroe W. Hatch, Jr., pointed out in a letter to House Veterans Affairs Committee Chairman Rep. G. V. "Sonny" Montgomery (D-Miss.) that "issues such as homosexuals serving openly in the armed forces . . . are having a negative impact" on recruiting. Many other veterans organizations have made the same case.

- Declining recruiting resources. Secretary Aspin made a strong appeal to Congress to provide better funding for recruiting and advertising. The Air Force believes its \$5.6 million advertising budget request is about \$2 million short of the minimum to hold even in its recruiting efforts.

- Public misunderstanding. Top defense leaders note a broad public impression that the military, because of the continuing drawdown, doesn't need to recruit any new soldiers, sailors, airmen, or Marines. The public is unaware that the services are still recruiting to preserve a balance of youth and experience in the ranks. General Alexander said, "Young people seem to believe that the reductions—which they might view as layoffs—mean that we no longer are hiring."

Worse, many in Congress are also ignorant of the necessity of attracting new recruits. "My colleagues in Congress . . . said, 'Why are we still spending money on recruitment here when you're taking 100,000 men and women out of the armed forces this year?'" said Secretary Aspin.

Maj. Gen. John J. Closner III, chief of the Air Force Reserve, warned that AFRES faces several unique recruiting problems. AFRES success depends in part on recruiting trained service members who leave active duty. That pool will shrink dramatically as the active-duty armed forces drop from 2.2 million in 1987 to 1.4

million—and perhaps 1.2 million—in 1998.

Base closures also hurt the Reserve: Moving a base from a densely populated area to an isolated location "severely reduces our ability to recruit the skilled people we need."

Furthermore, AFRES is losing physicians in the aftermath of Operation Desert Storm. According to Air Force Surgeon General Lt. Gen. Alexander M. Sloan, "Dissatisfaction with financial implications and the necessary time commitment are reasons for this persistent loss of physicians."

Solving the recruiting problem will not be easy, according to witnesses. A shrinking pool of potential recruits, inadequate recruiting staff and budget, fewer benefits, and a perceived decline in the military's importance seem certain to complicate the effort.

The military potentially faces competition from President Clinton's alternative national service program. The Clinton plan would provide generous educational benefits to young people in return for community service. Veterans groups argue that these volunteers would receive benefits comparable to or better than the Montgomery GI Bill benefits available to veterans who opted for potentially dangerous military duty. The GI Bill is widely recognized as a key recruiting tool.

At present, officers have not experienced problems with retention—getting experienced veterans to reenlist. However, some worry that the situation could change.

Part of this has to do with the high operational tempo of today's military forces. Air Force Gen. Ronald R. Fogleman, commander in chief of US Transportation Command and commander of USAF's Air Mobility Command, testified about the pressures of long overseas tours and low pay.

"It disturbs me," said General Fogleman, "when I start to see shortfalls in recruiting and enlisted personnel using food stamps. . . . We can't afford to keep burning the candle at both ends. There is a breaking point. I can't define it with any precision, but I know we are closer to it this year than last year or the year before that." ■

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By John T. Correll, Editor in Chief

Gay Horizons

Activists say they'll continue the fight in court and by other means if they don't get what they want from the Pentagon.



WASHINGTON, D.C., JUNE 9
Barney Frank, the openly gay Congressman from Massachusetts, made a shrewd assessment last February. The swing vote on homosexuals in the military, he said, consisted of "people who very much wish no one had ever brought this up."

As the controversy wore on, millions of people who previously knew little about homosexuality found out more than they ever wanted to learn. The more they learned, the less they liked President Clinton's proposal to allow homosexuals to serve openly in the armed forces.

Mr. Clinton had depicted his proposal as simple: whether homosexuals in the military should have freedom to declare their status and *nothing more*. Gay militants had much more in mind, however, and said so.

Torrie Osborn, executive director of the National Gay and Lesbian Task Force, declared that "this is the beginning of the Queer Nineties" and said that, "Down the line, we will get gay marriage. We're going to get the military to recognize us and our partners. We're going to promote our agenda."

A fateful by-product of the aggressive gay rights campaign has been growing public awareness of and apprehension about the homosexual agenda. In particular, the armed forces proved to be a more difficult target than the activists had expected.

Overriding angry objections from Sen. Edward M. Kennedy (D-Mass.), the Senate Armed Services Committee voted to visit military bases as part of its hearings on homosexuals in the armed forces. A photo of Sens. Sam Nunn (D-Ga.) and John Warner (R-Va.) inspecting the sleeping quarters on a submarine at Norfolk instructed the public on how close living arrangements in the military can be.

"That photograph has done more damage to this issue than a thousand generals testifying against it," said David Smith, who heads a coalition of groups that oppose the military ban on homosexuals.

Mr. Clinton stood his ground for a while. In April, he issued a written statement reaffirming his intention "to implement an executive order lifting the ban on gays and lesbians in the military by July 15." Congressional Democrats, however, warned the President he was heading for a crushing defeat if he persisted, and on May 27, Mr. Clinton signaled that he was prepared to compromise.

A by-product of the gay rights campaign is growing public apprehension about the homosexual agenda.

Political Cover from Frank

Gay leaders were outraged, but the President took advantage of the political cover created two weeks earlier when Mr. Frank shocked his constituency by declaring that gays should accept a compromise or else risk total defeat. Mr. Frank's judgment was that the President's proposal to lift the ban could not pass Congress. "I don't know anyone who follows this regularly who thinks we can win," he said.

Several compromise options have been floated, all of them variations on an idea advanced by Charles Moskos, a Northwestern University sociologist, in which the armed forces "don't ask, don't seek," and military homosexuals "don't tell, don't flaunt." These compromise plans are under fire from both flanks, with conservatives saying they concede too much and gay activists calling them a sellout.

Some Congressional Democrats, worried on the one hand about the straight voters and about their pro-gay constituencies on the other, fig-

ured to take political cover behind Secretary of Defense Les Aspin and the official position Mr. Clinton instructed him to prepare by July 15. "They feel that if the Pentagon comes up with its solution first, they can say, 'This is what the Pentagon wants,'" a congressional aide told the *Washington Post*.

Mr. Aspin appointed two teams to study the problem. One of them, consisting of RAND Corp. consultants, was reported to have advised the full integration of homosexuals into the armed forces and legalization of consensual sodomy under military law.

Should the homosexual movement fail to get what it wants from Mr. Clinton or Congress, the next step will probably be legal challenges. "If the Frank compromise goes through, we'll be in court," said Tanya Domi of the National Gay and Lesbian Task Force, a former Army captain. "We'll litigate, and we'll win." In a subsequent statement, Ms. Domi declared that "We will not go away, and this issue will not go away." She said gay rights groups would march in protest, engage in civil disobedience, and encourage homosexual soldiers to announce their orientation.

According to the *Washington Blade* (which bills itself "The Gay Weekly of the Nation's Capital"), Rep. Gerry Studds (D-Mass.), who is also openly homosexual, predicts that, "We will prevail. We just don't know when."

The "Boy Next Door"?

In January, the *Windy City Times*, a gay newspaper in Chicago, urged workers for the cause to "bring on the patriots" and get media exposure for military homosexuals who are "picture-perfect, straight-arrow over-achievers who look like the boys and girls next door." A number of gay veterans fitting that description testified at congressional hearings and got feature attention from the press and the television networks.

The "Boy Next Door" strategy, however, overlooked the resistance to straight-arrow packaging by many in the homosexual rank and file. This was spectacularly evident at the Gay and



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Lesbian March on Washington in April. There were "Dykes on Bikes," cross-dressers, drag queens, "transgendered" persons, bare-chested women kissing each other in the streets, men in dresses and high heels, a "Lesbutante Ball," a "Queerfest" multimedia program, and a mass marriage ceremony with some 1,500 homosexuals taking their vows.

In a government-owned building a few blocks from the White House, 1,600 persons attended a program of flogging demonstrations and other diversions put on by the Sodomasochistic Leather Fetish Conference. The major news media, generally sympathetic to gays, played down the seamier stuff, but regular tourists who chose that weekend to visit the capital took home memories they will not soon forget. Representative Frank declared the March on Washington a "political failure."

A few days before the big march, National Gay and Lesbian Task Force spokesman Robert Bray said the movement's secret weapon was "the millions of gays who haven't come out yet." Activists had based much of their political influence on the claim that ten percent of the population and a corresponding percentage of military members are homosexual.

Recent surveys, however, indicate the incidence of homosexuality to be closer to one or two percent. When the March on Washington drew 300,000 rather than the advertised 1,000,000, organizers hotly insisted that the US Park Police had counted wrong. (They also avoided comparisons with the 800,000 people who attended the Desert Storm victory parade in 1991.)

Hoping to demonstrate homosexuality in high places, a group in Massachusetts has posted a \$10,000 bounty, payable to the first person who successfully exposes as homosexual a four-star officer on active military duty, a living American cardinal of the Catholic Church, or a US Supreme Court justice.

Parade of Witnesses

At hearings by the Senate and House Armed Services Committees, pro-gay witnesses argued basically that homosexuals have long served quietly and with distinction in the armed forces and deserve the right to serve openly. (The gays received some unexpected—if limited—moral support in April, when Adm. William J. Crowe, former Chairman of the Joint Chiefs of Staff, told reporters that the military would be able to adjust to homosexuals in the ranks.)

Conservative witnesses at the congressional hearings said that admitting homosexuals would undermine unit cohesion and would force proximity with an unacceptable lifestyle on the other troops, who don't have the option to quit and go home if they don't like it.

Among those testifying to the Senate was Lt. Gen. Calvin Waller, second in command of forces during Operation Desert Storm. General Waller, who is black, said he finds it "personally offensive" when the right of homosexuals to serve is equated to the

AFA President James McCoy says that gays are seeking "to advance their broader social and political campaign."

civil rights of blacks. (Gen. Colin L. Powell, Chairman of the Joint Chiefs of Staff and also black, has consistently argued that exclusion for sexual orientation is not on a par with racial discrimination.) Senator Kennedy objected to General Waller as a witness, saying that his views were well known already.

Ms. Domi of the National Gay and Lesbian Task Force sought to put some distance between homosexuals and AIDS in her testimony to the House. "It is not being gay that puts an individual at risk for HIV infection, but one's sexual conduct, whether homosexual or heterosexual," she said. "In fact, current statistics demonstrate that the highest risk group for HIV infection includes young adult men and women, the very populations the military seeks to recruit."

This has been a recurring theme for the gay movement. It echoes a March 30 report by Dr. Edward Martin, acting assistant secretary of Defense for Health Affairs, which said, "We are not aware of any scientific evidence that individual sexual preferences, in and by themselves, be they homosexual, heterosexual, or bisexual, affect work productivity, scholastic aptitude, disease incidence, medical costs, or crime rate in the population at large," and that "homosexuality, per se, cannot be characterized as a medical issue."

That drew withering comment from critics who said Dr. Martin's whole

argument hinged on separating homosexuals from the sole behavioral characteristic that distinguishes them from heterosexuals.

An April 29 memo from the Army surgeon general to the deputy chief of staff for Personnel expressed concern about the Army blood supply and pointed out that the Food and Drug Administration "mandates that any male [blood] donor who has had sex with another man since 1977, even once, is ineligible to donate and is to be placed on a permanent deferral list." Eighty-four percent of the blood in the Army's supply is donated by active-duty soldiers.

The Army memo also says—citing numerous medical sources—that "homosexual male-to-male sex is the practice most responsible for the AIDS epidemic within the United States. Homosexual male-to-male sex and intravenous drug abuse are the two practices most responsible for transmission of HIV within the United States. The homosexual male and the intravenous drug abuse populations form the reservoir from which HIV infection is spread to the pediatric and heterosexual populations of the United States."

The Gay Agenda

Air Force Association President James M. McCoy, responding April 2 to an inquiry from Senator Nunn, said that "the real reason gay activists are attacking the military ban is to advance their broader social and political campaign, not to establish their right to bear arms in the nation's defense. We were frankly surprised to see how clearly this stands out when their arguments are examined. Statements and literature from the gay movement reveal a contempt for the military. If the armed forces are damaged in the furtherance of their social campaign, that is of no consequence to them."

A promotional folder for the March on Washington proclaimed a broad constituency: "We demand legislation to prevent discrimination against lesbians, gays, bisexuals, and transgendered people in the areas of family diversity, custody, adoption, and foster care and that the definition of family includes the full diversity of all family structures."

Gay activists soft-pedal these goals when addressing straight audiences, but they are not about to throw anyone out of their club for weirdness. "For the record," said Gregory Adams, communications director for the March on Washington, "we are as proud of

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the contributions of our leather and drag brothers as we are of any other viable member of the lesbian, gay, bisexual, and transgender community."

(To say that traditional standards do not apply is putting it mildly. According to the *Washington Times*, the man who organized the sadomasochistic demonstration in April said the floggings "didn't last more than a minute" and were for "testing equipment" vendors had for sale after the program.)

As Ms. Osborn of the National Gay and Lesbian Task Force said, homosexuals expect "the military to recognize us *and our partners*" (emphasis added). Gaining recognition for these partnerships is a major goal of the gay rights movement and is tied directly to qualification for "spousal" benefits. Presumably, such recognition of homosexual partners by the military would set up entitlement to health care, survivor benefits, and perhaps family housing.

Another perspective on the gay agenda is "Recommendation for Accepting Homosexuals and Bisexuals Into the Armed Forces," submitted by the Military Freedom Project to the Clinton-Gore transition team after the 1992 election. It called on the new Administration to issue an executive order ending discrimination against homosexual orientation *or conduct*. It prescribed training for every individual in uniform to promote the acceptance of homosexuals.

All persons discharged for homosexuality should be notified of the opportunity to apply for reinstatement, upgrade of discharge, separation pay due, and various benefits to which they may be entitled. Furthermore, the document said, the Secretary of Defense should appoint a committee to advise him on matters affecting gays, lesbians, and bisexuals, and the Pentagon should publish annual reports for the next five years on its progress in implementing the new policies.

Status and Conduct

On May 10, restating a view he had expressed earlier, President Clinton declared that "this whole debate" is "about whether someone should be able to acknowledge, if asked or otherwise, homosexuality and do nothing else." He has repeatedly drawn a distinction between homosexual *status* and homosexual *conduct*.

"Conduct" would surely include sodomy, presently punishable under the Uniform Code of Military Justice (although the gay movement is ac-

tively working to legalize sodomy). But what about public displays of affection?

If a gay airman holds hands with his partner—as heterosexual airmen sometimes do with their spouses—is that part of declaring his status or is it conduct? What if a soldier constantly and openly reads gay magazines in the barracks? If he hangs up a picture of his lover? If he participates in gay rights parades off base?

"I think it is impossible to draw a line between open status and conduct," Senator Nunn said. "The effect

An Army report belies the charge that DoD is engaged in "witch hunts" against homosexuals.

on military units of an open declaration of status and actual conduct would be pretty much the same." Gen. H. Norman Schwarzkopf, commander of forces in the Gulf War, expressed a similar opinion earlier in testimony to the Senate. In his experience, he said, once a homosexual's status was public knowledge in a military organization, polarization soon followed and unit cohesion suffered.

The compromise suggested by Representative Frank would make a further distinction between behavior on base, on duty and off base, off duty. During duty hours, gays and lesbians would not advertise their orientation or engage in any homosexual conduct. After hours, off base, they would be free to maintain an openly homosexual lifestyle.

Again, Senator Nunn disagreed. He pointed out that the Uniform Code of Military Justice applies to a wide range of off-base conduct. The sexual harassment in the Tailhook scandal took place off base and much of it happened in private rooms of a private hotel. "I don't know anyone who argues that this conduct should not be the subject of military jurisdiction just because it occurred off base during off-duty time," Senator Nunn said.

Mr. Frank's proposal, he said, would "create an off-base safe haven for homosexual conduct that is not available with respect to other offenses under the UCMJ." Such a standard,

Senator Nunn said, would give immunity to a service member who made an unwelcome homosexual approach off base to another member of the same unit. And, he asked, what effect would it have on the troops if they knew their officer was pursuing an openly homosexual lifestyle off base?

Asking Questions

As interpreted by Senator Nunn, a "Don't Ask, Don't Tell" compromise would basically continue the interim policy in effect since January, when the Pentagon stopped asking recruits questions about their sexual orientation. This would rule out "sex squads" investigating "private, consensual behavior," Senator Nunn said, but the official military prohibition of homosexuality would remain in force.

That is not acceptable to Mr. Frank, who told the *Boston Globe*, "The overwhelming majority of gay men and lesbians who have been kicked out never volunteered anything to anybody" and were discharged either because investigators discovered their homosexuality or when "somebody squealed on them." He proposes to expand "Don't Ask, Don't Tell" to include "Don't Listen, Don't Investigate."

The Campaign for Military Service, formed to fight the ban, would push the formula still further. The group presented its proposal, "Don't Ask, Don't Punish," to a Pentagon task force studying the issue for Secretary Aspin. The group's director said May 27 that no version of "Don't Ask, Don't Tell" would fulfill the President's promise to eliminate the policy of discrimination.

A standard accusation from the gay rights movement is that the armed forces were conducting "witch hunts" in their past investigation and prosecution of homosexuals. A report prepared for the Pentagon task force sheds a somewhat different light on what happened.

The report analyzes the 102 cases of individuals discharged by the US Army for homosexual misconduct between 1989 and 1992. Of those, eighty-two percent involved a nonconsenting victim. In sixty-two percent of the cases, the perpetrator made use of rank or position to "facilitate" the offense. More than half of the assaults began when the victims were intoxicated or asleep.

Only twenty-two percent of the discharges were based on consensual homosexual behavior—and most of those involved some "compelling factor," such as the act having taken place in public. ■



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with liberty
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By Frank Oliveri, Associate Editor



McDonnell Douglas made the first delivery of a C-17 transport to the 437th Airlift Wing at Charleston AFB, S. C., in June. The aircraft was landed by Air Force Chief of Staff Gen. Merrill A. McPeak before an appreciative crowd.

Deutch Issues C-17 Ultimatum

John M. Deutch, the new under secretary of Defense for Acquisition, warned McDonnell Douglas to improve its management of the C-17 program or risk its termination. Mr. Deutch's formal "cure notice" came in May after a major review [see "The C-17 Fights the Headwinds," p. 34]. He gave Chairman and CEO John F. McDonnell this warning:

"Unless there is strong resolve on the part of McDonnell Douglas corporate management to meet contract requirements, particularly schedule, specifications, and testing requirements, the C-17 program cannot continue."

Mr. Deutch expressed concern about technical risk in flight test software and avionics integration; structural deficiencies; poor allocation of engineering and manufacturing personnel; lack of definitized contracts for Lots IV and V; uncertainty of flight test requirements; and heavy turnover in the labor force.

He said the firm has made progress but "I cannot report that this program has 'turned the corner' and is in good health."

The Pentagon has begun to explore such alternatives as reopening C-5 production, refurbishing aged C-141s to extend their service lives, acquiring commercial aircraft for a portion of the airlift requirement, or a combination of these.

Operation Deny Flight Sorties Tallied

NATC forces through mid-May had flown 1,792 sorties over Bosnia-Herzegovina in Operation Deny Flight, the enforcement of a no-fly zone over the area. Of the total, US aircraft chalked up 873 sorties.

Aircraft from the US, France, United Kingdom, Turkey, Italy, and the Netherlands took part. Mirage 2000s, F-15As, Tornado F. Mk. 3s, F/A-18Cs, F-14s, and F-15C fighters have all been used, supported by C-135s, VC-10Ks, and KC-135 tankers. Surveillance aircraft, such as the E-3A/D and the E-3F, have also been used to monitor the airspace.

USAF Finds More C-141 Cracks

Discovery of new wing cracks forced Air Mobility Command to bar all 264 C-141B transports from carrying their

full loads of military cargo, the Air Force said in May.

The weight limit is set at 55,000 pounds, or about seven fewer tons than the airlifter's normal maximum peacetime load. This restriction will affect both active and Reserve fleets.

An Air Force scientific advisory board recommended the action after further structural analysis on the aging C-141. The tests were used to determine the aircraft's suitability for a Service Life Extension Program, AMC said.

The payload restriction is the same as an earlier limit imposed on part of the fleet because of other cracks found in the C-141 inner and outer wing joins. AMC is planning an inspection and repair schedule with Air Force Materiel Command to determine the extent and damage of the newly discovered cracks.

War Chiefs Win Olympic Arena

The 351st Missile Wing of Whiteman AFB, Mo., won the Blanchard Trophy at the annual Olympic Arena competition, making it the top missile wing in Air Combat Command.

The three-day missile combat competition, held in April at Vandenberg AFB, Calif., assesses performance of missile crews, civil engineering, communications, maintenance, and security police. Out of a possible 3,600 points, the War Chiefs of the 351st accumulated 3,294, just eight points ahead of the second-place 341st MW, or First Aces, from Malmstrom AFB, Mont.

The 351st took top honors in the mechanical shop event and the overall maintenance competition, while sharing first place in the Security Police tactics competition with the First Aces. The 341st took top honors in missile handling, electronics laboratory, and combat arms. In combat arms, the First Aces had a perfect score.

The 321st Missile Wing from Grand Forks AFB, N. D., took third place with a score of 3,246; the 44th MW, from Ellsworth AFB, S. D., took fourth place with a score of 3,231; the 90th MW, from F. E. Warren AFB, Wyo., earned fifth place with 3,189 points; and the 91st MW from Minot AFB,

N. D., took sixth place with 3,128 points.

NASA Lands F-15 With Limited Controls

A NASA F-15, using only engine power for control, touched down at NASA's Ames Dryden Flight Research Facility at Edwards AFB, Calif., in April.

With its flight control deliberately locked, the F-15 completed the milestone flight without incident. The flight was part of a NASA project to develop a computer-assisted engine control system that allows a plane to land safely with only engine power if its normal control surfaces, such as elevators, rudders, or ailerons, are disabled.

This technology could help prevent airplane crashes that result from the loss of flight-control systems, such as the crash of a United Airlines DC-10 at Sioux City, Iowa, in 1989, NASA said.

"Changes to the NASA F-15's digital flight-control system include a cockpit panel with thumb-wheel controls, one for pitch and the other for banking commands," NASA said. "The system converts the pilot's thumb-wheel inputs into engine throttle commands.

"The flight-control system automatically programs the engines to turn the aircraft, climb, descend, and eventually land safely by varying the speed of the engines, one at a time or together."

NCO Academy to Shut Doors

Thirty-one years and 41,600 graduates after it opened its doors, the Air Combat Command Noncommissioned Officers Academy at Bergstrom AFB, Tex., graduated its last class in June.

Bergstrom is expected to close by September as part of ongoing force-structure changes. The NCO Academy will go with it.

The academy, a management course for midlevel enlisted supervisors, started operations at Langley AFB, Va., in 1962. The Air Force relocated the school to Bergstrom in 1975 as the Tactical Air Command NCO Academy West, and later renamed it ACC Academy-Bergstrom.

JAF, A/F-X, MRF Issues

The Navy A/F-X attack aircraft and Air Force Multirole Fighter came under fire from another "paper" plane, the so-called "Joint Attack Fighter." Top USAF and Navy officials said the JAF might supersede both aircraft.

USAF Lt. Gen. Buster C. Glosston, deputy chief of staff for Plans and Operations, and Vice Adm. William A. Owens, deputy chief of Naval Opera-



More than 250 aircraft gathered at Nellis AFB, Nev., for ACC's first Long Shot competition. Teams of sixteen various aircraft tested long-range conventional bombing skills. A team of A-10s, F-15Cs, F-15Es, and B-52s won the first Long Shot.

tions (Resources, Warfare Requirements, and Assessment), said the services had studied new options as part of Defense Secretary Les Aspin's ongoing Bottom-Up Review.

In House testimony, both officials said the JAF was a conceptual airplane with a range of about 500 miles and a cost of \$40 billion-\$45 billion. The payload that was being sought was four internal air-to-air missiles and up to four 2,000-pound bombs externally with significant radar cross section reductions.

JAF was to be modular, enabling it to emphasize either an attack or fighter configuration. The Navy wanted a fighter built around the A/F-X Operational Requirements Document, Admiral Owens said. The Air Force had looked at F-22 derivatives for JAF requirements.

As a part of the Bottom-Up Review, the Air Force and Navy tried to merge requirements for the A/F-X and MRF. The JAF was one of many options that was under review.

Maintainers Win Allen Trophy

Two senior Air Force maintainers won the 1992 Gen. Lew Allen, Jr., Trophy.

Maj. Tina Chester and MSgt. Claude Rolan earned the award, which recognizes Air Force personnel directly involved in the generation of aircraft sorties. The major and sergeant were honored for sustained job performance, efficiency, results, knowledge, and leadership, the Air Force said.

Major Chester commands the 834th Component Repair Squadron, 1st Special Operations Wing, Hurlburt Field,

Fla. Sergeant Rolan is production supervisor for the 59th Fighter Squadron, 33d Fighter Wing, Eglin AFB, Fla.

Air Force Offers Another Way Out

USAF is offering a voluntary officer early retirement program to supplement the Voluntary Separation Incentive (VSI), the Special Separation Benefit (SSB) program, and the early retirement authority, the service announced.

Officers could begin applying for permission to separate or retire before they complete their active-duty service commitment, with separation occurring between October 1, 1993, and September 29, 1994, or a retirement date between October 1, 1993, and September 1, 1994.

Separations and retirements would take place in 1994 rather than 1993 because 1993 goals for force reductions have already been reached.

Officers eligible for the May 1994 captain, major, and colonel Selective Early Retirement Boards who also apply for voluntary retirement may only request retirement dates of January 1, 1994, or later.

Most Air Force officers are eligible to participate. The exceptions are: health professional officers in all grades and categories; officers in core duty 17XX air weapons director and 49XX communications and computer systems specialties; F-15E pilots and weapon system officers; B-1B navigators (offensive and defensive systems officers); F-4G pilots, WSOs, and electronic systems operators; officers being involuntarily separated; and officers under investigation or

facing court-martial proceedings, appellate leave, or dismissal.

US, Russia Perform Joint SAR

Units from 11th Air Force in Alaska and the Alaska Air National Guard participated in a joint US-Russian search-and-rescue exercise at Tiksi, Siberia, in April.

The purpose was to demonstrate the capability to conduct combined military and civilian search-and-rescue operations in an Arctic environment. The two-day exercise focused on interoperability. It featured an HC-130 from the 210th Rescue Squadron at Kulis ANGB, Alaska, and an AMC C-5 Galaxy, carrying two HH-60G Black Hawk helicopters from the 210th RQS.

The exercise included the simulated crash of an aircraft on an island about 225 miles north of Tiksi in the Arctic Ocean. The combined US-Russian search-and-rescue force, including US and Russian helicopters and pararescuemen, then rescued the "survivors." In-flight and prepositioned ground refueling of the helicopters, treatment of the survivors, and evacuation of the survivors to Tiksi AB were practiced.

This is the first joint USAF-Russian Air Force exercise since World War II. Overcoming language difficulties and different operational procedures received particular emphasis.

F-22 Completes PDR

The F-22 fighter program successfully completed Air Vehicle Preliminary Design Review in late April, the Air Force said.

The PDR marks the point in the Engineering and Manufacturing Development phase in which the functional design of the weapon system is reviewed compared to its baseline requirements and the transition to detailed design of the system and its subsystems begins.

The top-to-bottom review was the culmination of eighty-eight studies of various F-22 subsystems and software conducted over the past year.

The next milestone for the program will be the Critical Design Review in late 1994.

SSB and VSI Benefits Levelled

Benefits once set aside for SSB recipients are now being made available to VSI recipients, the Air Force said in April.

The 1993 Defense Authorization Act provided for the expanded benefits, with the transition management program providing the benefits for personnel separating from the Air Force.

VSI and SSB transition benefits include the following:

- Two years of commissary, exchange, and theater privileges. Use of other morale, welfare, and recreation facilities is at the discretion of the installation commander.

- Up to 120 days of extended medical care, CHAMPUS, and treatment at uniformed service facilities. The 120 days of extended care will begin on the date of separation. Personnel can also get eighteen months of medical coverage, which includes pre-existing conditions, with the purchase of conversion health insurance.

- A chance to enroll in the Montgomery GI Bill.

- Travel entitlement and shipment of household goods to home of selection, regardless of years of service.

- Storage of household goods for one year.

- Priority over equally qualified candidates for those who want to join an Air National Guard or Air Force Reserve unit. This benefit extends only one year beyond date of separation.

- Hiring preference for nonappropriated-fund positions.

- Up to 180-day extension in family housing at fair rental value, at the discretion of the base commander.

- Extension in Department of Defense dependent schools so children can finish twelfth grade. The child must complete eleventh grade before the active-duty member separates.

- Permissive temporary duty for job search or house-hunting. People are allowed twenty days' permissive TDY from CONUS bases and thirty days from overseas bases, subject to mission requirements and unit commander's approval.

- Permissive TDY for up to seven days to attend a transition assistance program seminar if one is not locally available.

- Transition services, including relocation assistance, job counseling, financial counseling, and skills verification.

B-1B Is Top Upgrade Priority

The B-1B bomber is the Air Force's top-priority upgrade program, said Lt. Gen. Stephen B. Croker, vice commander of Air Combat Command. He noted that no other platform in the Air Force arsenal has greater potential to alter the outcome of a conventional conflict.

Despite the funding crunch, upgrades proposed for the B-1B in the Bomber Roadmap, released in June 1992, remain largely intact.

The deputy assistant director of the

B-1B Development Division at Wright-Patterson AFB, Ohio, Mike Higgins, said in May that the following system upgrades remain in Air Force plans:

- The ALQ-161 ECM suite will be upgraded to handle conventional or tactical warfare threats in addition to its strategic capability. The new system will be known as the 1122 ECM Antenna.

- The 1760 bus, which is a standard bus enabling USAF aircraft to deliver smart weapons, will be added to the bomber. It is also being used in the F-117.

- Radio upgrades will help the B-1B handle such tactical scenarios as air-to-ground attack, during which communications with ground commanders is essential.

- A more powerful computer processor is being added because the upgrades require greater memory.

- Primary carriage modifications will allow the B-1 to deliver cluster bomb units, enhancing the B-1's antipersonnel and mine warfare capabilities.

- The Global Positioning System will be added as a prerequisite for the Joint Direct Attack Munition and will be integrated with the inertial navigation system.

- General reliability and maintainability improvements will be made to the B-1B engines.

SDIO Gets New Name

The Strategic Defense Initiative Organization has been changed to the Ballistic Missile Defense Office, DoD said in May.

The new organization will focus on improving systems designed to stop short-range battlefield weapons, such as the Scud missile. Its second priority will be the development of space-based systems to counter ICBMs.

The move diminishes the influence of the office. SDIO formerly reported directly to the Secretary of Defense. The new office will report to the under secretary of Defense for Acquisition.

Tax Credit Eligibility Overseas

US servicemen and -women stationed abroad still qualify for an earned income credit of up to \$2,211 on their 1992 income tax returns, despite US residency requirements, according to the Internal Revenue Service.

To meet the requirements, a taxpayer must have a qualifying child living with him or her in the US for more than six months during the tax year. In the case of a couple filing a joint return, only one spouse needs to be living with the child Stateside for the period required. Those taxpayers

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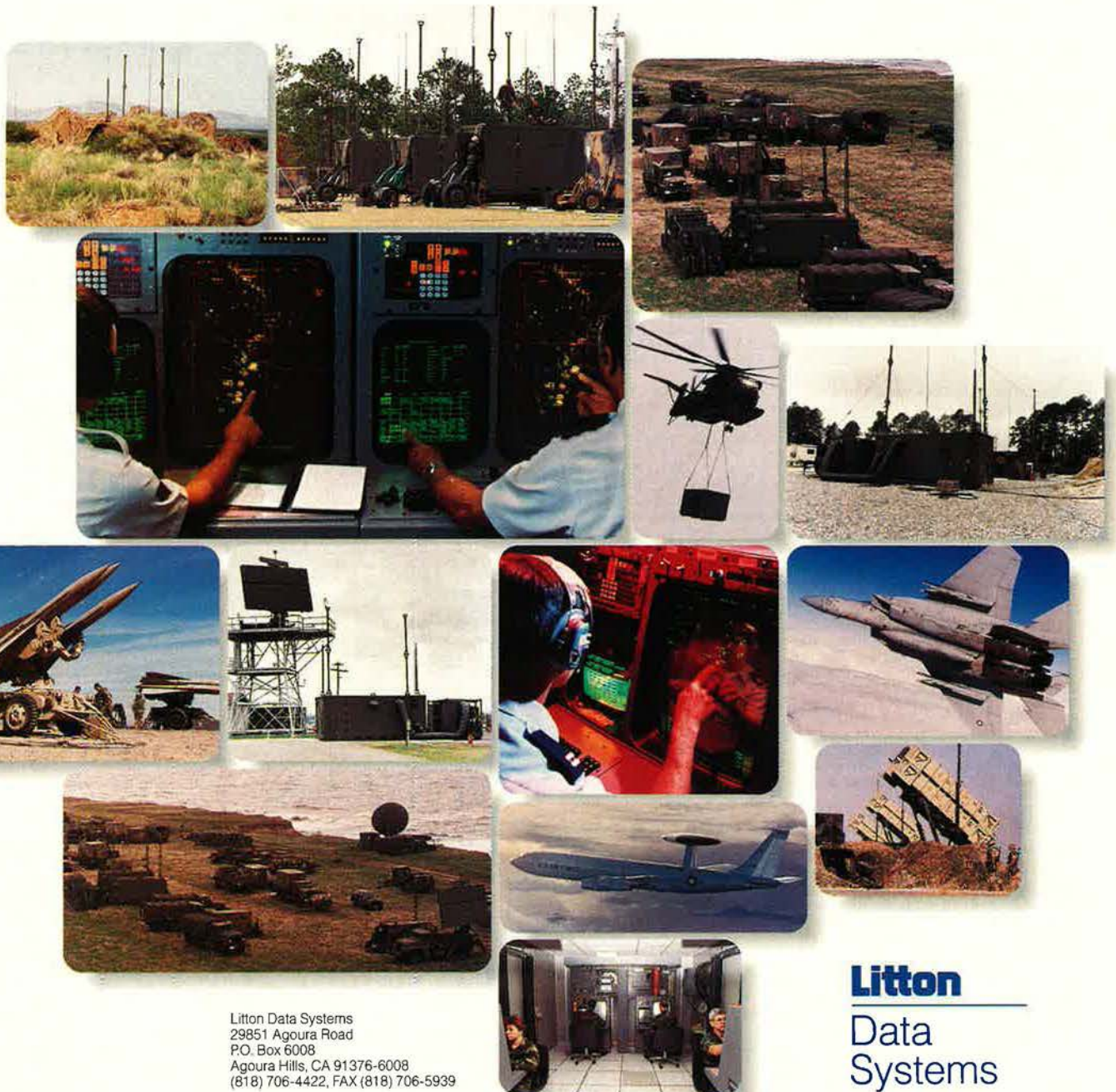
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Senior Staff Changes

RETIREMENTS: L/G Thomas A. Baker; Gen. James B. Davis; M/G Lawrence E. Day; B/G William M. Douglass; L/G Thomas R. Ferguson, Jr.; L/G Trevor A. Hammond; M/G Frank B. Horton III; B/G Thomas C. Hruskoc; M/G William K. James; B/G John O. McFalls III; B/G Lawrence A. Mitchell; B/G John M. Nauseef; M/G Gary W. O'Shaughnessy; M/G Michael D. Pavich; B/G Robert W. Poel; L/G Martin J. Ryan, Jr.; B/G Dale E. Stovall; B/G Robin G. Tornow.

PROMOTIONS: To be Lieutenant General: James A. Fain, Jr., John G. Lorber, John M. Nowak, Thad A. Wolfe.

CHANGES: B/G (M/G selectee) George T. Babbitt, Jr., from Dir., Log., Hq. USAF, Ramstein AB, Germany, to Dir., Supply, DCS/Log., Hq. USAF, Washington, D. C., replacing M/G (L/G selectee) John M. Nowak.

Col. (B/G selectee) Maxwell C. Bailey, from Sr. Nat'l Defense Fellow, Council on Foreign Relations, AU, New York, N. Y., to Cmdr., 1st SOW, Hq. AFSOC, Hurlburt Field, Fla., replacing B/G Charles R. Holland. **M/G Roy D. Bridges, Jr.**, from Cmdr., AFFTC, AFMC, Edwards AFB, Calif., to Dir., Requirements, Hq. AFMC, Wright-Patterson AFB, Ohio, replacing M/G (L/G selectee) James A. Fain, Jr. **B/G Fredric N. Buckingham**, from Vice Cmdr., Warner Robins ALC, AFMC, Robins AFB, Ga., to Cmdr., 314th AW, AMC, Little Rock AFB, Ark., replacing Col. Charles J. Wax. **B/G John P. Casciano**, from Dir., Intel., Hq. ACC, Langley AFB, Va., to Dir., P&R, ACS/Intel., Hq. USAF, Washington, D. C., replacing B/G (M/G selectee) Kenneth A. Minihan.

Col. (B/G selectee) Charles H. Coolidge, Jr., from Vice Cmdr., TACC, Hq. AMC, Scott AFB, Ill., to Cmdr., 375th AW, Hq. AMC, Scott AFB, Ill., replacing B/G Dwight M. Kealoha. **B/G Stewart E. Cranston**, from Dir., Test & Ops., Hq. AFMC, and USAF Test Rep., Jt. Cmdrs. Group (Test & Eval.), JCS, Wright-Patterson AFB, Ohio, to Cmdr., AFDT, AFMC, Eglin AFB, Fla., replacing M/G Michael J. Butchko, Jr. **L/G Stephen B. Croker**, from Vice Cmdr., Hq. ACC, and Vice CINC, USAFLANT, Langley AFB, Va., to Cmdr., 8th AF, ACC, Barksdale AFB, La., replacing retired L/G Martin J. Ryan, Jr. **M/G Gary L. Curtin**, from Dep. Dir., Int'l Negotiations, J-5, Joint Staff, Washington, D. C., to Dir., Intel., J-2, Hq. USSTRATCOM, Offutt AFB, Neb., replacing retired M/G Frank B. Horton III. **B/G Roger G. Dekok**, from Cmdr., 50th Space Wing, AFSPACECOM, Falcon AFB, Colo., to Dir., Plans, Hq. AFSPACECOM, Peterson AFB, Colo., replacing B/G Robert S. Dickman.

B/G Robert S. Dickman, from Dir., Plans, Hq. AFSPACECOM, Peterson AFB, Colo., to Cmdr., 45th Space Wing, and Dir., Eastern Range, AFSPACECOM, Patrick AFB, Fla., replacing retiring B/G Jimmy R. Morrell. **M/G Kenneth E. Eickmann**, from Staff Dir., Hq. AFMC, Wright-Patterson AFB, Ohio, to Dir., Log., Hq. AFMC, Wright-Patterson AFB, Ohio, replacing retiring M/G Richard D. Smith. **Col. (B/G selectee) Richard L. Engel**, from Cmdr., 412th Test Wing, AFMC, Edwards AFB, Calif., to Cmdr., AFFTC, AFMC, Edwards AFB, Calif., replacing M/G Roy D. Bridges, Jr. **M/G (L/G selectee) James A. Fain, Jr.**, from Dir., Requirements, Hq. AFMC, Wright-Patterson AFB, Ohio, to Cmdr., ASC, Hq. AFMC, Wright-Patterson AFB, Ohio, replacing retired L/G Thomas R. Ferguson, Jr. **B/G Francis C. Gideon, Jr.**, from Vice Cmdr., Sacramento ALC, AFMC, McClellan AFB, Calif., to Dir., Test & Ops., Hq. AFMC, and USAF Test Rep., Jt. Cmdrs. Group (Test & Eval.), JCS, Wright-Patterson AFB, Ohio, replacing B/G Stewart E. Cranston.

B/G (M/G selectee) Richard N. Goddard, from Cmdr., 27th FW, ACC, Cannon AFB, N. M., to Dir., Log., Hq. USAF, Ramstein AB, Germany, replacing B/G (M/G selectee) George T. Babbitt, Jr. **M/G John C. Griffith**, from Cmdr., Keesler Training Ctr., ATC, Keesler AFB, Miss., to Cmdr., Tech. Training Numbered AF (Provisional), AETC, Keesler AFB, Miss. **Col. (B/G selectee) William M. Guth**, from ACS/Offensive Ops., Hq. AAFCE, Ramstein AB, Germany, to Cmdr., 27th FW, ACC, Cannon AFB, N. M., replacing B/G (M/G selectee) Richard N. Goddard. **B/G Milton L. Haines**, from Dep. for Special Projects, Ass't Sec'y of the Air Force for Financial Management, and Chairman, Policy Review Board, Hq. USAF, Wright-Patterson AFB, Ohio, to Ass't to the Vice C/S, Policy, Hq. USAF, Washington, D. C. **B/G Marcelite J. Harris**, from Vice Cmdr., Oklahoma City ALC, AFMC, Tinker AFB, Okla., to Dir., Tech. Training, Hq. ATC, Randolph AFB, Tex., replacing retired M/G Lawrence E. Day.

Col. (B/G selectee) Michael V. Hayden, from Dir., Air Force C/S Ops. Group, Hq. USAF, Washington, D. C., to Dir., Intel., J-2, Hq. USEUCOM, Stuttgart-Vaihingen, Germany, replacing M/G Ervin J. Rokke. **Col. (B/G selectee) Charles R. Henderson**, from Chief, Nuclear Ops. Command & Control Div., J-36, Joint Staff, Washington, D. C., to Cmdr., 384th BW, ACC, McConnell AFB, Kan., replacing Col. Edgar A. Ott. **B/G James L. Higham**, from Cmdr., 377th ABW, AFMC, Kirtland AFB, N. M., to Vice Cmdr., AFSOC, Hurlburt Field, Fla., replacing retiring B/G C. Jerome Jones. **B/G William S. Hinton, Jr.**, from Cmdr., 366th Wing, ACC, Mountain Home AFB, Idaho, to Spec. Ass't to the Cmdr., Hq. ACC, Langley AFB, Va. **B/G Henry M. Hobgood**, from Staff Dir., Hq. ACC, Langley AFB, Va., to Cmdr., Lackland Training Wing, AETC, Lackland AFB, Tex., replacing retiring M/G Billy G. McCoy.

Col. (B/G selectee) Peter F. Hoffman, from Ass't. Dir., Medical Prgms. & Resources, Office of the Surgeon General, Hq. USAF, Bolling AFB, D. C., to Cmdr./Dir., AFMOA, Office of the Surgeon General, Hq. USAF, Bolling AFB, D. C., replacing retiring B/G Paul D. Gleason. **B/G Charles R. Holland**, from Cmdr., 1st SOW, AFSOC, Hurlburt Field, Fla.,

to Dep. Commanding Gen., JSOC, USSOCOM, Fort Bragg, N. C., replacing retired B/G Dale E. Stovall. **B/G Dennis K. Hummel**, from Vice Cmdr., ASC, Hq. AFMC, Wright-Patterson AFB, Ohio, to Dir., Maint., DCS/Log., Hq. USAF, Washington, D. C., replacing retired B/G William M. Douglass. **L/G John E. Jackson, Jr.**, from Cmdr., 15th AF, and Dir., 15th AF Combat Ops. Staff, AMC, March AFB, Calif., to Vice Cmdr., Hq. AMC, Scott AFB, Ill., replacing L/G Walter Kross. **L/G James L. Jamerson**, from Vice CINC, Hq. USAF, and Dir., EACOS, Ramstein AB, Germany, to Cmdr., 12th AF, ACC, and Cmdr., USSOUTHCOM Air Forces, Bergstrom AFB, Tex., replacing retired L/G Thomas A. Baker.

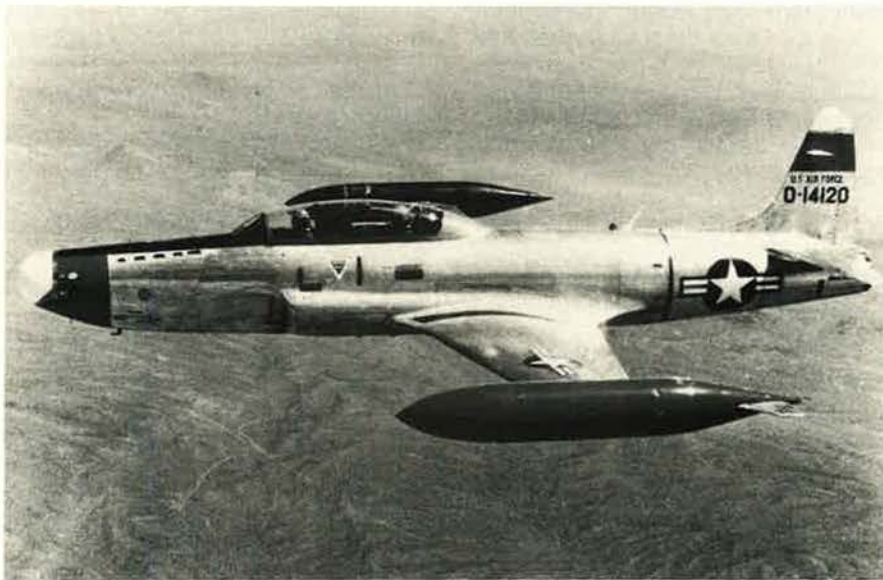
B/G Albert D. Jensen, from Cmdr., 22d ARW, AMC, March AFB, Calif., to Cmdr., 502d ABW, Hq. AU, Maxwell AFB, Ala. **Col. (B/G selectee) Orest L. Kohut**, from Dep. Dir., P&P, Hq. AFMC, Wright-Patterson AFB, Ohio, to Dir., Financial Mgmt. and Comptroller, Hq. AFMC, Wright-Patterson AFB, Ohio, replacing retired B/G John M. Nauseef. **L/G Walter Kross**, from Vice Cmdr., Hq. AMC, Scott AFB, Ill., to Cmdr., 15th AF, and Dir., 15th AF Combat Ops. Staff, AMC, March AFB, Calif., replacing L/G John E. Jackson, Jr. **Col. (B/G selectee) George P. Lampe**, from Vice Cmdr., AFCC, Scott AFB, Ill., to Dir., C⁴ Sys., J-6, Hq. USTRANSCOM, Scott AFB, Ill., replacing B/G John R. Worthington. **Col. (B/G selectee) James D. Latham**, from Comdt., SOS, Hq. AU, Maxwell AFB, Ala., to Comdt., AFROTC, ATC, Maxwell AFB, Ala., replacing retired B/G Robin G. Tornow.

M/G (L/G selectee) John G. Lorber, from Dir., Plans, DCS/P&O, Hq. USAF, Washington, D. C., to Vice CINC, Hq. USAF, and Dir., EACOS, Ramstein AB, Germany, replacing L/G James L. Jamerson. **B/G Lance W. Lord**, from Cmdr., 90th MW, ACC, F. E. Warren AFB, Wyo., to Cmdr., 21st Space Wing, Hq. AFSPACECOM, Peterson AFB, Colo., replacing retiring B/G Ronald D. Gray. **Col. (B/G selectee) Gregory S. Martin**, from Cmdr., 33d FW, ACC, Eglin AFB, Fla., to Cmdr., 1st FW, Hq. ACC, Langley AFB, Va., replacing Col. (B/G selectee) David J. McCloud. **Col. (B/G selectee) David J. McCloud**, from Cmdr., 1st FW, Hq. ACC, Langley AFB, Va., to Cmdr., 366th Wing, ACC, Mountain Home AFB, Idaho, replacing B/G William S. Hinton, Jr. **B/G (M/G selectee) Kenneth A. Minihan**, from Dir., P&R, ACS/Intel., Hq. USAF, Washington, D. C., to Dir., JEWEC, and Cmdr., Hq. AFIC, Kelly AFB, Tex., replacing retired M/G Gary W. O'Shaughnessy.

B/G Thomas H. Neary, from Cmdr., 341st MW, ACC, Malmstrom AFB, Mont., to Cmdr., 90th MW, ACC, F. E. Warren AFB, Wyo., replacing B/G Lance W. Lord. **M/G (L/G selectee) John M. Nowak**, from Dir., Supply, DCS/Log., Hq. USAF, Washington, D. C., to DCS/Log., Hq. USAF, Washington, D. C., replacing retired L/G Trevor A. Hammond. **M/G Raymond E. O'Mara**, from Dep. USCINCLANT, and C/S, Hq. USLANTCOM, Naval Base Norfolk, Va., to Dir., Defense Mapping Agency, Fairfax, Va., replacing retired M/G William K. James. **M/G John F. Phillips**, from Cmdr., Jt. Log. Sys. Ctr., Hq. AFMC, Wright-Patterson AFB, Ohio, to Cmdr., Sacramento ALC, AFMC, McClellan AFB, Calif., replacing retired M/G Michael D. Pavich. **M/G Glenn A. Profit II**, from Dir., P&R, Hq. ATC, Randolph AFB, Tex., to Dir., P&O, Hq. ATC, Randolph AFB, Tex.

Col. (B/G selectee) Karen S. Rankin, from Vice Cmdr., Lackland Training Ctr., Lackland AFB, Tex., to Cmdr., Keesler Training Wing, AETC, Keesler AFB, Miss., replacing M/G John C. Griffith. **M/G Ervin J. Rokke**, from Dir., Intel., J-2, Hq. USEUCOM, Stuttgart-Vaihingen, Germany, to ACS/Intel., Hq. USAF, Washington, D. C., replacing M/G Richard J. O'Leary. **Col. (B/G selectee) George T. Stringer**, from Exec. Ass't to the Comptroller, OSD, Washington, D. C., to Dir., Budget Ops., Ass't Sec'y of the Air Force for Financial Management, Washington, D. C., replacing B/G Allen D. Bunker. **B/G Eugene L. Tattini**, from Vice Cmdr., Space and Missile Sys. Ctr., AFMC, Los Angeles AFB, Calif., to Cmdr., 377th ABW, AFMC, Kirtland AFB, N. M., replacing B/G James L. Higham. **M/G (L/G selectee) Thad A. Wolfe**, from Ass't Dep. Dir., Ops., NSA, Fort Meade, Md., to Vice Cmdr., Hq. ACC, and Vice CINC, USAFLANT, Langley AFB, Va., replacing L/G Stephen B. Croker. **B/G John R. Worthington**, from Dir., C⁴ Sys., J-6, Hq. USTRANSCOM, Scott AFB, Ill., to Cmdr., Jt. Log. Sys. Ctr., Hq. AFMC, Wright-Patterson AFB, Ohio, replacing M/G John F. Phillips.

SENIOR EXECUTIVE SERVICE (SES) CHANGES: Robert J. Conner, from Assoc. Dir., Aircraft Mgmt., Sacramento ALC, AFMC, McClellan AFB, Calif., to Dir., Commodities Mgmt., Oklahoma City ALC, AFMC, Tinker AFB, Okla., replacing Thomas L. Miner. **R. Earl Good**, from Dir., Geophysics, Phillips Lab, AFMC, Hanscom AFB, Mass., to Dep. Dir., Phillips Lab, AFMC, Kirtland AFB, N. M., replacing James Romero. **Gary M. Grann**, from Sr. Tech. Advisor, ESC, AFMC, Hanscom AFB, Mass., to DCS/Plans & Advanced Prgms., ESC, AFMC, Hanscom AFB, Mass. **William Maikisch**, from DCS/Prgm. Mgmt., Space and Missile Sys. Ctr., AFMC, Los Angeles AFB, Calif., to Exec. Dir., Space and Missile Sys. Ctr., AFMC, Los Angeles AFB, Calif. **James P. McCarthy**, from Dir., Engineering, AMRAAM, ASC, AFMC, Eglin AFB, Fla., to Ass't Dir., Engineering for Munitions, ASC, AFMC, Eglin AFB, Fla., replacing James F. Bair. **James Romero**, from Dep. Dir., Phillips Lab, AFMC, Kirtland AFB, N. M., to DCS/Plans & Advanced Prgms., Space and Missile Sys. Ctr., AFMC, Los Angeles AFB, Calif. **Harold Roth**, from Dir., Solid-State Science, Rome Lab, AFMC, Hanscom AFB, Mass., to Dir., Geophysics, Phillips Lab, AFMC, Hanscom AFB, Mass., replacing Dr. R. Earl Good.



USAF's oldest aircraft, this much-modified T-33, is still on the job at Wright-Patterson AFB, Ohio. The NT-33A is performing extensive, in-flight simulation research. The forty-one-year-old aircraft has accumulated fewer than 8,000 total flying hours.

filing a "married filing separate" form may not claim the credit.

A qualifying child includes a son or daughter, adopted child, grandchild, stepchild, or foster child under age

nineteen at the end of the year, or under twenty-four at the end of the year and a full-time student, or any age if permanently and totally disabled.

The taxpayers' earned income and adjusted gross income must be less than \$22,370 each.

US Aircraft Engage Iraqi Targets

In two separate incidents, USAF fighters engaged two targets while patrolling the no-fly zone over Iraq.

The first engagement took place April 9, when three F-16s and one F-4G "Wild Weasel" were fired on by Iraqi anti-aircraft artillery. Two F-16s peeled off and hit the site with cluster bombs. The US warplanes completed their mission and returned to Incirlik AB, Turkey.

Nine days later, an Iraqi radar illuminated two F-4Gs on patrol over northern Iraq. One of the planes fired a single high-speed antiradiation missile at the site of the tracking radar.

In neither case, said DoD spokesman Bob Hall, was any bomb-damage assessment available.

SERBs Take Their Toll

The Air Force chose 893 more lieutenant colonels and forty-two nonline colonels for early retirement, the service said.

The two groups were reviewed in April by Selective Early Retirement



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Boards and are expected to retire by October 1.

The boards considered 2,977 line and chaplain lieutenant colonels and 212 colonel chaplains, judge advocates, nurses, and biomedical sciences corps officers.

Additional boards met in May to consider line colonels, majors, and captains who are eligible for early retirement.

Airman's Heroism Recognized

The Air Force Sergeants Association awarded SrA. Daniel W. Downey the 1993 Pitsenbarger Award for saving the lives of several individuals.

Airman Downey, of the 5th Security Police Squadron, Minot AFB, N. D., was cited for his "extraordinary courage and heroism without regard to his own safety" while stationed overseas.

The association said, "An unauthorized vehicle had crashed through the installation boundary where Airman Downey was working, and gunfire erupted from foreign national soldiers posted on the scene. After several attempts to establish a cease-fire, he entered into the direct line of fire to secure the vehicle and administer first aid to the wounded occupants."

Airman Downey was credited with preventing further injuries through his actions.

Pentagon to Reprogram Somalia Cost

The Defense Department has asked Congress to reprogram \$750 million to cover the cost of Operation Restore Hope in Somalia, the Pentagon announced.

Reprogrammed funds are not new funds, but funds that are shifted from one account to another within the budget of the Defense Department.

In the past, the Pentagon would fund such operations as Restore Hope through operations and maintenance accounts. However, because readiness is derived from O&M accounts and those accounts have endured large cuts in recent years, the Pentagon is looking to cover the expense in other ways.

Further O&M reductions could hurt military readiness, according to Defense Secretary Les Aspin.

Mr. Aspin said he hopes to work with Congress to find sources for the funds needed, since the Fiscal Year 1993 budget is already short on such sources. "There are no more painless pockets," he said.

In Fiscal 1994, the Defense Department set aside more than \$300 million for peacekeeping operations, the first request of its kind.

USAF Dominates Picture Competition

The Air Force dominated the 1992 Military Pictures of the Year competition, with SSgt. David L. Vandenbrake, Charleston AFB, S. C., being named runner-up for Military Cinematographer of the Year.

The Air Force swept all categories in the Motion Media Division. First place in the Combat Camera category went to Sergeant Vandenbrake, while MSgt. Daniel Raasch, Hill AFB, Utah, took second-place honors.

First and second place Uncontrolled Action winners were Sgt. Danny Kahler, Hurlburt Field, Fla., and SrA. Yun Sadowksi, Lackland AFB, Tex., respectively.

In the Controlled Action category, Sgt. Wendy Berg of Fairchild AFB, Wash., took first place, with Sergeant Vandenbrake finishing second.

Sergeant Berg also took first in the Editing category, while Sergeant Kahler was second.

In the Still Division, the Air Force took both the Combat Camera and Illustrative categories in the competition.

Combat Camera winners were SrA. Justin Pyle, Hickam AFB, Hawaii, in first, SrA. Mark Borosch, Norton AFB, Calif., second, Sgt. Gary Copping, Yokota AB, Japan, third, and MSgt. Donald Wetterman, Washington, D. C., honorable mention.

The Illustrative category was won by SSgt. Mark Allen, Washington, D. C. Airman Pyle took second, TSgt. Fernando Serna, Randolph AFB, Tex., took third, and Sergeant Serna and SSgt. Lance Cheung, Norton AFB, had honorable mentions.

Sergeant Cheung also took first in the Sports category and another honorable mention in the News category. SSgt. Lemuel Robson, Tokyo, Japan, was the winner in the Picture Story category.

DoD Transfers HIV Funds to HHS

The Department of Defense and Department of Health and Human Services agreed on how to conduct Human Immunodeficiency Virus (HIV) research called for in the Fiscal 1993 Defense Appropriations Act, the Pentagon said in April.

The agreement stipulates that \$20 million provided to the Defense Department will be transferred to HHS. The National Institutes of Health, the principal medical research arm of HHS, will be responsible for a large-scale clinical investigation among the HIV-infected population.

The transfer takes advantage of NIH's large AIDS Clinical Trial Group network of civilian medical research

units throughout the US. The studies will include 6,000 to 12,000 people.

Gulf War Airpower Survey Summary Released

Airpower was pivotal in the 1991 Gulf War victory, but could not have succeeded alone, according to a \$5.8 million study commissioned by the Air Force.

Released in May, the unclassified summary of a 6,000-page report entitled "Gulf War Air Power Survey" contains a wealth of data but is inconclusive on several key questions.

The summary concluded that the efficacy of airpower in the Gulf War did not represent a military technological revolution. In fact, it said, most of the effective systems used in the war were mature technologies. Eliot Cohen, professor of strategic studies at Johns Hopkins University, directed the study.

SR-71 Contributes to Science

A NASA SR-71 formerly used for reconnaissance by the Air Force has been modified to conduct high-altitude astronomy studies, NASA said in April.

The "Blackbird," based at NASA's Ames Dryden Flight Research Facility, Edwards AFB, Calif., made its first scientific flight March 9. The aircraft nose bay has been modified to carry an ultraviolet video camera, which studies stars and comets at three times the speed of sound. Future flights will carry a variety of instruments, including a fiber-optic device and an ultraviolet spectrometer.

During its first mission, the SR-71 climbed above 83,000 feet, where, with specialized instruments, scientists can observe stars and planets at ultraviolet wavelengths that are blocked to ground-based astronomers.

NASA currently has three SR-71s in its stable.

Horner Urges Nuclear Vigilance

The US should face up to the expanding number of nations seeking nuclear technology that could pose new challenges to the nation, warned the commander of Air Force Space Command and the North American Aerospace Defense Command.

In a hearing before the Senate Armed Services Committee, Gen. Charles A. Horner said, "In the euphoria of our hard-earned victory in the cold war, we dare not assume away some 27,000 nuclear weapons dispersed throughout the [Commonwealth of Independent States], a condition exacerbated by the continuing power struggle over command-and-control authority."

However, the potential proliferation

of nuclear weapons and sensitive weapons technology may well pose a bigger challenge to NORAD than the Soviet Union ever did, General Horner said.

General Horner described the Russian space program as "robust." He wondered how the Russians can maintain "this robust space program when they're having such economic problems. They also have a very considered effort to shape their space programs in the commercial sector."

News Notes

■ The US marked the fiftieth anniversary of the Pentagon in May. The National Park Service has designated the office building a National Historic Landmark. The Pentagon was completed on January 15, 1943—after only sixteen months of construction. Covering a floor area of 6.5 million square feet, it remains the largest office building in the world under one roof.

■ The final class of navigators completed undergraduate navigator training at Mather AFB, Calif., in April. Mather has been training navigators since August 1941. The base will close October 1.

■ DoD announced the winners of the Commander in Chief's Award for Installation Excellence in April. They are: White Sands Missile Range, N. M.; MCAS Beaufort, S. C.; Naval Station, San Diego, Calif.; Eglin AFB, Fla.; and Defense General Supply Center, Richmond, Va. The award recognizes outstanding and innovative efforts by the people who operate and maintain US military installations.

■ USAF accepted the 6,000th F100 turbofan engine built by Pratt & Whitney in May. The F100-PW-229 engine was placed in an Air Force F-15E.

■ A newly enhanced Patriot radar system successfully detected and tracked a tactical ballistic missile in May, Raytheon said. The test, conducted off Kwajalein in the Pacific, was the first in a series that will evaluate the performance of radars against TBM threats.

■ The Rafale B 01 two-seat development aircraft made its maiden flight in April, Dassault Aviation said. The aircraft flew for one hour and ten minutes without a hitch. The fighter will be used by the French Air Force and Navy.

■ Shemya AFB, Alaska, was dedicated in May as Eareckson AFS, after Col. William O. Eareckson, a World War II hero during the Aleutians campaign, the service said.

■ General Motors' Allison Gas Turbine Division and United Technologies Pratt & Whitney formalized their teaming agreement to develop the propulsion system for the Navy and Air Force's A/F-X, the firms announced in May.

The firms delivered their engine proposal to Grumman, which is teamed with Boeing and Lockheed, in April.

■ The Air Force deployed the Array of Low-Energy X-Ray Imaging Sensors satellite in low-Earth orbit in April from an Orbital Sciences Corp. Pegasus booster. ALEXIS is a small, 240-pound satellite featuring six wide-field X-ray telescopes that will survey the sky for celestial X-ray sources. The booster was launched from a B-52 eighty miles off the coast of Monterey, Calif.

■ Saab's JAS-39 Gripen, which will be used by the Swedish Air Force, completed its 1,000th test flight in April, the firm said. While basic aircraft systems have been fully tested, further flights will focus on refining the flight and systems characteristics and tactical applications.

■ The Civil Air Patrol posted its best safety record in fifty-one years in 1992, flying 130,000 hours with an accident rate of 1.54 per 100,000 flying hours, CAP announced in April. That compares with a general aviation rate of 7.14 and the Air Force rate of 1.65 per 100,000 hours.

■ In April, the Pentagon notified Congress that the government of Argentina has requested the purchase of thirty-six surplus A-4 aircraft at a cost of \$125 million. Included in the request are eight spare engines, the rework and overhaul of aircraft and engines, support equipment, publications and technical data, personnel training and training equipment, spare and repair parts, and 200,000 rounds of 20-mm cartridges.

■ Aeronautical Systems Center's Wright Laboratory Research and Development Contracting Directorate was

awarded the Air Force Outstanding Contracting Unit Award in March. The directorate was recognized for its outstanding work in streamlining and standardizing processes to better meet customer needs.

■ The first hover test of the Lightweight Exoatmospheric Projectile using solid rocket fuel was successfully conducted in April by Air Force Phillips Laboratory personnel at Edwards AFB, Calif. The seventeen-pound vehicle hovered for seventeen seconds in a specially constructed test environment. It was propelled from its launch cradle to a height of thirteen feet, where it used built-in sensors to lock on to and track a simulated missile threat.

Purchases

The Air Force awarded Lockheed Fort Worth Co. a \$231.8 million face-value increase to a fixed-price incentive firm contract for Peace Onyx II long-lead extension and funding increase through June 30, 1994, for thirty-four F-16C and six F-16D aircraft, and long-lead materials for an additional thirty-four F-16C and six F-16D aircraft. Expected completion: July 1996.

The Air Force awarded Rockwell's Collins Avionics and Communications Division a \$10.9 million face-value increase to a firm fixed-price contract for 388 miniature airborne Global Positioning System receivers. Expected completion: July 1995.

The Air Force awarded Texas Instruments' Defense Systems and Electronics Group an \$80 million firm fixed-price contract for Lot I production of the F-117 Infrared Acquisition and Detection System (IRADS) upgrade. Expected completion: August 1997. ■

Index to Advertisers

AIL Systems, Inc.	11
Central Fidelity Bank	23
E-Systems, Inc.	17
Grumman Corp.	15
Litton Data Systems	21
Lockheed F-22 Team	48-49
Lockheed Fort Worth Co.	5
Lockheed Sanders Inc.	74
Loral Randtron Systems	Cover II
Magnavox Electronic Systems Co.	13
McDonnell Douglas Corp.	Cover IV
Northrop Corp.	Cover III
Rockwell International, Collins Avionics and Communications Div.	3
Vought Aircraft Co.	9
AFA Convention	88
AFA Directory	7
AFA Insurance	94
AFA Member Supplies	95

How much of the load can the Guard and Reserve carry?

Testing the Limits of the Total Force

By Bruce D. Callander

THE SPIRIT of the Colonial Minuteman—that farmer-soldier who dropped his plow, grabbed his musket, and marched off to defend liberty—is alive and well in today's reserve component. However, maintaining the readiness of the on-call troops has certainly changed.

The Reservist, if he or she wants to be prepared, must adhere to a training schedule almost as demanding as a full-time job.

Today's Reservists may be ordered to push aside the computer keyboard, jump into front-line fighters, and swiftly deploy to distant war zones. Others may go overseas for months to take part in round-the-clock refueling operations. Still others may find themselves patrolling a lawless foreign capital.

That's not all. Unlike their Colonial counterparts, members of the Air Force Reserve (AFRES) and Air National Guard (ANG) must be prepared to shoulder much of the nation's military mission during peacetime.

With the reserve component taking on an increasing role in the nation's defense responsibilities, military leaders are starting to examine closely the limits of its ability to carry a heavy

peacetime load and still be ready for war.

They note that the modern Reservist, in addition to handling his or her duties, must be ready to lay aside considerations of family or career for the duration of an emergency and that all of these pressures can be debilitating.

Maj. Gen. John J. Closner III, the AFRES chief, worries about the strain that Reserve operations place on participating members and their families and employers. "I'm concerned that we may be demanding too much—not just from our Reservists but also from their family members and civilian employers. If we commit our people to more than they can reasonably provide, retention could drop drastically," General Closner said in a wide-ranging interview.

Maj. Gen. Philip G. Killey, the director of ANG, indirectly addressed the question in congressional testimony, noting that the Air Force so far had avoided serious reductions in the size of the Air Reserve Component, despite intense budget pressures. "It has been suggested that with further reductions, the Air Force will have no choice but to reduce the Guard and Reserve," said the General, add-

ANG and AFRES are no longer handicapped by a reliance on outmoded equipment. This Texas ANG F-16 from the 111th Fighter Squadron, 147th FG, carrying four AIM-9Ls and two AIM-7 Sparrows, is the kind of advanced system the reserve component needs to carry out its increasing portion of USAF's mission.



HOUSTON

111FS



The Guard and Reserve often work together. Here, a KC-135 from the 151st Air Refueling Group, Utah ANG, and an F-16 from the 419th Fighter Wing (AFRES), Hill AFB, Utah, deploy together, illustrating the total force concept in action.

ing, "We do not welcome that prospect."

General Killey testified that the ANG already was reorganizing itself to better meet the Air Force's operational needs. "Today, we have assumed a greater share of the nation's defense responsibilities even though the Guard's size has not increased," he said. "To accomplish so much with smaller forces requires operating more flexibly and being creative about how we use our forces."

No service matches the Air Force in its heavy reliance on Guardsmen and Reservists to perform core missions, whether in peace or war. Nor has any service kept so much of its reserve component intact in the present draw-down. So far, USAF's main cut in nonactive forces has been the reduction in Reserve fighter wings, which was offset by an increase in reserve component refueling units.

The Inspiration

The Air Force's success with its Guardsmen and Reservists may have inspired recent proposals for reshaping the total force. President George Bush's "Base Force" plan called for cutting active-duty and Reserve strength in other services, but spared most of AFRES and ANG. As chairman of the House Armed Services Committee, Secretary of Defense Les Aspin proposed "Option C," a plan to cut active forces still more and shift more of the burden to the Guard and Reserve.



Photo © Dean Garner

The Guard and Reserve have an experienced, highly trained work force, and ANG Director General Killey is confident that his troops "have the skill and capability to do almost any mission assigned, if properly resourced."

Earlier, Sen. Sam Nunn (D-Ga.), chairman of the Senate Armed Services Committee, had introduced the idea of "flexible readiness," a plan that would assign some Guard and Reserve forces the mission "to be ready to get ready."

The common assumption of these proposals is that Guard and Reserve elements can assume more of the defense burden, provide the needed level of combat readiness, and save billions of dollars. As the Air Force already has shown, the theory is sound, but applying it as broadly as some pro-

posals require would raise all manner of questions.

Operation Desert Storm was the most recent major test of the readiness of AFRES and ANG, as well as Guard and Reserve units in other services. For many of the 23,000 AFRES members and 7,300 Air Guardsmen who took part, it was the first large-scale demonstration that they were more than mere "weekend warriors."

Employers, particularly small US businesses, noted that the call-up posed unexpected problems for them. It meant filling gaps left by absent workers while they were in the Persian Gulf region and reshuffling work forces again when those workers returned, often sooner or later than expected.

During the Gulf War, General Closser met with fifty employers to discuss their problems and possible ways

of easing the impact. He plans a similar meeting in the future to explore ways to keep employers satisfied. One possibility, he suggested, could be to provide tax credits that would kick in whenever there was a call-up affecting the business.

It is not just the possibility of future call-ups that makes participation in the AFRES and ANG so demanding, however. It is their day-to-day peacetime contributions that set Air Force Reservists and Air Guardsmen apart from their counterparts in the other services.

While most Army and Navy Reservists train in traditional weekend drills and two-week summer camps, Air Force Reserve crews routinely fly peacetime missions that just decades ago would have been handled exclusively by active-duty units.

During 1992, for example, AFRES provided about one-third of the Air Force's airlift operations, including humanitarian missions to Somalia, Bosnia, and disaster sites in the US.

Reserve F-16s deployed to Turkey to police the Iraqi "no-fly" zone, and AFRES rescue crews were credited with saving more than 100 lives in Florida's Hurricane Andrew. Some crewmen who normally would fly only twenty-five hours per month logged up to 150 hours.

ANG has also stepped forward to meet the day-to-day operational commitments of the Air Force. Its response to the Air Force's call for volunteers to support a host of disaster relief and humanitarian missions both in the United States and throughout the world has been overwhelming.

General Killey pointed out in congressional testimony that the call has come not just for ANG's fighter, tanker, and airlift assets, but also for its communications, medical, and civil engineering capabilities. In 1992, ANG members participated in relief efforts in Sarajevo, Kenya, and Somalia.

"This past winter," he told the House Armed Services Committee, "we had Air National Guard men and women deployed to every continent—including Antarctica—using their skills and training [to support] our national interests around the world. . . . We fully expect this demand for Air National Guard participation to continue, if not increase."

Nor was 1992 an unusual year. The ANG's C-130 Hercules crews routinely provide tactical airlift in Central and South America, and its fighter crews provide air defense for Hawaii and much of the continental US. AFRES crews fly refueling and weather missions, support space shuttle launches, participate in an array of international exercises, fight forest fires, spray crops, and track hurricanes.

Relatively Small Force

This load is carried by a relatively small force. On paper, reserve component strength is almost twice that of the active-duty force, but two-thirds

The Fighter Force Mix

Fighter Wing Equivalents—DoD Projection

Component	Fiscal 1992	Fiscal 1993	Fiscal 1994
Active-Duty Forces	16.3	16.1	13.3
AFRES/ANG Forces	13.4	12.3	11.0
Total	29.7	28.4	24.3

Source: Dept. of Defense, Fiscal 1994 Budget.

Makeup of the Total Force

Component	Fiscal 1992	Fiscal 1993	Fiscal 1994
Active-Duty Forces	470,300	444,900	425,700
Air National Guard	119,100	119,300	117,700
Air Force Reserve (paid)	81,900	82,300	81,500
USAF Civilian Force	214,400	206,600	198,700
Total	885,700	853,100	823,600

Source: Dept. of Defense, Fiscal 1994 Budget.

of the total are in retired or nontraining standby status.

The rest, about 300,000, are in more active categories. The bulk of the peacetime mission, however, falls to the 119,000 Air Guardsmen and 82,300 paid AFRES members who are assigned to flying and support units. Almost 10,000 are Air Reserve technicians (ARTs) who work as full-time civilian employees with the same units, mainly in maintenance.

In addition to filling out air and maintenance crews, the reserve component provides backup workers in medicine, engineering, security, logistics, and dozens of other fields.

The work load seems certain to increase. The Air Force already has announced that it will assign long-range bombers to AFRES and ANG. The move raised speculation in some quarters that the aircraft might be too advanced for the non-active-duty force. General Clossner has no such reservations.

"This is not a big deal," asserted the General. "When I joined the Reserve in 1972, they were thinking about giving us the F-105. It had all sorts of wild avionics that the active force had a really tough time maintaining and they said, 'Well, we aren't expecting much out of you guys.'

"But, they found that, with the stability of our work force, we didn't have any problem at all. Our mission capable rates went higher than those of the active force. That's always been the case. People say, 'This is too complicated for the Reserve to handle,' or 'too maintenance-intensive,' or whatever. Then, they give it to us, and it works out very well."

General Killey, in his House testimony, took much the same stance. The ANG director pointed out that not only is the Air National Guard preparing to mark another "major milestone" with its transition into the heavy bomber business, but it also is plan-



The Air National Guard and Air Force Reserve shoulder a large part of the peacetime mission in addition to their role in responding to crises and contingencies. The work load seems certain to increase.

ning to become more active in other new areas. ANG is "continuing to work with the Air Force to define potential roles for the Air National Guard in space missions," said the General. "These missions make sense for the Air Guard as we respond to the changing military force requirements. We have the skill and capability to do almost any mission assigned, if properly resourced."

Assessing the success of the Reserve in such missions, General Clossner credits the combination of experience, training, and continuity in the job. Like the General, who served six years on active duty and flew combat missions in Vietnam, about eighty percent of AFRES members have had prior active-duty service. Also like the General, many have flown with commercial airlines, and a sizable number still do. Once in, Reservists meet training schedules comparable to those of their active-duty counterparts and stay longer with the same units than most active members can.

The General also cites another, less quantifiable factor as contributing to the quality of the force.

"Reservists are twice the citizen, having served once and then having volunteered their extra time as civilians," said General Clossner. "I don't say they are more dedicated than anybody else, but nobody is holding a gun to their heads, and they still participate."

Experience, training, and dedication are among what General Clossner



Staff photo by Guy Aceto

Fighter, tanker, and airlift missions are only a fraction of the reserve component's contribution. Here, AFRES and active-duty medical aircrews train together.

calls the "core competencies" of the AFRES.

He also cites what he says is the relatively low cost of maintaining the Guard and Reserve compared to active-duty forces. "It's one of the main points of the Air Force Reserve and the Air Guard," said he. "We do it cheap. Lower personnel costs are the primary thing. We don't have to fly as many hours because the people are so well trained."

Concern for the Future

The Air Reserve Component could

be diminished, however, if it has to take on too great a load too fast.

"Common sense says we must maintain a prudent pace in the defense drawdown," said General Killey. "Any shift in magnitude of the [active-duty] Air Force force-structure changes should be done in an orderly fashion to avoid damaging or destroying the forces we are trying to preserve and to soften the impact on our people."

The General said that recruiting, training, and retaining the "best and brightest" troops are ANG's top priorities. These also pose great challenges. "We are pushing our personnel systems to the limit to smooth the transition of our reductions in full-time civilian personnel back into an economy that is not as robust as it could be," said the ANG chief. "We are losing over 1,300 full-time civilian personnel [in Fiscal Year 1994]

and are concerned about helping our people transition to other careers. Simultaneously, we want to preserve the right mix of skills and experience while motivating and training the force that remains."

General Clossner points out that in addition to holding onto its present Reservists, the Reserve must be concerned about finding future replacements. The General concedes that today, with large numbers of troops leaving active duty, recruiting is easy. However, because much of the current force reduction stems from fewer

accessions, there will be fewer members completing active tours in the future. That means it will be harder to recruit prior-service members.

Traditionally, General Closner said, thirty percent of those leaving active duty want nothing to do with the Reserve. The rest show some interest. Only about half of those, however, are both sufficiently interested to join and located in the right places at the right times.

The alternative to recruiting prior-service members would be training more recruits from scratch, but, as General Closner stated, that would lower experience levels and raise training costs.

The Air Force's ability to maintain its current high level of Reserve competency could be undercut by base closings.

Many of the most active Reservists are in "associate" units, which share bases, aircraft, missions, and maintenance with active-duty counterparts. Associate crews now account for about half the Air Force's strategic airlift capability and a major share of its refueling and medical airlift capabilities. Other AFRES and all ANG units have their own equipment, but many of these also operate from active-duty bases and account for substantial percentages of USAF capability in fighters, tactical airlift, special operations, and other areas.

General Killey said that ANG seeks to avoid such outright disestablishment of units. "We must find smart ways to reduce those things that are no longer needed," he testified. "When cuts come, we seek alternate missions. Next, we seek to downsize in place to maintain the National Guard infrastructure in our local communities. Only as a last resort do we intend to close units."

Many bases are closing to active forces, however. USAF leaders hope to maintain a Reserve presence at such bases even if the active-duty forces are withdrawn, but General Closner is not sure that will be economical or even possible in all cases.

If a base loses an active-duty unit that has a Reserve associate unit tied to it, USAF could leave the aircraft in place and convert the associate element to unit-equipped status. All the flying, maintenance, and other support once shared by the active-duty and Reserve units then would fall to the Reserve unit.

"It's not as cheap as an associate unit," conceded General Closner, "but it's cheaper than keeping up an active-duty unit."

Another possible approach being considered for units that already own their own aircraft but operate from active-duty bases marked for closing is to get the community to ante up.

"If we can't move the Reserves to another base in the local area," the General said, "maybe we'll look at

of the F-16, for example, years earlier than anticipated.

General Killey pointed out that ANG continues to modernize its aircraft fleet. Last year, it took receipt of 126 F-16C/Ds, twelve C-130H airlifters, twenty-six KC-135Rs, four C-141s, and twenty-four F-4G "Wild Weasel" aircraft. The infusion of equipment permitted ANG to withdraw from its inventory 303 older aircraft, 174 of which will be retired. The Guard also



Staff photo by Guy Aceto

AFRES C-141s, such as this one from the 459th Airlift Wing at Andrews AFB, Md., have seen heavy use, and AFRES Chief General Closner worries that modernization of strategic airlift "hasn't moved as fast as it should have."

lessening the impact on the local area by saying to the community, 'We'll leave the Reserve unit there if you pick up the running of the base as a civilian airport . . . [and] take over the cost that the Air Force is trying to get away from.'

Zero Appeal

General Closner acknowledges that the idea may not appeal to financially strapped communities about to lose base income.

In addition to worrying about manpower and bases, Reserve leaders express concern about equipment. It is a problem not yet apparent in some areas. For example, Reserve fighter units are no longer forced to wait for the war-weary castoffs of the active squadrons; their aircraft are almost as modern as those found in active units.

The end of the cold war and the drawdown have made advanced weapons available more quickly. AFRES units expect to get advanced versions

plans to retire the remainder of its aging A-7s and some A-10s. By October 1, the Air Guard will have converted all its A-7 units to the F-16 and will no longer have any A-7s in its inventory. It is expanding its air-rescue capability with the procurement of HH-60 helicopters.

Simply put, the problem is not age but mileage. Many of the aircraft now found in Reserve units have been flown hard already. Increased use by the Reserve crews is aging the aircraft prematurely.

In the airlift field, where the reserve component makes its biggest contribution, aging already is a growing problem. C-141s and C-5s have seen heavy use. "We've ridden 'em hard and put 'em away wet," said General Closner, using an analogy with horsemanship. "We have a lot in the barn getting rehabbed, even from Desert Storm. . . . So, the fighter force is quite modernized, but if you look at strategic airlift, which hasn't moved as fast as it should

have, we're looking at a shortfall even in the intermediate term."

General Killey believes it is essential to strengthen the Guard's existing systems for longer life. "Extending the useful life of current aircraft systems makes good economic and military sense," he said. "Mission-enhancing programs, such as upgraded defensive systems and improved common radar for our airlift and tanker mobility assets, and programs to extend the service life of our airlift aircraft should continue to receive strong support even though our force is getting smaller. These are prudent modernization efforts that are critical to our future ability to project power."

Defense Secretary Les Aspin recently showed similar concern. Though calling for cuts in other defense areas, he emphasized the need for the US to acquire improved "lift capabilities."



Staff photo by Guy Acefio

Active-duty, ANG, and AFRES C-130s took part in this year's Airlift Rodeo. Reserve component crews do very well at such competitions because of their level of experience and the stability of their units.

Staff photo by Guy Acefio



SMSgt. Ben Scott, a Security Policeman from the 315th AW, Charleston AFB, S. C., also took part in this year's Airlift Rodeo. Retaining such high-quality, experienced members is a top priority for both the Guard and Reserve.

General Closner agrees. "What you need," he said, "is enough airlift to get where you want to be with the high-priority stuff and enough sealift capability to move the other stuff fast enough to sustain the forces. . . . We were able to do the airlift pretty well in Desert Storm, but we were carrying some pretty low-priority cargo that probably would have been a lot more economical to run across on a fast sealift."

One proposal for slowing the aging process calls for putting much of the fleet in storage and having Reservists exercise each plane periodically to

see if it still works. The problem with that idea, particularly in the case of airlift, is that it would provide neither enough aircraft to meet day-to-day requirements nor the amount of training time needed by aircrews.

General Closner agrees that there may be other ways to reduce the type of flying that puts the most wear on the aircraft.

"It makes sense to me to hold off the flying hours that you can give up, such as flying C-5s around a local area, doing touch-and-go landings," said the General. "It's a maintenance-

intensive aircraft, and every time you raise the gear, it ages a little. You can take off with a full load, fly for ten hours, and put down, and you aren't going to wear the airplane down nearly as much."

The General suggested, "You can get your local proficiency sortie in a state-of-the-art simulator." He said the cost of simulators—\$20 million to \$22 million—is a pittance compared to the cost of downtime for the aircraft, which also may not be available for a contingency. More important, he said, "if you wear the airplane out, there aren't a lot of those things around."

New Type of Simulator

The General also is pushing a new type of simulator, a bargain trainer AFRES has been developing for the F-16. General Closner says it costs less than a million dollars—far less than the \$16 million price of today's fighter simulators.

The new simulator "does exactly the same thing, except that it doesn't move," he said. "It has the same visuals, the same boxes, [and] the same switches that are in the aircraft. You can transport it, and you can buy enough to put one down at the same squadron where the guys go to work. . . ."

"Another good thing is that, when you have a modification in the aircraft, you don't need three to eight months for the contractor to modify the software. So, you're doing training in the upgraded aircraft concurrently with that in the simulator."

Funding the Reserve Component

Appropriation Title	Fiscal 1992	Fiscal 1993	Fiscal 1994
Personnel ANG	\$1,184,586,000	\$1,166,100,000	\$1,197,892,000
Personnel AFRES	733,700,000	729,019,000	772,748,000
Subtotal	1,918,286,000	1,895,119,000	1,970,640,000
O&M ANG	2,361,512,000	2,533,519,000	2,657,233,000
O&M AFRES	1,169,038,000	1,210,868,000	1,354,578,000
Subtotal	3,530,550,000	3,744,387,000	4,011,811,000
MilCon ANG	217,260,000	305,759,000	142,353,000
MilCon AFRES	9,700,000	29,900,000	55,727,000
Subtotal	226,960,000	335,659,000	198,080,000
Equipment ANG	558,000,000	431,800,000	0
Equipment AFRES	362,000,000	124,800,000	0
Subtotal	920,000,000	556,600,000	0
Total ANG	4,321,358,000	4,437,178,000	3,997,478,000
Total AFRES	2,274,438,000	2,094,587,000	2,183,053,000
Grand Total	6,595,796,000	6,531,765,000	6,180,531,000

O&M=Operations and Maintenance
MilCon=Military Construction

Source: Dept. of Defense, Fiscal 1994 Budget.

short-term projects in such fields as science, engineering, medicine, and intelligence. They have become the rough equivalent of corporate "temps."

The roles of some more traditional IMAs are also changing. General Closner concluded that too many were being used to back up Pentagon officials who were unlikely to leave their jobs in wartime. "I'm moving as many as I can out of the Pentagon into operational units," he said. "I want to get them down to those areas where they can do a job now, as second-shift or third-shift operators, for example."

This philosophy of providing hands-on experience while training Reservists for wartime roles applies to those in associate units. The Reserve commanders of such units play an active part in peacetime operations and could command both active-duty and Reserve members in a mobilization.

In the past, national security leaders might have questioned the "week-end warriors'" ability to step so quickly into the wartime role. Today, the forces are so closely linked that Generals Killey and Closner see no problems with the transition.

The ANG director said that the Air Force's approach to the reserve com-

AFRES also is looking into the use of "distance-learning" systems that will link trainees electronically with instructors in remote locations.

The General is wary about AFRES taking on added missions that seem inappropriate. One suggestion, for example, is that AFRES take over the initial pilot training for the Air Force. "We're looking at it," he said, "but it's not a surge requirement. It's a high-peacetime-intensive mission, a full-time, day-in-and-day-out requirement. I don't know that it would be of real value to put it in the reserve [component]."

The General also has been cool to proposals for taking in former officers as airmen. "Quite frankly," he said, "we can't see much value in that if the person is not three-level [apprentice] trained. If you have the positions and they want to come in, we'll give them priority consideration. That's part of our charter under the drawdown transition program. But it means spending more training dollars and doesn't make much sense from the taxpayer's standpoint."

General Closner does favor new ap-

Active-Duty Experience in Air Reserve Component

ARC Element	Officers	Enlisted
Air National Guard	61%	52%
Air Force Reserve	75%	64%


proaches, such as making greater use of the AFRES's Individual Mobilization Augmentees (IMAs).

Traditionally, most of the 12,000 IMAs have served as understudies to specific active-duty officers so that they would be able to step into critical positions if the incumbents were called overseas to war. Some still play this stand-in role, but more are now being assigned to specific,

ponent has been vindicated. "In tough times, they have kept the faith with their Guard and Reserve," said the General. "When we were needed, we were called. When we went, we were prepared to do the job."

Adds General Closner: "If there is a call-up, it doesn't matter. When the Reservist comes on board, he is an active-duty officer. We're all active-duty guys at that point." ■

Bruce D. Callander served tours of active duty during World War II and the Korean War. In 1952, he joined Air Force Times, becoming editor in 1972. His most recent article for AIR FORCE Magazine, "Reforming Military Medical Care," appeared in the June 1993 issue.



Despite the problems, the Air Force still believes this is the airlifter of the future.

By David J. Lynch

THE Air Force C-17 cargo jet has emerged as the most controversial item in the Clinton Administration's defense plan. By now, the litany of problems is familiar—McDonnell Douglas is \$1.2 billion over budget on development of the aircraft and more than one year behind schedule. In April, Defense Secretary Les Aspin sacked the two-star general who had headed the program until 1991, citing concern over alleged management failures.

What about the aircraft itself? According to pilots who have flown it in test flights above Edwards AFB, Calif., the C-17 represents a dramatic improvement over the aging airlifters that it would replace. Sophisticated cockpit avionics, including a state-of-the-art head-up display, reduce the work load on the aircrew. Advanced "blown flaps" technology allows the 174-foot-long aircraft to land on a dime and maneuver nimbly on the ground.

Still, there have been a host of technical problems, which McDonnell Douglas and the Air Force see as typical snags found in any program. Last month, a C-17 stalled and came within 1,700 feet of crashing in an

The C-17 Fights the Headwinds

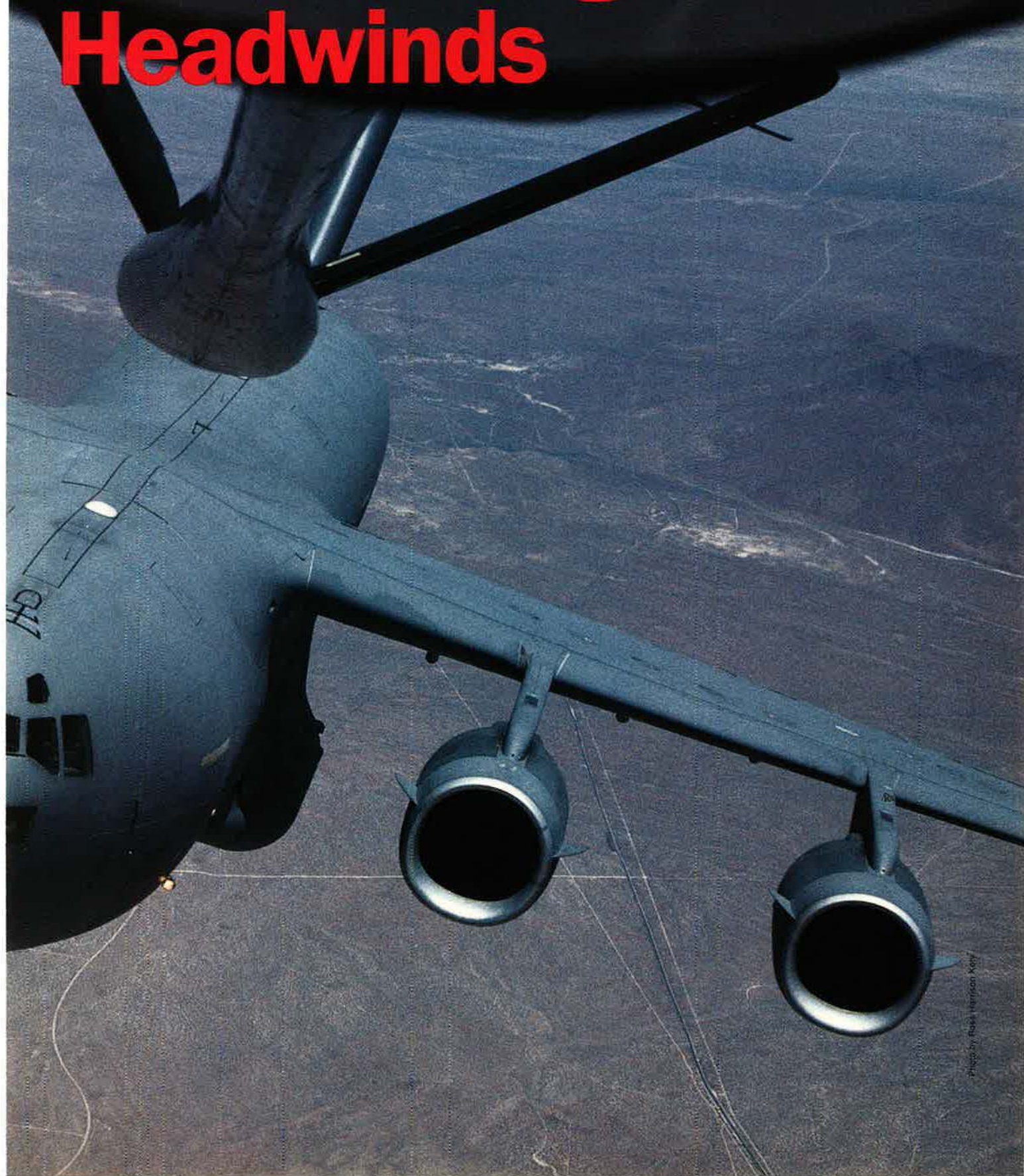


Photo by Russ Harrison/Aviation



The C-17 test aircraft ("T-1," above) made its first flight September 15, 1991. Since then, T-1 and the four production aircraft (below and previous pages) have flown 405 missions totaling 1,458 hours.

incident blamed on pilot error. "The test community thinks it was a close call," said one program official. "It's a situation no one wants to repeat."

In January, flight tests were halted after officials discovered weaknesses in the landing gear. Earlier in the program, there were persistent fuel leaks and software snags. Last fall, a wing collapsed during stress tests.

The list is a sobering one. In May, John M. Deutch, under secretary of Defense for Acquisition, threatened to cancel the program outright unless there was substantial improvement by August. Mr. Deutch also appointed an outside panel of experts to assess the program's chances of success. Even so, program advocates are quick to point to the performance of US weapons in the Gulf War—many of which had once come under C-17-style criticism—as well as the history of other development programs as evidence that initial stumbles are not necessarily evidence of fatal flaws. [For more details on the C-17 controversy, see "Blood on the Rock," p. 2.]

The first Navy F-14 Tomcat fighter, for example, crashed on its second flight. The Air Force's C-130 transport also crashed early in its test program. And McDonnell Douglas argues that its recent factory performance data demonstrate marked improvement. "The airplane is a class act," insists Ken Francis, McDonnell Douglas executive vice president. "It's a good airplane."



Photos by Ross Harrison Kaly

Success in the "Real" World

Last January 20, a C-17 took off from Edwards bound for Eglin AFB, Fla. Six hours and ten minutes later, the aircraft touched down, after a 2,786-mile flight carrying more than 160,000 pounds of cargo. Still sloshing in the plane's fuel tanks were 21,000 pounds of fuel, enough for another ninety minutes of flying. That flight demonstrated the C-17's ability to meet the "real-world" weight and distance requirements of the Air Force, according to McDonnell Douglas.

However, when the contractual scoring rules are used, the aircraft remains tons short of its range-payload speci-

fication. Mr. Francis said flatly that the plane will be in compliance when the Air Force declares the first squadron to be operational.

In the view of program supporters, the past several months have brought a number of underappreciated test achievements.

In February, a C-17 at Fort Hood, Tex., was loaded and unloaded with an M1 tank, two Apache helicopters, two five-ton trucks, and a D8K-8 bulldozer. Three months earlier, a key capability of the aircraft's three-man operation was demonstrated when a single loadmaster reconfigured the cargo hold during flight. Unlike current transports, which require crews of six to eight, the C-17 relies on technology to augment its two pilot, one loadmaster lineup. It also has demonstrated the ability to land on short, 2,370-foot runways and unpaved surfaces.

Still, the test program is in its infancy. The first few C-17s arrived at Edwards requiring additional work before they were ready for full-scale operations. Then, persistent fuel leaks slowed progress. Finally, McDonnell Douglas found itself well behind schedule—the result, perhaps, of what Air Force officials now call an overly ambitious test plan.

The original schedule, drafted by McDonnell Douglas and approved by the Air Force, called for a ninety-one percent efficiency rate in the testing, with an average of thirty-three flight hours per aircraft per month. The General Accounting Office maintains



Ground-crew training on the C-17 has already begun at Edwards AFB, Calif. Here, crews practice pallet loading on T-1, which has already drawn raves from loadmasters for the ease with which it takes on cargo.

that the actual figures have been forty-seven percent efficiency and twenty-nine hours per aircraft per month.

Air Force officials are claiming success despite being well behind schedule. According to Col. Charles Seiffert of the C-17 program office, the new transport in its first eighteen months of testing has been the most impressive aircraft in nearly thirty years of testing at Edwards.

"It's doing the best we've ever seen," said Colonel Seiffert.

No High-Cost Problems

At this point, he maintained, almost all of the flutter testing to prove the soundness of the basic aircraft design has been completed. That means the greatest risk of a high-cost modification has been eliminated, according to the Air Force. In April, the aircraft flew a total of 160 hours (forty hours per aircraft) at an overall efficiency rate of more than sixty percent, Colonel Seiffert said.

McDonnell Douglas was to finish C-17 testing by January 1994. The GAO, which recently conducted a critical review of the program, claims that the program is likely to be nineteen months late. The Air Force projects a fifteen-month slip.

McDonnell Douglas blames the delay in part on the Air Force flight test approach, which differs dramatically from the way the company tests commercial aircraft. New passenger jets are tested on a seven-day-a-week ba-

sis, while the government program sticks to a five-day-a-week schedule, said the contractor.

The Air Force rejects that view, noting that military aircraft must demonstrate dangerous maneuvers such as low-altitude cargo airdrops, which are unknown in the commercial world. Colonel Seiffert said work is being done on the aircraft every day of the week.

Since delivery to the test site, the C-17s have spent more than one-third of their time in "work programs to

perform maintenance, complete deferred work, fix problems such as fuel leaks, and correct other aircraft design and system problems," according to GAO.

Despite the problems, operations are improving on the factory floor, according to program officials. Over the past twenty months, for example, the time needed to assemble a C-17 has been reduced by fifty-seven percent. Four-fifths of the first C-17s were put together out-of-sequence on the assembly line. On the most recent aircraft, however, only five percent of the work was done out of order. Additional savings have been realized by halving the time to install the 51,961 rivets in each C-17 wing.

Part of that improvement is no doubt due to the introduction of a corps of new production experts, whom McDonnell Douglas's Long Beach, Calif., unit recruited from other companies and other parts of its own enterprise. Two executives—the new vice president for the C-17 program and the general manager in charge of aircraft production—came from Northrop's B-2 program. Others came from Boeing Co. and from McDonnell Douglas subsidiaries.

The company's financial forecast also has improved. McDonnell Douglas officials, after posting a loss of \$383 million in 1992, maintain that the C-17 will be profitable this year. The company must absorb an estimated \$1.2 billion loss over time on



The 437th Airlift Wing at Charleston AFB, S. C., is officially slated to reach initial operational capability with the C-17 in Fiscal Year 1994. Production and testing problems, however, may delay IOC by more than a year.



The C-17 has earned praise from pilots for its modern cockpit, which in some ways has more in common with a fighter cockpit than with that of other transports. The all-function head-up displays and multifunction electronic displays should substantially reduce the C-17 crews' work load.

its initial development contract, but it expects to make a slim profit on the third production lot, which is nearing completion. Over the life of the program, McDonnell Douglas expects to earn more than \$2 billion, assuming the Air Force buys the planned production run of 120 aircraft.

"I have to be candid: We got our [butts] kicked on this program big-time," said Jim Berry, the new vice president of the C-17 program. "The good news is the pain is almost over."

Downbeat Assessment

In March, Louis J. Rodrigues, GAO's director of Systems Development and Production, told a congressional subcommittee that the program should be halted until contractual and technical issues are resolved. In strikingly downbeat testimony, Mr. Rodrigues said McDonnell Douglas's performance on the C-17 was getting "worse, not better." The company, which hit difficult financial times in 1990, was balking at the investments needed to improve production and the aircraft's design, he said.

McDonnell Douglas officials vigorously dispute the GAO testimony, insisting they have made the neces-

sary investments. Likewise, the company disputes the office's figures showing that the amount of work being redone because of failure to do it right the first time has been holding steady at close to forty percent. McDonnell Douglas figures show such so-called rework declining on each new plane.

GAO disputes this. It claims that, if one uses another measure of production efficiency, McDonnell Douglas had its worst month to date in January—completing just twenty-six cents of planned work for each dollar spent. McDonnell Douglas says the GAO numbers are based on outdated contract work plans.

Both sides agree on one thing: The C-17 program has been hurt by constant and increasing labor turnover. Because the aircraft program shares McDonnell Douglas's Long Beach facility with the company's commercial jet assembly lines, workers laid off from the MD-11 and MD-80 passenger jet programs can exercise union seniority rights to claim jobs on the C-17 line. This has led to constant churning. Up to one-third of the company's 10,000 C-17 workers came into the program last year. Up to one-half

of the work force will be replaced this year.

The aircraft's technical performance also has attracted criticism. Earlier this year, McDonnell Douglas confirmed it is redesigning the aircraft's flaps in the wake of problems that limited the C-17's ability to perform essential test maneuvers. Unlike on conventional aircraft, the C-17's flaps are mounted behind the aircraft's four engines. During landings, the flaps extend into the exhaust stream. Hot exhaust gases blow past the flaps, enhancing lift, permitting the plane to stay aloft at slower speeds, and thus allowing the plane to come in slower and land on shorter fields.

In tests, however, the flaps proved susceptible to heat damage from the exhaust. After considering a Band-Aid solution, McDonnell Douglas eventually opted for a titanium replacement. The new material will add about 560 pounds to the already overweight aircraft, company officials said. A similar change on the aircraft's slats will add another 235 pounds.

The aircraft also currently falls short of its required range-payload requirement. Company officials have vowed that the C-17 will meet its contract specifications by the time of its initial operational capability, but GAO investigators are skeptical of this claim. The watchdog office said it expects further weight growth in the aircraft as the test program moves forward and additional issues emerge. Durability testing, for example, has only begun. Air Mobility Command officials are revising the scenarios dictating C-17 range-payload requirements. The GAO maintains that AMC, less than two years ago, reduced its requirements for the aircraft to what it said were minimum acceptable levels.

Broken Wings

Earlier this year, the C-17 experienced landing gear difficulties, but those apparently are being resolved. The technical issue that attracted serious concern was the collapse of a C-17 wing in static testing last fall.

On October 1, 1992, a C-17 static test article "flying" at 32,100 feet and weighing 585,000 pounds was hit with a simulated strong wind gust. As the wings bent to handle the stress, a symmetrical crack occurred on the upper wing skin between fuel access doors on both wings. Later calculations determined the wing had failed in condi-

tions representing only 128 percent of the load requirement. The contract requires the plane's wings to be able to withstand 150 percent of the load requirement.

Specialists from McDonnell Douglas and the Air Force pored over test data and the static article itself to determine what had gone wrong. They concluded the root causes were a computational error by the McDonnell Douglas engineers who designed the wing, optimistic design assumptions, and a high and uneven distribution of the test pads on the wing.

Program officials tended to downplay the gravity of the wing failure and contended that it would require only \$50 million to fix the static article and incorporate a fix on the production line aircraft. Congressional officials, skeptical of that estimate, expect the total cost ultimately will be higher.

McDonnell Douglas test official Ned Newman said the company is almost finished with repairs on the static article. The solution appears to be a fairly modest technical chore of bolstering isolated areas of the wing with "stiffeners." This change, like many others, will add weight—another 744 pounds. GAO claims the effect of the computational error is being seen in other areas of the wing and fuselage.

USAF officials have struggled to provide a proper context in which to view the C-17's problems. Colonel

Seiffert notes that the A-10 attack plane's fuselage cracked during static testing and that the F-16, C-5, and L-1011 also experienced various static failures. Landing gear problems are not uncommon in the early stages of programs, he said.

Air Force officials insist they are committed to the C-17. In recent weeks, they have stepped up efforts to deflect interest in a number of alternatives that have caught the eye of skeptical lawmakers. In response to calls for a study of a replacement, Air

Force spokesman Col. John Kirkwood said the following: "If you cancel the C-17 and come in with a new aircraft, it'd be the mirror image of the C-17."

Underground Efforts

Even so, others have stepped into the picture. Earlier this year, long-time rival Lockheed intensified a *sub rosa* lobbying effort promoting the C-5B as an alternative to the beleaguered C-17. According to Lockheed figures, Congress could save \$11.15 billion by buying seventy-four of the



The aircraft's four Pratt & Whitney F117-PW-100 turbofans enable it to carry 160,000 pounds at Mach .77 over distances of up to 2,765 miles. Its short-field landing capability will allow it to operate at airfields as short as 3,000 feet.



With today's airlift fleet, USAF is incapable of airdropping or extracting outside cargo in a tactical environment. The C-17 will meet that need. It will also modernize a fleet that is rapidly aging because of the high tempo of operations.

larger C-5Bs and scrapping the C-17 program.

Boeing has been approached about converting its 747 or 767 commercial freighters for military operations. However, commercial cargo jets carry significant disadvantages—in particular, the need for expensive ground support equipment to lift heavy military gear to the aircraft's high cargo doors.

The Air Force bought eighty-one C-5As beginning in the late 1960s and early 1970s and an additional fifty B models in the mid- to late 1980s. At the request of the House Armed Services Committee, Lockheed briefed lawmakers in April on its proposal to restart the once-controversial C-5 line. Company executives also provided courtesy briefings to USAF officials in the Pentagon and at Hq. Air Mobility Command at Scott AFB, Ill.

In its efforts to capitalize on McDonnell Douglas's difficulties, Lockheed faces a delicate political balancing act. On the one hand, the Calabasas, Calif., defense contractor has a number of lucrative contracts with the Air Force, including one for the F-22 Advanced Tactical Fighter, the service's next-generation air-superiority fighter.

Any blatant move to sink the C-17 could irritate service officials, whose cooperation and support Lockheed will need on other ventures. At the same time, with new orders few and far between, the corporation would be remiss in passing up a chance to capture the airlift business.

Lockheed also has prepared a \$4.5 billion proposal for a thorough Service Life Extension Program for the Air Force's 264 aging C-141 Star-Lifters. But all of these are currently operating under flight restrictions



Although the C-17 has been beset with criticism, USAF still sees it as the solution to its airlift needs. An Air Force spokesman asserts, "If you cancel the C-17 and come in with a new aircraft, it'd be the mirror image of a C-17."

Photos by Ross Harrison Koty



because of such age-related problems as cracks in the cockpit window frames. A Pentagon scientific advisory board is studying the feasibility of rewinging the C-141s, Colonel Kirkwood said.

Lockheed has taken direct aim at the C-17's advertised virtues, billing the C-5B as capable of operating from austere airfields. Lockheed's briefing charts say the C-5B can deliver a 240,000-pound payload (almost one-third larger than the C-17) 3,000 nautical miles to an austere front-line air base and on a 3,000-foot runway.

The Air Force prepared an unusual,

point-by-point rebuttal of the Lockheed sales pitch, which took issue with almost every aspect of the company's claims. "Normal aircraft limits do not permit this alleged capability," the Air Force paper said. The service also disputed Lockheed's claimed ability to take off from a 2,900-foot airfield, saying the aircraft cannot train or perform to "these standards on a routine

basis." As for landing on a 3,000-foot airstrip, the Air Force says "abnormal pilot actions" are necessary upon touchdown to achieve this. Spoiler deployment must be initiated one second after touchdown, and maximum antiskid braking must occur 1.5 seconds after touchdown.

Lockheed estimates it could begin production a little more than three years after receiving a go-ahead.

As of early summer, roughly thirty percent of the flight test program had been completed. Some critics say it is likely that new problems will emerge. Air Force officials, for their part, take comfort from the completion of electromagnetic and climatic testing without major incident.

In those tests, some off-the-shelf commercial avionics were found to require heating during cold-weather tests, Colonel Seiffert said. Other questions yet to be answered fully include whether the two-man cockpit can handle all situations, including multiple emergencies, and whether the aircraft can meet its low-altitude cargo-dropping requirement.

For now, however, the Air Force is betting that the C-17 is its transport of the future. ■

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If the electronic endgame goes sour,
here's where it is most likely to happen.

The Infrared Battleground

By James W. Canan, Senior Editor

FOR combat aircrews under fire, the most perilous phase of electronic warfare is its endgame, anxious moments when the electronic countermeasures systems aboard their aircraft go into action as the final defense against oncoming missiles. Unless the ECM systems detect those missiles and disrupt or deceive their guidance systems to throw them off course, disaster is at hand.

Air Force fighters and attack aircraft come well-equipped for victory in the endgame—so-called “terminal disruption”—against radar-guided missiles. Operation Desert Storm proved the prowess of their advanced radar warning receivers and radar jammers.

Infrared-guided missiles are another matter. Air Force tactical aircraft are all too vulnerable to them. Against such missiles, the EW endgame often goes sour, as Desert Storm also showed. IR missiles accounted for all but a few of the twenty-seven US combat aircraft losses in Desert Storm, and such missiles—surface-to-air and air-to-air varieties—are showing up all over the world.

As a result, programs for countermeasures to protect tactical aircraft against IR missiles are gaining momentum among the armed services.



An AC-130 Spectre gunship expends flares in spectacular array to attract incoming infrared-guided missiles and draw them away from the plane. USAF puts a premium on advanced IR countermeasures to protect currently vulnerable planes.

Photo by Randy Jolly / Arms Communications

They constitute one of the few EW growth areas at a time of diminished defense spending across the board.

"This is the year of IR countermeasures," declares Air Force Col. John Booher, a top EW official in the Office of the Assistant Secretary of the Air Force for Acquisition. "We need to make progress on them."

Colonel Booher emphasizes that "IRCM is an umbrella term covering many elements," including missile approach warning systems (MAWS) and various types of expendable decoys, such as flares, to misdirect heat-seeking missiles away from their intended targets.

Not Fooled by Flares

The need for new and upgraded IRCMs on US combat aircraft is increasingly urgent. Advanced IR missiles, such as US-made shoulder-fired Stingers and others produced in the West and elsewhere, are falling into the wrong hands all over the place. They are tough to thwart in the endgame. Flare decoys that do a good job of luring older IR missiles away from aircraft are ineffective against the newer ones featuring sharply discerning guidance systems. They can distinguish between the flight characteristics of the planes and those of the flares and are not fooled by the flares.

As a result, the search is on for decoys of surpassing sophistication—so-called "smart expendables"—that would mimic, when airborne, both the



Advanced shoulder-fired heat-seeking SAMs, such as this US-made Stinger, are formidable threats to tactical aircraft and are spreading around the globe. USAF needs new missile approach warning systems to help aircrews thwart SAMs.

IR signature and the flight characteristics of their host aircraft. Also coveted are jammers capable of disrupting sophisticated IR missiles with finely tuned pulses of radiated IR energy.

All such devices need a MAWS to make them work. This is why "missile warning is the number one priority among IRCMs," Colonel Booher declares.

Jammers and decoys take their cues from MAWS. Unlike a radar warning receiver, which detects only radar-guided missiles, a MAWS detects all

kinds, including those with IR and electro-optical guidance. Many Air Force airlifters, bombers, and special operations aircraft are equipped with MAWS, but these are unsuitable, in size and other respects, for installation in fighters and attack planes.

Now the Air Force is moving to upgrade its airlifter MAWS and, if possible, to adapt them to tactical aircraft. The Bosnia airlift mission assigned to USAF early this year lent urgency to the upgrade program, which involves the AAR-47 MAWS on C-130s like those over Bosnia.

Early this year, the increasing possibility of US air strikes on Bosnian Serb military positions and of Serbs shooting at US combat aircraft with shoulder-fired SAMs also refocused the Pentagon's attention on the need for MAWS on fighter and attack planes.

The Air Force long ago acknowledged that need and had been trying to meet it. Last year, amid shrinking budgets, the service put MAWS development programs for F-15 and F-16 fighters on hold, scrubbing their funding in the Fiscal Year 1994 budget.

Meanwhile, though, an EW acquisition scenario was playing out at the Pentagon that would bring the Air Force back into the MAWS picture as part of a multiservice development effort with unexpected funding firmly in hand.

With the civil war in Bosnia an ominous backdrop, the Directorate of Defense Research and Engineering assigned each service a special MAWS

Photo by Joe Towers / Arms Communications



The ALQ-131 radar-jammer pod on the centerline of this F-16C from the 944th Fighter Group (AFRES) at Luke AFB, Ariz., is an example of the electronic countermeasures equipment carried by Air Force fighters and attack aircraft.

development role. DDR&E told the Air Force to concentrate on MAWS for fixed-wing stealth aircraft; the Navy, on MAWS for fixed-wing non-stealth aircraft; and the Army, on MAWS for helicopters.

Neglect of IR?

The DDR&E move showed that “we’re stepping up to the [EW] endgame” in IR countermeasures, says Anthony R. Grieco, DDR&E’s director of Electronic Combat. “We had neglected it to a great extent.”

Air Force EW officials welcome the interservice division of labor in MAWS development programs and expect to benefit from the Navy’s share of the work in fairly short order. Lockheed Sanders has developed a MAWS for Navy fighters—the ALQ-156A—that has performed extremely well in live-fire tests and that “is one of several promising candidate systems for Air Force aircraft,” says Colonel Booher.

The ALQ-156A and other MAWS are involved in a USAF program with Westinghouse and Raytheon to build MAWS and flare dispensers into their respective ALQ-131 and ALQ-184 radar jammer pods, both of which are carried by Air Force fighters.

Both services stand to gain a great deal from previous Air Force MAWS technology test programs that evaluated the technologies of MAWS on airlifters and bombers, with an eye to adapting them to fighters. Companies providing MAWS hardware for the tests included General Electric, Loral, Lockheed Sanders, Westinghouse, and Cincinnati Electronics.

Derivatives of the AAR-47 MAWS originally developed by Loral and installed on hundreds of military helicopters and transport planes—C-130s, C-141s, and C-5s—loom large in Navy-USAf MAWS development plans for fixed-wing tactical aircraft as well. Hercules Defense Electronic Systems, Inc., has the current production contract for the AAR-47, and may eventually produce AAR-47 derivatives for both services.

Not long ago, the Air Force discovered something big while adapting the airlifter AAR-47 MAWS to fighters. Live-fire demonstrations revealed that modest modifications of the AAR-47 for fighters greatly improved its performance on airlifters, notably those destined for airdrop missions over Bosnia. Apprised of this, the

Defense Department provided additional funding for the program.

The Navy, in keeping with its lead role in the development of MAWS for nonstealth aircraft, is in charge of contracting for AAR-47 upgrades. But the Air Force sets requirements for its MAWS derivatives and sees to it that they are met throughout development and production.

The point is that the Air Force and Navy are now in touch on all MAWS for fixed-wing planes. “In the past, there were a lot of individual missile warning efforts in the services that were going nowhere,” says Lt. Col. Paul R. Handwerker, an Air Force EW acquisition officer. “Combining

The goal, he says, is to come up with “generic systems—what we’re really looking for is the missile warning technology that can deliver the performance required for both the near term and the far term, whether packaged in pods or internally.”

To set the stage for the DoD MAWS development master plan, the services last year analyzed their individual MAWS operational requirements with an eye to eventual commonality. The Air Force, as sole possessor of stealth fighters and bombers, naturally took the lead in developing MAWS for such planes.

For low-observable aircraft, which eschew external pods and any kind of active, energy-radiating sensors such



USAF photo by SSgt. Eric C. Baker

Flares fire up behind an F-16 to help it win the dangerous EW endgame against an IR missile. Fighters without MAWS have been shot down with full loads of flares still aboard, meaning that the crews never knew what hit them.

the efforts [among the services] gave them momentum.”

Off the Roller Coaster

“We’re excited about the progress we’re seeing on missile warning systems,” he continues. “For the first time, we can look ahead to reaching [missile warning] goals that have been talked about for almost two decades.”

Colonel Booher agrees. “We’ve come through a roller coaster period on the funding and priorities of missile warning programs, and now we’re on our way,” he says. “We know what we would like to achieve—missile warning systems common to all the services and, inside the Air Force, to both fighters and transports.”

as Doppler radars, MAWS must be passive and internally mounted. Passive systems, including those using infrared or ultraviolet sensors, are now in service on some nonstealthy Air Force special operations planes. The problem with existing passive systems is that they cannot determine the range or closing speed of the incoming IR-guided missiles they have detected. Thus they are of no help in timing the release of IR countermeasures, such as flares, for maximum effect against the missiles.

Flare decoys dispensed too soon or too late are much less likely to lure missiles along wayward flight paths than are those deployed at just the right time. Aircrews lacking a MAWS



This MC-130H Combat Talon II special operations aircraft comes equipped with the AAR-44 nonemitting passive MAWS to trigger ECMs against radar and IR missiles. Modified airlifter MAWS are slated for fighters.

have been known to deploy flares over hostile territory as a precautionary measure even when not under attack, leaving them short of flares when they really need them later. In past wars, there have been all too many instances of enemy IR missiles shooting down US tactical fighters unequipped with MAWS and with a full load of flares still aboard, meaning that their crews never knew what hit them.

Now the Air Force is working with two electronic warfare contractors in developing a passive MAWS that will be able to determine the "time to intercept" of an approaching IR missile. One of the contractors is Cincinnati Electronics, maker of the passive AAR-44 MAWS on special operations C-130s. The other is the Lockheed Sanders and General Electric team developing the defensive avionics suite for the Air Force F-22 Stealth fighter.

Procuring highly sensitive IR scanners capable of detecting the hot-gas trails of IR missiles is a key goal in the development of advanced MAWS. On-board computers would process signals from the scanners to determine the intercept courses of inbound missiles and direct the employment of appropriate countermeasures. The Air Force is developing such devices.

Not long ago, the Air Force flight-tested passive missile warning systems developed by GE, Texas Instruments, and Loral. Installed side by side in the tail of a C-141, the three MAWS were

subjected to more than seventy IR missile shots along their lines of vision, and their reactions were compared. The testing was part of a program to devise a Silent Attack Warning System for stealthy fighters and bombers.

Stealthy Planes, Too

Many EW officials maintain that self-protection in the EW endgame is just as important for stealth aircraft as it is for nonstealth planes. Even though stealth planes are harder to spot, they are susceptible to radar and IR detec-

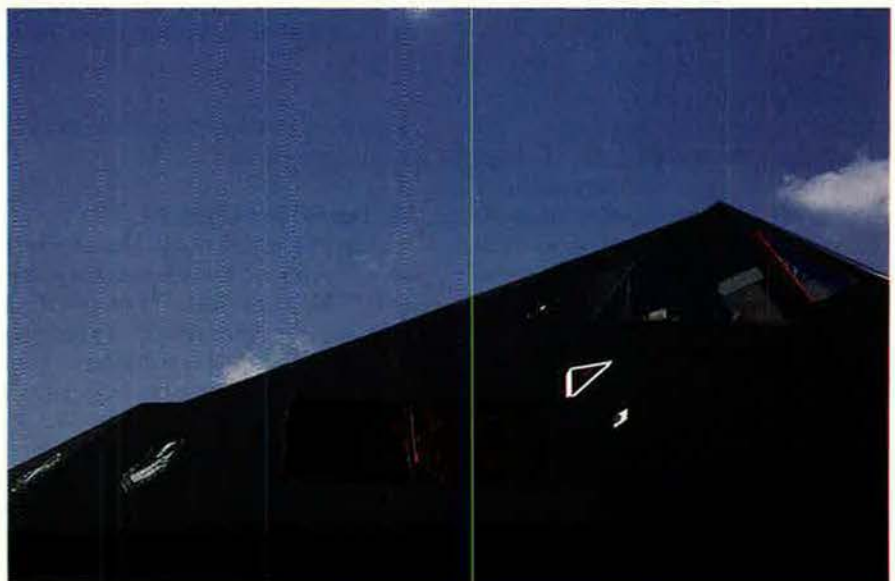
tion under some circumstances and may have to rely on passive missile warning, timely deployment of decoys, and evasive maneuvers.

As the Air Force F-117 amply demonstrated in the Persian Gulf War, stealth planes have a big built-in advantage. They can finesse enemy air and ground defenses, slipping through them on preplanned paths of least resistance. Stealth is now seen as another way of conducting electronic combat and as a form of electronic warfare—an EC subset.

EW officials make the point that stealth and passive sensors are a potent EW combination, one that gives warplanes "first-look, first-kill" capability without compromising their presence in hostile airspace. "If you can't see a plane, then you can't lock your radar on it or fire a missile at it," sums up one EW official.

In many military circles, mission planning and situational awareness in the cockpit are now considered to be, along with stealth, tools for electronic combat. The idea is to plan missions with "threat avoidance" more in mind and to make aircrews constantly aware, via data links and cockpit displays, of what's happening all around them vis-à-vis those threats.

With this in mind, the Air Force late last year turned to Lockheed Sanders to develop a next-generation computer-based mission planning system for fighters, bombers, tankers, transports,



Stealth is now an important part of electronic warfare, as the Air Force F-117 amply demonstrated during the Persian Gulf War. Stealth and passive sensors are a potent combination, enabling warplanes to shoot without being detected.



The Air Force is upgrading the hardware and software of the ALQ-99 jamming system aboard its EF-111 Ravens to make them more effective in disrupting enemy ground radars. Each Raven contains three tons of electronic gear.

and helicopters. The so-called Air Force Mission Support Systems (AFMSS) are designed to automate flight planning, route planning, radar predictions, threat penetration procedures, target-area tactics, mapping and imagery, and postflight analysis and debriefing.

Mission planning systems now in service do many of those things but for only one kind of airplane at a time. A single AFMSS deployed with a composite wing, such as USAF's 366th Wing at Mountain Home AFB, Idaho, designed for quick-response air intervention missions, would do the job for all the diverse aircraft in that wing. The Air Force is expected to try out the new system this summer in special operations MH-53J Pave Low helicopters and has ordered 210 production units.

Don't Worry If It's Destroyed

Situational awareness in the cockpit is one of a combat pilot's most important EW tools, EW officials contend. For example, they say, if a pilot becomes aware that a ground radar is tracking his plane, his tactics may depend on his knowledge of his overall situation. He may react to the radar threat in a different manner if he also becomes aware, via communications links, that a friendly "Wild Weasel" plane has launched a high-speed anti-radiation missile (HARM) against the radar and that it likely would soon be taken out of action.

As Operation Desert Storm demonstrated, Air Force combat aircrews

get plenty of support from a wide variety of EC assets, including "Wild Weasels," E-3 Airborne Warning and Control System aircraft, EC-130 Compass Call communications-jamming aircraft, E-8 Joint Surveillance and Target Attack Radar System planes, and area-jamming EF-111 Ravens.

The Air Force is outfitting its EF-111s to do an even better job of jamming ground radars and thus preventing the enemy from detecting the approach of fighter and attack aircraft and from launching radar-guided SAMs against them. Under a five-year EF-111 System Improvement Program contract awarded in 1991, Grumman is upgrading the hardware and software of three tons of electronic gear—transmitters, receivers, antennas, computers, and display equipment and consoles—incorporated in each Raven to support its ALQ-99 electronic jamming system.

Air Force fighter and attack planes are in good shape for the endgame against radar missiles. Among their EW systems are variants of the Loral ALR-56 radar warning receivers, Westinghouse ALQ-131 and Raytheon ALQ-184 radar jammer pods, and Northrop internally mounted ALQ-135 radar jammers exclusive to F-15Cs and F-15Es. All of these systems proved their worth in the Persian Gulf War.

For the most part, Navy tactical aircraft carry older, less effective radar ECM systems and are said to have an

urgent need for new ones. The Navy had counted on the Westinghouse and ITT ALQ-165 internal Airborne Self-Protection Jammer (ASPJ) to protect its fighter and attack planes well into the next century, but the ASPJ, long in development, had problems of high cost and spotty performance. The Navy put ASPJ production on hold early this year. The Air Force, which once planned to outfit its late-model F-16Cs with ASPJ, bowed out of the biservice ASPJ program in 1990.

The Navy leads the way in multi-service programs now producing new ECM expendables to counter radar-guided missiles. These include the Gen-X radar decoy developed by Texas Instruments and the ALE-50 towed decoy developed by Raytheon.

Smarter Decoys

The Air Force, looking more to the future in radar ECMs, is exploring "smarter" aircraft-towed decoys with reprogrammable signals to confuse radar missiles.

Under some circumstances, radar warning receivers on tactical aircraft automatically trigger the release of chaff to bamboozle the radar guidance systems of approaching missiles. MAWS now in the works would do that and would also trigger the deployment of flares and other countermeasures against infrared-guided and electro-optical missiles. IR missiles now pose the most sophisticated and dangerous threat to tactical aircraft in a growing number of regions around the globe.

To counter them, the Air Force is devising new IR countermeasures in its Advanced Strategic and Tactical Expendables program—small, self-propelled, maneuverable IR-jammer decoys to supplant or augment existing pyrotechnic flares. Loral, Lockheed Sanders, Thiokol, Tracor, and Alloy Surfaces have produced and are testing prototypes. They lead heat-seeking missiles astray by radiating IR energy that simulates jet engine exhausts.

Before long, such devices may be indispensable to airlifters and other big planes that lack maneuverability. Agile high-performance fighters have often been able to defeat IR missiles by dodging them or deploying flares to divert them. But big planes like airlifters cannot jink under attack and must resort to flares to fool the increasingly sharp-eyed missiles. ■

Mr. Aspin's successor at the House Armed Services Committee says he's antiwar, not antiwarrior.

The Dellums Agenda

By Pat Towell

Rep. Ron Dellums (center) has moved from being a liberal gadfly to a position of potentially great authority. Here, he confers with Secretary Aspin and Joint Chiefs of Staff Chairman Gen. Colin Powell.

AFTER twenty years of lonely and frequently fruitless efforts to restrain increases in the size and lethality of United States armed forces, Rep. Ronald V. Dellums last January attained a position of potentially great institutional authority. The California Democrat became chairman of the House Armed Services Committee, succeeding Les Aspin after the latter took the post of Defense Secretary.

In trying to use his newly conferred power, however, Mr. Dellums must continue to display the patient tenacity he has shown heretofore. The gap between where he would lead and where Congress seems ready to go is so large that, if he pushes too hard, he could wind up as yet another figurehead chairman, one whose ostensible authority yields little true clout.

By national political standards, Mr. Dellums is a radical, both in his vision of American security requirements and in his approach to the exercise of the power he now holds. On both fronts, Mr. Dellums's views are rooted not in academic theory but in the pain and anger of an African-American political figure all too used to being relegated to the margins of power.

Mr. Dellums's strongest defense against future marginalization, aside from his well-honed sense of how much pushing the political traffic will bear, is the high regard in which he is held by political allies and opponents alike for fairness and honesty. Moreover, he has proven adept at forming pragmatic coalitions in pursuit of specific near-term goals with allies who do not share his long-term vision of a radically reduced US military.

Mr. Dellums expresses confidence that, over the long haul, the public will demand an aggressive federal effort to convert the defense industry to commercial uses—one of his fundamental goals. "Kicking and screaming, the country's got to walk by that street corner," he says. "Economic conversion was a throwaway line. Now it has become an imperative."

For twenty years, the Dellums critique of Pentagon policy has rested on the premise that most of the missions for which US armed forces were being sized and equipped were either suicidal—in that they risked nuclear war with the Soviet Union—or morally bankrupt—in that they strong-armed developing countries for US ends.

Underlying those strategic arguments has been Mr. Dellums's anger at what he sees as the high opportunity costs of paying for superpower status. In floor speeches, in alternative defense budgets crafted for the Congressional Black Caucus, and in dissenting views appended to Armed Services Committee reports on annual defense authorization bills, Mr. Dellums has relentlessly propounded his view that excess spending on defense has undermined the nation's true security by shortchanging social programs.

"The security of this nation must be understood to rest on more than our country's ability to . . . prevail in military conflict," he wrote last year in a dissent to the Armed Services Committee's report on the Fiscal Year 1993 defense authorization bill. "It rests more on the ability of our country to care for the needs of its people and to repair gaping holes that have been torn in the very fabric of our national soul. For too long, we have funded at extraordinary levels the worst-case scenarios of Pentagon theorists, while so many people in our country live out the desperation of their worst-case scenarios every day."



Apocalypse Then?

Central to Mr. Dellums's view during the cold war was his adamant conviction that any use of nuclear arms would escalate into an apocalyptic conflict and that any notion of controlled or limited nuclear strikes was a dangerous illusion. "While some nuclear weaponry may be necessary as a deterrent to nuclear war," he said in 1988, "existing inventories of well over 25,000 warheads are far more than sufficient for that purpose."

Occasionally, Mr. Dellums would cite the argument made in the early 1960s by Defense Secretary Robert S. McNamara that 400 warheads would be adequate for deterrence. Even so, the focus of Mr. Dellums's effort has been on what the US nuclear force *should not* be. He tried to block a succession of nuclear weapons programs that he contended would increase the risk of war by threatening a first strike at the Soviet nuclear arsenal or by fostering the dangerous illusion that a limited nuclear war could be fought.

Such weapons were key elements of President Reagan's defense buildup. However, Mr. Dellums had just as vigorously attacked the Carter defense

budget in 1979 because it included funds for the Peacekeeper intercontinental ballistic missile (ICBM), a more powerful Mk. 12 warhead for the existing Minuteman III missile, and the Trident II submarine-launched missile. All three programs aimed to provide a combination of accuracy and explosive power sufficient to destroy Soviet ICBMs in their hardened silos, Mr. Dellums insisted. "They are nothing more than the basic tools for fighting a nuclear war with options for a first strike," he said. "So we have arrived at the brink of utter madness."

Though some theoreticians did in fact speculate about the controlled use of nuclear arms, the more widely held rationale for such highly accurate weapons was the need for US forces to be seen by Soviet leaders as having the capacity to destroy something of greater military value than Soviet cities if the US deterrent was to be credible. Mr. Dellums argued that such detailed "warfighting" scenarios are beside the point because the sheer, unimaginable horror of nuclear war dissuades nuclear-armed adversaries from risking such a conflict.

In addition to opposing such prompt-hard-target-killing offensive weapons

through the 1980s, Mr. Dellums also opposed the Strategic Defense Initiative (SDI), President Reagan's anti-missile defense program. Mr. Dellums argued that it would foster a false sense of security, which might tempt officials to consider using nuclear arms, and objected that it would eviscerate the 1972 treaty limiting anti-ballistic missiles.

Of Feasibility and Morality

A second pillar of Mr. Dellums's view is that it is neither feasible nor moral for the United States to use military force to coerce developing countries into sharing Washington's policies or providing access to oil.

"We must share a permissive attitude toward the Third World that reflects understanding of the diversity that will and should develop," the congressman wrote in 1979—when most US policymakers viewed regional conflicts through the cold war prism of a great ideological competition against the Soviet Union. "American military might will *not* stem the revolutionary tide that flows . . . toward sovereignty and independence."

Accordingly, Mr. Dellums opposed President Reagan's naval buildup,



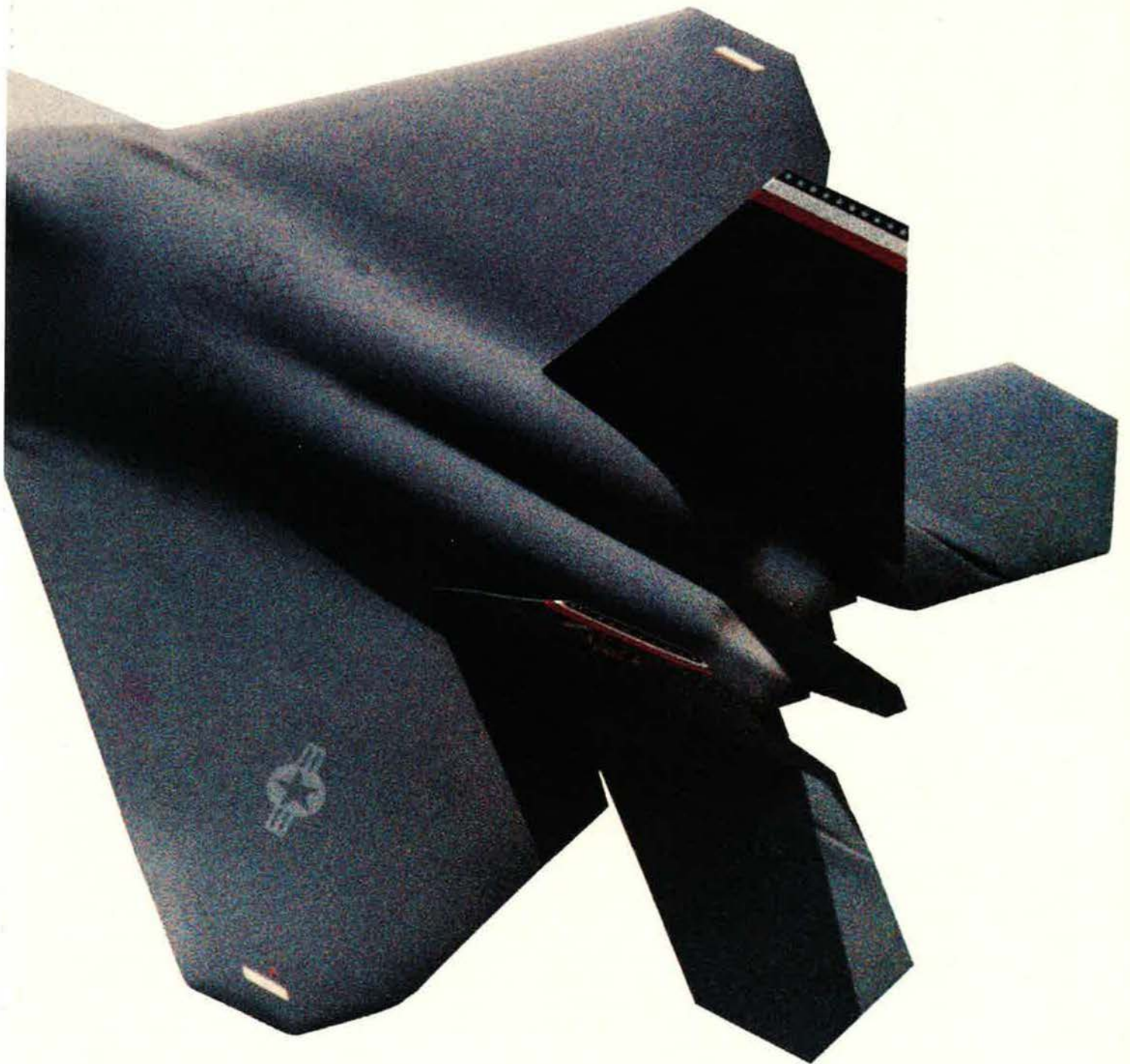
**WE CAN'T
PREDICT THE
FUTURE BUT WE
CAN PREPARE
FOR IT.**

The world bristles with MiG-29 and Su-27 upgrades readily available to those with hard currency. What's more, the new century promises to find even more advanced fighters in the hands of tomorrow's regional aggressors.

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fighters in the current U.S. inventory will be approaching thirty years old. The challengers will be much younger.

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The F-22 program is on track – which means American air superiority will exist tomorrow and well into the future.



which centered on expanding the fleet's complement of big-deck aircraft carriers and their escort ships. The big warships could survive in battle only against poorly armed countries, Mr. Dellums maintained. In 1983, when the Navy was planning to expand its carrier fleet from thirteen to fifteen, he argued instead for cutting the number to ten or fewer within five years. In the same vein, Mr. Dellums also opposed efforts by the Carter and Reagan Administrations to better organize US forces to intervene in the Middle East and to speed their deployment by buying additional cargo and tanker planes and large cargo ships.

In his first few years on the House Armed Services panel, Mr. Dellums primarily tried to slash the number of US troops deployed overseas. He was deeply skeptical that the Soviet Union would risk nuclear war by attacking western Europe. He also opposed US deployments in the Far East that buttressed authoritarian regimes in the Philippines and South Korea.

Mr. Dellums insisted that western European nations should bear a larger share of the financial burden of Alliance defense. In 1988, he called for the return of two of the four Army divisions then stationed in Europe. He called for limiting the purchase of weapons, such as the Army M1 tank and Bradley infantry fighting vehicle, designed to meet a large-scale conventional attack.

As early as 1983, Mr. Dellums included in his alternative defense budgets provisions intended to cushion individuals and communities against the economic impact of the radical cuts he was proposing. "The burden of a decision to eliminate or reduce certain weapon systems should be a national one, and not concentrated in those cities and towns where those systems are produced," he wrote, proposing to create 300,000 jobs for the defense workers that would be displaced by his plan.

That theme was echoed in recent alternative budgets proposed by the Congressional Black Caucus. Mr. Dellums drafted the defense portions of those proposals, including the Fiscal 1994 plan proposed earlier this year. In that plan, most of the funds that would have been saved by cuts in military personnel were earmarked for severance pay, pension benefits, and job training for those discharged. He targeted \$3 billion to support busi-

nesses and communities dependent on defense.

Views of a Ground-Pounder

Mr. Dellums is particularly frustrated by critics who treat his opposition to recent US military policy as hostility to the welfare of US military personnel. "What I have opposed," he says, "are certain [nuclear] weapons . . . that I think have served no purpose but to threaten all life on this planet. I have opposed . . . intervention into countries and situations where the problem could better be addressed diplomatically and politically."

He insists that, as chairman of the Military Installations and Facilities Subcommittee, he was a staunch promoter of family housing, child-care centers, and other quality-of-life facilities. "I was a ground-pounder," he says, referring to his two-year stint in the Marine Corps. "I understand what the human condition is in the military. . . . I'm not antiwarrior; I'm antiwar."

In his approach to the political process, Mr. Dellums's convictions as a small-"d" democrat, acutely sensitive to a political minority's right to be heard, were reinforced by his early experience on the Armed Services Committee. For a decade after he joined the panel in 1973, Mr. Dellums and the handful of other Democrats who questioned Pentagon orthodoxy—including Defense Secretary Aspin, then a Wisconsin representative—were routinely quashed by the Southern barons who still ran the panel. "In the early days, I was often dealt out of the process," Mr. Dellums says. "My [positions] were viewed as extremely controversial and in some quarters 'dangerous.' . . . That was a painful process to go through."

Nor was his continued marginalization any more tolerable in the late 1980s, when Chairman Aspin blithely brushed aside Mr. Dellums's sparsely supported amendments as irrelevant to the hard-nosed deal-cutting needed to produce a bill.

Mr. Dellums contends that his arguments have not been rejected so much as simply ignored, pigeonholed by his colleagues and the press as the rigid misconceptions of a flamboyant radical. "There were times we couldn't buy press attention for what we wanted to say," he recalls, referring to alternative military budgets he has drafted for the Congressional Black Caucus annually since 1981. "We'd call press con-

ferences and sometimes not one member of the established press would show up. . . . They weren't prepared to grapple with me or a number of my colleagues seriously and substantively."

In Mr. Dellums's view, his talent as a legislative broker began to break through the stereotype in 1989, when he became chairman of the Armed Services Research and Development Subcommittee, which has jurisdiction over the Pentagon's \$30 billion-plus R&D budget. "Over half the Congress then had to deal with me almost on a daily basis," he says. "They found that there was a human being there—a multidimensional person who could sit down and understand, evaluate, make judgments. . . . That's when you started to hear members say, 'This guy is a fair person. This guy is prepared to hear us out,' " he says.

Fifty-Eight to Zero

By the time Mr. Dellums succeeded Mr. Aspin, he had established an extraordinary pattern: He would help craft defense bills that enjoyed broad support, and then vote against them on the grounds they were too generous to the Pentagon. In his twenty-two years on Capitol Hill, the House has conducted fifty-eight roll-call votes on final passage of a defense authorization bill or military construction authorization bill, or on adoption of a conference report on such a measure. Every single time, Mr. Dellums has been opposed. He voted "no" fifty-two times, paired up with a "yes" vote four times (effectively voting "no"), and announced his opposition twice.

However, Mr. Dellums has over the years offered a raft of floor amendments to defense bills and to House budget resolutions aimed at challenging fundamental premises of US policy—usually regarding nuclear weapons. On a few of his lonely crusades, Mr. Dellums claims vindication:

- In 1986, confounding conventional wisdom, his proposal for tough economic sanctions against South Africa's white supremacist regime became the basis for legislation enacted over President Reagan's veto.

- In 1977, he garnered only eleven votes for his first amendment to kill the mobile Peacekeeper. By 1985, Congress had forced President Reagan to settle for deploying only fifty of the multiwarhead missiles, and many of the arguments used by opponents were

those Mr. Dellums had mounted eight years earlier.

■ His first run at cutting back the B-2 program, in collaboration with Rep. John R. Kasich (R-Ohio), was rejected by the House by a two-to-one margin in 1989. By 1990, they carried the House. In 1992, President Bush agreed to accept a fleet greatly reduced to twenty planes.

In his first few months as chairman, Mr. Dellums has run Armed Services in a collegial style, acting as committee members' agent rather than as their landlord. He put three long-time associates in staff jobs: Marilyn Elrod, a Dellums aide since he joined the House in 1971, became staff director, the first woman to hold the post; Robert B. Brauer, a close political associate since Mr. Dellums's tenure on the Berkeley, Calif., City Council, became committee counselor; and George O. Withers, a seventeen-year veteran of the Dellums House staff and formerly his legislative director, became committee press secretary.

The new chairman asked all the other committee staff members to stay on. Mr. Dellums is adding to the staff a few aides who share his critical attitude toward the defense establishment. However, whereas the staff in Mr. Aspin's regime included a corps of defense policy analysts who worked strictly for the chairman, Mr. Dellums emphasizes that all members have a claim on the entire staff.

In a late March comment on President Clinton's first defense budget request, Mr. Dellums argued that the logic that brought Congress to his side of the B-2 fight should move it also to transcend the temporizing Clinton Pentagon program for Fiscal 1994. "With the irreversible disintegration of the Warsaw Pact and the Soviet Union, the threat has been diminished well beyond the level that would require current funding projections," he wrote. "As the committee studies the budget, I am sure there will be room for significant cuts and changes."

Powerful Constraints

However, Mr. Dellums faces powerful political constraints on his ability to steer the committee his way. Most fundamentally, the committee as a whole remains well to the political right of the House Democratic Caucus on defense issues—and far to the right of Mr. Dellums. Committee Republicans appear solidly opposed

to Clinton's projected defense cuts, and Mr. Dellums's views do not enjoy much support among the panel's senior Democrats. Of the nine other Democrats who have been on the committee for ten years or more, only two have anything like Mr. Dellums's liberal views on defense policy: Patricia Schroeder of Colorado, who chairs the Research and Development Subcommittee, and Frank McCloskey of Indiana.

Another challenge Mr. Dellums faces is that other influential Democrats are trying to shape the defense debate from a centrist perspective. In the past two years, Chairman John P. Murtha (D-Pa.) of the House Appropriations Defense Subcommittee has staked out positions on a few questions—the balance between active-duty and Guard and Reserve forces, for example—which are much broader than those on which appropriators typically concentrate.

Mr. Dellums must also come to terms with the influence of Senate Armed Services Committee Chairman Sam Nunn (D-Ga.), a dominant figure in Washington defense debates for more than a decade. In part, Senator Nunn's clout reflects his frequent role as spokesman for centrists of both parties who hold the balance of political power in a Senate debate, but it also reflects his mastery of a type of think-tank analysis of defense issues. Ms. Schroeder thinks that Mr. Dellums may be more of a match for Nunn on some issues than was Mr. Aspin, who shared the Georgian's quasi-academic approach. "Ron may be able to out-talk him," she says. "He may be a harder seller for the House position. Aspin would always deal, [so] Nunn could gradually wear him down."

Other Barons, Other Bills

Some denizens of Capitol Hill speculate that the job of crafting a defense bill acceptable to the centrist Armed Services panel will pass by default from Mr. Dellums to Reps. Ike Skelton (D-Mo.), Dave McCurdy (D-Okla.), and John Spratt (D-S. C.) and the other centrist barons. However, many of the barons disagree, citing Mr. Dellums's proven ability to engineer bills

with which he disagrees. "You're looking for confrontation," said Mr. Skelton. "I'm not sure it's going to happen."

Despite the constraints imposed by political reality, the Armed Services chair offers Mr. Dellums considerable leverage to alter US policy. Most fundamentally, it virtually eliminates the likelihood that his views will be ignored as, he argues, has often been the case in the past. "The power is the power to educate, the power to clarify [options]," Mr. Dellums says. Rep. Tom Andrews (D-Me.), a fellow committee liberal, elaborates: "You set the agenda. . . . You have the creative ability to focus the debate."

Some liberals complain that Mr. Dellums has been slow to use that power. To some degree, this may reflect his preoccupation with a crash course of almost daily briefings and extensive readings designed to acquaint him with the broader range of issues that now fall within his purview—issues ranging from Balkan politics to weapons acquisition. "When I walk into that committee room, I want to be a knowledgeable person," he says. "I want people at the end of the day to say, 'The guy knows his job.'"

Having the chairmanship carries with it the power to be at the table until the last dog is hung in negotiations with Senate conferees. Mr. Dellums recalls years past when House conferees somberly lamented to him that the Senate had refused to accept some provision of interest to him. "And the thing is, I believed them," he adds with a laugh. "Then I became a subcommittee chair and participated in the conference, and I realized that the chair and the staff have enormous leeway."

What the committee might do to foster defense industrial conversion on a broader scale or over the long run is not clear at present. But Mr. Dellums sees the tide running his way and is eager to explore new options. "If I was willing to stay here from Nixon to this point," he says, "I've got to be willing to hang in there for a while to see what these next few months and years will bring." ■

Pat Towell, a senior writer for Congressional Quarterly, has covered defense issues on Capitol Hill for nearly twenty years. His most recent article for AIR FORCE Magazine, "The Pentagon vs. Congress," appeared in the February 1990 issue.

Not all the bundles fell into the right hands, but apparently a great many of them did.

Bosnia Airdrop

By Tony Capaccio

EXACTLY six seconds after the navigator yelled, "Green light!" ten giant bundles of food and other supplies began gently sliding down the ramp of the C-130 and falling into the darkness, starting a two-minute descent by parachute through the clouds blanketing eastern Bosnia.

The crew members and passengers took two gulps of pure, bone-dry oxygen through yellow rubber masks. By the end of the second gulp, the airplane had disgorged all ten bundles—nine containing meals, ready-to-eat (MREs), one crammed with medical supplies.

The previously packed cargo bay, bathed in the glow of red lights, seemed positively cavernous. The airplane went into "feet dry" condition as crew and passengers donned flak jackets and helmets. Electric power was reduced. The missile warning system was switched on.

Welcome to the world of precision airdropping, 1990s style. Part of a humanitarian operation dubbed "Provide Promise," the drop was a rare event. The last time USAF's computerized Adverse Weather Air Delivery System (AWADS) got such a workout was in 1968. Then, the Air Force was



The C-130 (opposite) is seeing service over Bosnia, achieving accuracy with its airdrops that pilots of high-technology attack aircraft might envy. Above, MSgt. Ben Pandes of the 37th Airlift Squadron, 435th AW, uses his nonverbal communication skills to indicate that the load is ready to go.

USAF photo by SMSgt. Bob Wickley



dropping supplies to the besieged US Marine garrison at Khe Sanh, South Vietnam.

Outside, in twenty-two-knot winds, the 1,520-pound bundles swayed gently as they fell at a speed of sixty miles per hour. The elaborately wrapped bundles contained a variety of supplies: food pouches of chicken and rice, spaghetti and meatballs, Danish and British biscuits, Turkish anchovies, and other edible goods. There were vials of penicillin.

The plan called for the bundles to drift no more than one-half mile from the computer-designated release point to which the Air Force C-130 had flown. The drop zone on the ground measured about 1,500 yards by 1,000 yards.

No Bundle Bombs

Originally, the airdroppers had planned to target their bundles on the centers of towns, but concern about hitting a building with a one-ton bundle killed that idea. Instead, drop zones were located hundreds of yards from towns. The airdroppers didn't have laser guidance systems or other exotic equipment to guide the plummeting bundles to Earth. It was all gravity and educated guesswork.

"I wish I had a little Atari set to steer the damn things down into somebody's arms, but once it leaves the aircraft, that's the last time I talk to it," said Maj. Tip Stinnette, chief tactics officer for the 435th Airlift Wing at Rhein-Main AB, Germany, the unit called on to conduct most of the drops into war-shattered Bosnia.

"We do not precision guide the bundles," said Capt. Scott Flotz, a 435th AW navigator on that night's mission. "They free-fall by parachutes. We do the best we can to get to the right position to release the load."

Most of the drops were executed by eight specially equipped C-130Es from the 435th. They had special AWADS computer gear for calculating midair release points and self-protection gear such as the AN/AAR-47 missile warning device.

Though airdrops disappeared from the headlines after the first operations in February, three-plane formations continued to fly for weeks over towns such as Gabela, a village near the heavily shelled Muslim enclave of Srebrenica on the Serbian border.

The operation seemed generally successful—a relative term. No one believed that all the bundles landed

upright, intact, or anywhere near the Muslim villagers who needed them most. Doubtless, many landed in Serb hands and many Muslims died trying to retrieve them. There were no illusions among the crews and planners that the airdrops were efficient. The drops will eventually be judged a victory or failure. The initial evidence pointed generally to victory.

The entire operation hinged on synergy generated by Army riggers, Air Force weather specialists, USAF navigators trained to read two-dimensional terrain features on radars, and unsung loadmasters who pack the bundles on the aircraft.

Sitting in a noisy cockpit just after the night's drop, Captain Flotz declared the mission—his sixth—to be a success. "We have been very accurate in our drops," he said. "Tonight, we were where we wanted to be with our on-board systems. At the release time, the pilot was less than ten yards off the cross-check I was giving him."

Positioning the plane was one thing. Dropping a properly rigged payload was another crucial part of the mission.

Clever Army riggers from the 5th Quartermaster Detachment, for ex-



Crews worked with care to ensure that the bundles were properly rigged—a task that took up to two hours—and “ballistically sound.” A properly rigged bundle was less susceptible to the influence of wind shifts.

ample, had become adept at using the MREs as packing material to mix and match with allied food donations. The goal was to assemble a balanced, “ballistically sound” bundle that would fall at a predicted “terminal” velocity, depending on wind speed.

Nineteen Configurations

Riggers from the 5th’s 29th Area Support Group had come up with nineteen bundle configurations. Army Capt. Brian Williams explained that some took twenty minutes to rig and some took two hours. Bundles were equipped with twenty-six-foot-wide, high-velocity parachutes to slow their descent.

Properly rigged bundles helped Air Force planners counter wind shifts, the main foe of accuracy. “From Day One to Day Fifty, wind is going to be the thing,” said Major Stinnette. “If you can tell me beyond a shadow of a doubt what the wind will be between the plane and the ground, accuracy is not a problem.”

Instead of certainty, the aircrew had a heavy work load before takeoff, receiving data from USAF’s meteorologists, who attempted to predict wind speeds at 1,000-foot intervals below the projected release altitude. These predictions were fed into an on-board computer and updated during the flight when matched against actual wind conditions.

In addition to having wind predictions, navigators came armed with radar images and coordinates of natural landmarks, such as mountains or

hills. “I’ll identify a particular [radar] return,” said Captain Flotz, as the radar screen cast a lime glow over his uniform. “Intel gives longitude and latitude. I place the cursor over it, and it’s entered into a computer. You can read it as though you are looking at a drawing. The only guy who sees the

ground is the navigator, and he sees it through the clouds.”

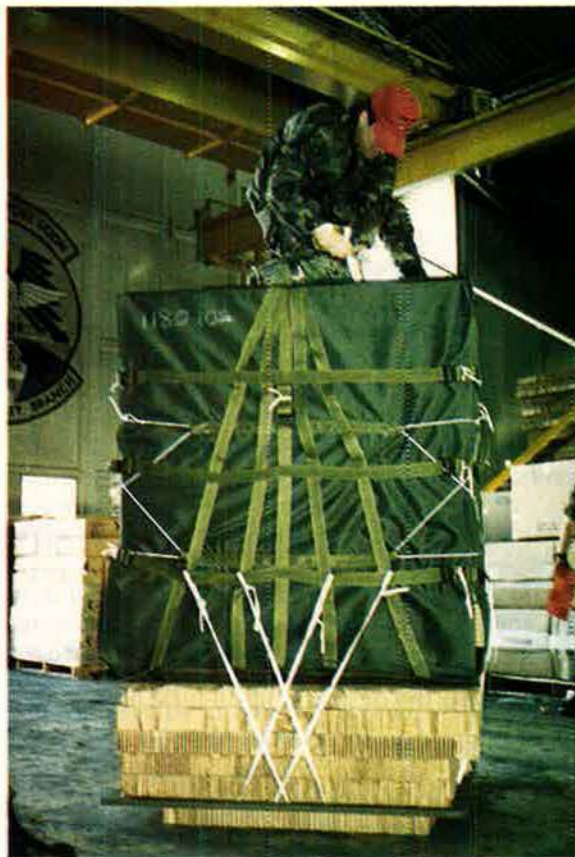
Route adjustments were made on the final approach before launch as the pilot “rode the bar” depicted on his horizontal indicator display. “When I move the cursor, it moves the ‘bar,’” Captain Flotz said. “The skill involved in making it work is being able to recognize what you are looking at.”

The wizardry came in gingerly steering the C-130 in ten-yard increments from left to right to its release point, Major Stinnette explained. The navigator gave constant updates until he shouted, “Green light!” This signal activated an automatic process that cut nylon straps restraining the bundles, allowing them to slide out the open ramp.

Many of the bundles landed within 130 feet of planned drop sites, according to airmen involved in the operation.

“Those guys are hitting from 10,000 feet as well as you can normally hit from 500 feet,” said Brig. Gen. Donald Loranger, commander of the 435th AW. “It’s continued to be a relatively phenomenal rate of accuracy.”

US flyers said their accuracy was displayed on the initial drop on February 28 to the east Bosnian village of Cerska. “Given the feedback we have



Even slowed by a twenty-six-foot-wide parachute, a 1,180-pound bundle, such as this one, comes down pretty fast (note corrugated cardboard at bottom that served to cushion the impact). To minimize the danger to the Bosnians, Air Force planners decided to avoid air-dropping in urban areas.

gotten from multiple sources, on the first night I went in there we had a load as close as forty meters [131 feet] from the [computer-generated] point of impact," said Major Stinnette, who planned the airdrops.

"Awesome" Accuracy

"The furthest load from point of impact was 400 meters [1,312 feet] away. . . . I think that, from 10,000 feet, forty meters is awesome," Major Stinnette said.

The forty-meter to 400-meter accuracy rate had been the average of all the airdrops since the Cerska run, Major Stinnette said. "There is not an F-111 or F-16 in the inventory that can give you that kind of accuracy every day," he said. "We hit exactly where we wanted to hit. . . . But the problem is the distribution system. . . . The strongest get the food."



USAF photo by SMSgt. Bob Wickley

Brig. Gen. Donald Loranger (right), commander of the 435th AW, confers with Bosnian colleague Inspector Mufid Hailovic. General Loranger said his aircrews "are hitting from 10,000 feet as well as you can normally hit from 500 feet."



USAF photo by TSgt. Marv Lynchard

The high drop altitudes of around 10,000 feet were a compromise between the twin demands for accuracy and aircraft survival. The altitude avoided "all the small arms fire, most if not all AAA [antiaircraft artillery fire], most of the missile threats, or at least [it] puts [the missiles] at the edge of their envelope, and it puts them totally out of their envelope if they can't see you," General Loranger said.

The first thirteen days of drops were conducted through the clouds. That didn't hurt accuracy, officials said. In fact, the clouds were seen as a blessing because they hid the aircraft from Serbian air defense weapons.

"The missions weren't deliberately timed to take advantage of bad weather, but it's a real nice benefit," said one tactics officer.

How did the airmen know that they were being so accurate with the drops?

"I have tons of anecdotal evidence and less, but still very good, specific evidence from national technical means," General Loranger said. "I

have no evidence—none—that it's not being very accurate."

"Burning Up Zones"

Added SSgt. Ted Balbierz, a Reservist loadmaster, "I've seen satellite photos, and we are really burning up the drop zones."

General Loranger pointed to another technical backup used to validate accuracy claims: Global Positioning System (GPS) terminals on each plane mark the aircraft's exact longitude and latitude release point. Based on the GPS readings reviewed by the General, most aircraft have been positioned within sixty feet of where planners intended them to make their drops.

"They are within twenty yards, dead center, or whatever," General Loranger said. Using GPS and AWADS virtually eliminates the perennial problem airlifters have faced with putting the plane where they wanted it. "The equipment we have puts the airplane 'spot on' the target."

What was the measure of success for the airdrops? General Loranger offered a compelling one. "My measure is looking at the pictures and all kinds of reports and seeing empty MRE packets," he said. "Hamsters aren't doing that." ■

Tony Capaccio, an editor with Defense Week in Washington, D. C., flew on C-130s on airdrop missions over Bosnia. This is his first article for AIR FORCE Magazine.

As part of a notable military buildup, Beijing is buying Russian fighters and is shopping for an aircraft carrier.

Chinese Airpower Revs Up

By Julia A. Ackerman and Michael Collins Dunn

IT ONCE was a common practice to characterize China as a “sleeping giant.” With its 1.2 billion people and military forces of some three million, it should have been a superpower, but it was not. Though it fielded a vast army, its air force was archaic and its navy nearly nonexistent.

That’s no longer the case. The giant is stirring, and its worried neighbors have noticed.

China has what may be the world’s highest rate of economic growth, and its defense budget has been growing proportionately—or more so. The huge nation is buying first-line weaponry from an old rival—Russia.

From the Indian Ocean to the Sea of Japan, China’s activities and intentions are being closely watched. In a few areas—particularly the South China Sea, where Beijing is locked in a highly explosive dispute over the Spratly Islands—China is behaving assertively, even aggressively.

Chinese leader Deng Xiaoping (who no longer holds an official post) intends to leave as his legacy a modernized armed force capable of advancing China’s interests. While cutting back the manpower of the vast and primitive People’s Liberation Army

(PLA), he has placed strong emphasis on training, organization, and a new doctrine aimed at professionalizing and modernizing Chinese military capabilities.

The Chinese Air Force and long-neglected Navy (and Navy Air) are being restructured and are procuring new weaponry aimed at extending their range and China’s reach.

The Chinese Navy, once merely a coastal defense force, is shopping for a blue-water aircraft carrier and claiming it will pursue its interests and territorial claims not only in home waters but also on the high seas.

China’s enhanced airpower, including recently acquired in-flight refueling technology and sophisticated Russian aircraft, is another sign of China’s new capability.

Increasingly, China’s doctrine takes a combined-arms approach. Once the crucible of Mao Zedong’s doctrine of People’s War, China has passed through the phase of preparing for nuclear war into a new era, characterized by a doctrine of limited war on its periphery using professional, well-armed forces.

Territorial Claims

China’s “defensive” posture in Asia

The numerically huge but somewhat ramshackle Chinese military has undergone a dramatic shift. The armed forces will be smaller, but—with such high-technology purchases as this Russian Su-27—better able to pursue China’s interests from the Indian Ocean to the Sea of Japan.



is one that carries forward defense to such an extreme that some in the West view it as an offensive posture. China has always claimed Taiwan as part of China, but it also claims Mongolia and maintains active or latent claims to areas now within the borders of Russia and India.

At sea, China claims islands ranging from the Spratlys (actively disputed by Vietnam, Malaysia, Taiwan, Brunei, and the Philippines) to the Senkaku Islands (disputed by Taiwan and Japan) in the East China Sea.

China never democratized, but it has for years vigorously pursued economic liberalization. One result is a phenomenal growth rate—more than twelve percent last year and a projected thirteen percent this year, which stands as the highest in the region and perhaps in the world.

Moreover, the defense budget China *officially* acknowledges is growing even faster than its superheated economy.

This year, Beijing announced an increase in its defense budget to \$7.4 billion US dollars, up 8.8 percent from its 1992 expenditure of \$6.8 billion. However, US intelligence agencies estimate that China's actual

defense spending is two or even three times the official budget. That means China may be spending as much as \$22 billion on military forces this year. Compared to the US defense budget of some \$275 billion, that seems like a pittance, but money goes much further in China than in the United States.

What is China doing with this increased budget? Some of the money certainly is being devoted to arms research and development and new technology, but much is also going for new procurement of equipment from abroad.

Much of the hardware comes from China's former nemesis, Russia. Once, the Sino-Soviet border was viewed as the most dangerous flashpoint in the world, with millions of heavily armed troops and advanced aircraft facing off against each other in a tense, nuclear-backed standoff. Now, the world worries more about the transfer of advanced arms across that border.

During Boris Yeltsin's trip to Beijing in December, the Russian President said that China ordered \$1.2 billion in Russian equipment in 1992 alone. While China may not have paid for all its Russian arms in the year

they were ordered, it clearly is buying heavily.

Nukes and Horse Cavalry

The ground forces of the People's Liberation Army long have been a paradox—huge but relatively weak, equipped with nuclear weapons and, for many years, horse cavalry. Deng reorganized the immense, clumsy, decentralized PLA and began to professionalize it. The old infantry-based Field Armies were replaced with newer combined-arms Integrated Group Armies. Huge cutbacks in the PLA's numerical strength were envisioned, though there have been some difficulties in finding civilian jobs for those being demobilized.

The reforms, say Western observers, have left the PLA leaner but stronger.

Similar strengthening is reshaping Chinese naval power. Most Western attention has been focused on reports that China was seeking to buy an aircraft carrier, with particular attention to what was to have been the second full-size carrier of the old Soviet Union.

That carrier, known in its most recent incarnation as the *Varyag* (origi-

Deployments

Each of seven military districts has a mix of J-8, J-7, and J-6 fighters, H-5 bombers, and Q-5 attack aircraft. The number of J-6 aircraft in a given district is important because these ancient aircraft are of little value.

A knowledgeable Asian military source provided estimates of deployment believed to be accurate within a few aircraft:

- **Shenyang** (Northeast, facing eastern Russia, Mongolia, and North Korea): Some 970 fighters, more than eighty percent J-6s.
- **Beijing** (Capital region, bordering Mongolia): Slightly fewer than 700 fighters, forty percent J-6s.
- **Jinan** (North Fleet headquarters): About 460 fighters, fifty-five percent J-6s.
- **Nanjing** (East Fleet headquarters): More than 800 fighters, some fifty percent J-6s.
- **Guangzhou** (Vietnam, Macao, Hong Kong borders, South Sea Fleet headquarters): More than 700 fighters, sixty percent J-6s.
- **Chengdu** (Nepal-India-Bhutan border, Myanmar-Laos-Vietnam border): Some 300 fighters, more than fifty percent J-6s.
- **Lanzhou** (Far northwest borders): About 400 fighters, more than fifty percent J-6s.

nally *Riga*), is unfinished at the Nikolayev yards in Ukraine. Most of its fittings need to come from Russia and are not forthcoming at the moment.

The reports that the Chinese tried to buy the *Varyag* seem to be correct, but problems of cost, coordinating the approval of the Russian and Ukrainian governments, and what Hong Kong's South China *Morning Post* called intense pressure from the US and Japan prevented the sale.

There have been suggestions that the Chinese are trying to buy one of the smaller, Soviet-built *Kiev*-class carriers, at least for training purposes, while designing and building their own carrier. The Chinese also reportedly plan to experiment with a British-style "ski-jump" carrier, which might allow them to modify a *Kiev* carrier to carry Su-27s, which China is purchasing in quantity.

The Chinese do not now have the right mix of escort ships to sail with a carrier, but they are reportedly buying *Kilo*-class submarines from Russia and are seeking to build up other escort capabilities. Former Navy Commander Liu Huaqing's presence on the Standing Committee of the Politburo should guarantee a smooth road for naval procurement.

The result, say analysts, is that China's inability to project power outside of territorial waters is coming to an end. A new Chinese Navy with carrier aviation, in-flight refueling, and airborne command and control will probably exist early in the twenty-first century if not sooner, allowing China to vigorously assert its claims on disputed territories.

Its ambitions may extend even fur-

ther. China is reportedly helping Myanmar build a naval base on Hyanggyi Island at the mouth of the Bassein River on the Indian Ocean. This is not far from the Andaman Islands, where India is building up its base at Port Blair. There have been published allegations that Myanmar may let China use the naval base and that China has a signal station on Great Coco Island, perhaps to monitor India's missile tests.

Reverse Engineering

The PLA Air Force began with Soviet equipment but, following the Sino-Soviet split in the early 1960s, found itself without a supplier or a major friend. Through reverse engineering the Chinese managed to build their own aircraft and even their own aero-engines, but they always lagged far behind the major aerospace powers.

Many Chinese aircraft are clones of Russian originals, but with less efficient engines or avionics, and, in some of the more recent cases, US, British, French, and Israeli technology have been grafted on.

The major combat aircraft currently in Chinese service include, among fighters, the J-6 (based on the now antiquated MiG-19), the J-7 (based on the MiG-21), and the J-8, a Chinese-designed aircraft with a delta wing and some aspects of the MiG-23.

In the air-to-ground role, the Chinese Air Force deploys the Q-5, an attack aircraft that evolved from the J-6; the H-5 light bomber, based on the Ilyushin Il-28; and the H-6 bomber (a clone of the Tu-16 "Badger").

Western technologies are available to China's aerospace industry. France's Aerospatiale Super Frelon helicopter became the Z-8 and their Dauphin became the Z-9. Grumman of the US, under the Peace Pearl program, contracted to provide a fire-control system and other avionics (with Litton contributing) for the J-8 II (F-8 II) program, a dual-role outgrowth of the J-8. This US-provided upgrade hit a major obstacle with the 1989 Tiananmen Square crackdown, when the US stopped all military technology deliveries to China. Although some limited electronics technology has since been released and US industry officials still hope to resume the program, China has indicated that it has decided to scrap the idea.

Chinese aircraft development programs are often hard to describe. Sometimes they are directly related to for-

Leadership

In late 1992, Deng Xiaoping's reformers began a major reshuffling—some might say a purge—of senior military leadership across all the services and the General Staff.

President Yang Shangkun and his half-brother, General Yang Baibing, relinquished key military posts. While Communist Party Chief Jiang Zemin retains the title of Chairman of the Central Military Commission, new Vice Chairmen are the real powers in the military. They are:

- Liu Huaqing, the first general appointed to the Standing Committee of the Politburo in years. He is a military professional who has not only been a senior general but once commanded the Navy. In his new post he is likely to continue to promote the growth of a blue-water navy.
- Zhang Zhen, another veteran general who served as the first head of the PLA's National Defense University.

A gradual replacement of old, ideologically-oriented officers with trained military professionals has been under way for some time, in the Air Force and Navy as well as the ground forces.

The National Defense University is now seven years old. It has reportedly trained thirty-seven lieutenant generals and 518 major generals, including most Group Army Commanders.

eign technology; at other times they are exhibited to the world in model form at the Paris or Farnborough air shows, never to be seen again.

In recent years, various publications have mentioned several new Chinese fighter programs. It is not clear whether any of these actually exist today. A next-generation "F-10" (Chinese designation: J-10) was intended to be a MiG-23 derivative converted for a ground-attack role; a reliable Asian military source says it would have had a delta wing. (The description resembles that of a J-8 derivative, designed with replacement of the Q-5 attack aircraft in mind.) Another source describes it as a multi-role fighter resembling the F-16 and indicates that the major problem was

hounds," many to be produced in China.

- Up to six Il-76 transports, perhaps three (included or in addition) to be used as "Mainstay" Airborne Warning and Control System aircraft.

- Mi-17 "Hip" helicopters.

- Four or more Tu-22M "Backfire" bombers.

These sales have never been officially confirmed, but many if not all are thought to be under way. The first equipment known to have been delivered is the Su-27, which represents a revolution in Chinese military aviation. With this aircraft, the PLA Air Force has leaped from the use of primitive aircraft to the best that Russia has to offer.

Reports of China's buys from Rus-

D. C., claims that the MiG-31 deal may be much larger than is now projected, with the Guizhou factory in China producing 600 aircraft, 400 of which would be sent back to Russia. Such a deal would be the first of its kind.

Efforts to purchase the Il-76 "Mainstay" have not been confirmed, but China is known to be looking at several options for acquiring some sort of AWACS capability. At least one of the options under study is the acquisition of a Russian radar and other equipment for fitting on a Chinese platform, with the Y-8 (An-12 variant) military transport and the Tupolev Tu-16 civilian transport being considered.

In-flight refueling is old hat to many Western air forces, but it is still the major watershed for air arms seeking to project power. China has only recently acquired the technology.

No one knows for sure from whom. Some say from Pakistan or Iran. China and Israel have a long-standing defense relationship. Israel's Bedek Aviation, the upgrade/refit side of Israel Aircraft Industries, has long promoted a package for converting transport aircraft to aerial tankers. China's refueling platforms are understood to be the Y-8 and the H-6 (B-6: Tu-16).

What can the Chinese refuel? The Su-27s, their own H-6s, and a handful of other aircraft seem to be candidates. Neighboring countries' intelligence services doubt that China will be able to exercise a full refueling capability before the end of the decade (though China has been underestimated before).

Some sources report that China has set up a base to train in aerial refueling at Zhanjiang opposite Hainan Island. This would suggest intent to project power into the South China Sea.

China contains one-fifth of the world's population, and its political and military clout will eventually allow it to exercise its global power accordingly. Its neighbors—from Russia on the north to India and Pakistan on the southwest to Japan and the United States to the east—must for the first time in decades pay careful attention to Chinese military power. ■

Aircraft

- China's arsenal of major combat aircraft includes a family of fighters derived from Soviet models. They are known by the Chinese letter designation J, for *Jianjiji* (meaning fighter aircraft), or *Jian*, followed by the model number.
- Bombers are known in Chinese by the prefix H, for *Hongzhaji* (meaning bomber aircraft), or just *Hong*.
- Attack aircraft are known by the prefix Q, for *Qiangjiji*, or just *Qiang*.
- Transports are known by the prefix Y, for *Yunshuji*, or just *Yun*.

For export models China uses English designations (e.g., F for fighter).

engine development. It has now been dropped, according to the first source, but this is unconfirmed.

Somewhat more confusing is the reported program to develop a J-12. Some sources suggest some resemblance to the Israeli Kfir (derived from the French Mirage III), using a Chinese WP-13A engine. This program too has reportedly been dropped.

Another major aircraft said to be under development is the H-7 bomber. *Jane's All the World's Aircraft* places it in the same class as the Su-24 "Fencer" from which it appears to have been copied. Other sources confirm that it has the same basic attack mission.

Impressive Acquisitions

New-development jets seem less important to China at the moment than the new acquisitions from Russia do. These purchases are indeed impressive and include, according to officials and press reports:

- Twenty-four to seventy-two Su-27 "Flanker" fighters.

- Fifty to ninety MiG-31 "Fox-

sia are—like all reports of Russian sales—full of conflicts and confusion, and Russia is reported by all its customers to be slow on delivery. At least twenty-four of the Su-27s are already in China, according to most reports.

The first Su-27s were based in southern China and then rotated to Hainan Island in the South China Sea, not far from Vietnam. However, they may be undergoing training and performance testing there, and Hainan may not be their permanent base.

China is also said to be highly interested in the MiG-31. Reports last year suggested that China was buying up to fifty of the modified MiG-25s. Japan's Kyodo News Agency early this year reported a sale of ninety.

Dr. Chong-Pin Lin of the American Enterprise Institute in Washington,

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Should we close West Point? Move Annapolis to Colorado Springs? The Superintendent of the Air Force Academy gives his perspective.

The Case for the Academies

By Peter Grier

WITH THE end of the cold war, the need for a large officer corps is diminishing, and service budget planners are looking for savings everywhere. Isn't an elite military education facility, such as the United States Air Force Academy, an extravagance at a time when flying squadrons are folding up?

No, says its superintendent, Lt. Gen. Bradley C. Hosmer. The General maintains that the Air Force Academy at Colorado Springs, the US Military Academy at West Point, and the US Naval Academy at Annapolis now are more valuable to the country than ever.

General Hosmer claims that history shows that the elite academies serve as the keepers of military tradition and thinking during long dry spells of small military budgets and relatively low public interest in the profession of arms.

Toward the end of the nineteenth century and again between the two world wars, the middle and senior levels of the US officer corps were thickly populated with military academy graduates. They were the ones who stayed on despite the distinct lack of prestige and public support.

"Military academy graduates have tended to be more dedicated professionals," observes General Hosmer. "They became the officer corps that held the whole thing together." He was himself a member of the Academy Class of 1959—the first ever.

The Air Force Academy, strictly speaking, has never had the opportunity to serve this national purpose. Throughout the short existence of the Academy, the United States has been engaged in either one of a number of hot wars or in the prolonged cold war, with a large standing military in place.

"So we have some new things to learn about surviving in peacetime," says General Hosmer—though he adds that "peace" may be a misnomer as regional conflicts flare around the world.

Today, survival of the Air Force Academy as a separate entity is likely not at stake, despite deep cuts under way in the US armed forces. Still, the Academy is being pressed by some members of Congress as never before to justify its continued existence.

"Inefficient" and "Bloated?"

Last year, the Senate Armed Services Committee fired some sharp



USAF photo by TSgt. Dennis Rogers

words at all three US military academies in the report accompanying its Fiscal Year 1993 defense authorization bill. The Senate report noted that the General Accounting Office, in a detailed review of the institutions, had found oversight of the academies to be "limited and diffuse. . . . The committee believes that such lack of oversight . . . has contributed to inefficiencies and bloated costs."

In particular, the Senate panel complained that both the Air Force Academy and West Point have significantly larger staffs than the Naval Academy. The panel noted its concern that the vast majority of professors at Colorado Springs and West Point are career military officers. At Annapolis, half the professors are civilians.

The committee even took aim at the academies' preparatory schools, which provide additional secondary education for deserving candidates who may not be quite up to the academies' entrance standards. The cost of these schools, per pupil, is at least 2.5 times greater than that of select American civilian universities, according to the Senate panel's report.

The report pushed for the training commands of the three services to

gain staff supervision of their respective academies. "Like the rest of the military, these institutions must be streamlined and configured to meet the demands of a smaller defense establishment," the Senate report concluded.

This Senate challenge has not gone unanswered by Academy proponents. A number of former Academy superintendents and staff members have informally organized to defend the service academies against what they judge to be a well-orchestrated challenge to their traditional roles.

Beginning in 1996, Academy grads will no longer receive regular commissions, noted these proponents in a letter drawn up early this year to attract support for the institutions. The number of general officers at all of the academies is being reduced. Deep cuts in cadet and midshipman numbers have been discussed in Congress, as has consolidation of the activities of the three academies, said the letter.

The influx of more civilians into the Academy faculty and prospective changes in the prep schools were among the changes raising the most concern, but the totality of the changes was viewed as the major threat.

"Cumulatively, they represent a clear and present danger," said the letter, which was signed by three former Air Force Academy superintendents: Lt. Gen. A. P. Clark, Lt. Gen. Ken Tallman, and Lt. Gen. Winfield W. Scott, Jr.

Why not have just one US military academy? Couldn't an efficient mega-institution produce a dedicated corps of officers for all services at lower cost?

Billion-Dollar Move

General Hosmer said that to understand why that is a bad idea, you have to look at the numbers. For one thing, he said, it would cost an exorbitant amount—more than \$1 billion, he estimates—to duplicate or replace the Colorado Springs infrastructure at another site.

Of course, all the services' cadets and midshipmen could cram into one academy without building new dormitories if their numbers were drastically reduced. That raises a subsidiary issue: How many of the Air Force's officers should be Academy-trained?

Currently the Academy contributes about twenty percent of each year's new cohort of Air Force officers.



The Academy excels at teaching leadership, instilling a sense of loyalty that translates into high retention rates among its graduates, and providing a thorough grounding in the lore and traditions of the Air Force.

“Is there a proper upper limit or lower limit on that?” asked General Hosmer. “I know no concrete way to draw that line, other than by looking in the past and saying, ‘This seems to work.’”

The only time this question was seriously addressed was in 1949, according to the Academy chief. Gen. Dwight D. Eisenhower and Dr. Robert Stearns, the head of the University of Colorado, co-chaired a panel examining what the future source of officers should be.

The year 1949 was similar to 1993 in that the country was demobilizing and the public believed that no war loomed on the horizon. (The Korean War broke out in 1950.) At that time, the Stearns-Eisenhower board thought that fifty percent of all future officers should come from specialized military academies.

As an afterthought, the board added that the new Air Force should get its own academy, to match West Point and Annapolis. While the founding of the Academy was still some years in the future, this was the trigger, according to General Hosmer.

The minimum acceptable size of the cadre of Academy officers depends on its perceived importance to the fabric of military life. “I think that gets you to numbers that are bigger than five or ten percent of the total influx each year,” says General Hosmer.

The Academy superintendent also argues that the respective academies

provide not only the core of the officer cadres, but the core of Army, Navy, and Air Force identity as well.

Experience has shown that the best joint officers have a good grounding in the problems of their own services, he argues. Experience has also shown that it is difficult for a cadet to be adequately steeped in the lore of his or her own service after completion of precommission schooling.

“Any reasonable scheme to amalgamate academies, in my opinion, tends to founder on how difficult it would be to still provide that really persistent, deep, and intense service aspect of education,” says General Hosmer.

Few ex-cadets would deny that the Academy experience is deep and intense. Cadets live in a military environment twenty-four hours a day, seven days a week, and almost twelve months a year. This immersion establishes a sense of comfort with the military style of life and discipline crucial to their future dedication to the service, according to Academy officials.

Staying Power

This dedication is reflected in retention rates. Not counting the Class of 1993, 25,662 cadets have graduated from the Air Force Academy since 1959. Of those commissioned in the Air Force, fifty-seven percent were still on active duty in June 1992.

Academy graduates stay around longer than officers commissioned from

other sources, according to figures compiled in 1991. At that time, 46.8 percent of Academy alumni who had reached the twenty-year service mark were still serving, compared to 30.6 percent of officers from other sources.

The status and quality of the academies’ graduates in comparison with other officers has long been a sensitive issue in all US armed forces. General Hosmer says he does not mean to suggest that Reserve Officers Training Corps or Officer Training School graduates are weak. ROTC and OTS graduates bring specific outlooks to the Air Force, which broaden and strengthen the service as a whole, he observes.

Where the Academy excels, he says, is in the teaching of leadership. He expects graduates to be able to take the people they have around them, whatever the circumstances, and mold them into an effective unit. “Dedication to the process of leadership and teamwork building is one [area] I think Academy graduates tend to be stronger in,” he says.

One main contributor to the USAF Academy’s culture through the years has been its preponderance of military faculty, according to alumni. Whereas Annapolis has a fifty-fifty civilian-military mix, the professors at the Academy are about ninety-five percent uniformed military. Currently, the only civilian faculty members are distinguished visiting professors—one per department—who typically teach for one year while on sabbatical from other institutions.

Under pressure from Congress that mix is changing. The Senate last year pushed for both West Point and the Air Force Academy to adopt the fifty-fifty ratio as an overtly stated goal. Donald B. Rice, then Secretary of the Air Force, worked out a compromise plan with the Senate. Both the Air Force Academy and West Point have agreed to bring in more civilian professors, moving toward a notional goal of fifty percent. That way, both academies can gain experience in integrating civilian instructors into their culture.

General Hosmer now has a pile of folders on his desk from civilians pursuing Air Force Academy positions. Current plans call for attainment of a seventy-five to twenty-five military-civilian ratio around the turn of the century.

The superintendent says he would prefer that there be no strict quota for civilians he has to hire. “I’d prefer that

we have the goal of finding out what the right number is, which is essentially where we are today," he says.

Listening to Their Own

Ironically, one area where military faculty may be more effective than its civilian counterpart is in the teaching of constitutional government and civilian chain of command to prospective military officers.

The 4,000 Academy cadets are typically individuals oriented toward high-risk activity, such as combat, who identify and bond with each other. After several years of this, they may become somewhat skeptical of what civilian instructors have to say about certain things—such as

subsidiary activity, it is important, say Academy officials. The idea behind the founding of Academy prep schools (Annapolis and West Point also have them) was to provide a means for deserving enlisted personnel to cycle back through traditional officer training. The schools still fulfill that function. In addition, they provide an extra lift for many cadet candidates who are members of an ethnic minority.

"It is still true in this country that a substantial number of potentially high-skill kids who are minorities get indifferent schooling," says General Hosmer. The small prep school class typically contains half of all incoming African-American cadets and supplies one-third of the Academy's minorities.

tions, say Academy officials. The salary of prep cadets could be cut, for instance—currently they are paid twice what an Academy cadet makes, because many of them are already enlisted personnel.

General Hosmer says he will oppose any attempts to consolidate the service prep schools or to send prep cadets to civilian universities. "We can identify these kids, but recovering [from] their academic defects is pretty tough," he says. "To do so takes a kind of monomaniacal focus. . . . [A program of] kids going out to junior colleges is simply not as effective."

No matter how the end of the cold war ultimately affects the Academy as an institution, it already is clear that the cadets are facing futures very different from what could have been expected only a few years ago.

After September 1996, Academy graduates will no longer be awarded automatic regular commissions. They will receive Reserve commissions, as the bulk of ROTC and OTS candidates do now.

In recent years, little practical difference could be discerned between regular and Reserve commissions. But regular status has been an important symbol for young officers—only the top ten percent of OTS grads received it, for instance.

Congress wanted all officers to begin their careers at the same starting line. General Hosmer says that cadets do not really seem concerned about this change. He says their parents, on the other hand, worry about it.

A change that does exercise cadets is the decline in pilot training billets. The Air Force will take only 450 pilot trainees this year—of which Academy grads will make up half.

Some 520 cadets, or just under fifty percent of this year's graduating class, signed up to compete for the Academy's 225 pilot or twenty-five navigator slots. In the past, 100 percent of the graduating class almost always competed for a much larger number of openings.

"It's an unhappy situation," says General Hosmer. "The cadets have handled it in an extraordinarily mature way." ■



Though the Academy's glider and parachute programs remain popular, its cadets recognize that fewer pilot and navigator slots will be open to graduates. Hence, applications for training billets in these two fields are down considerably.

subordination of the military to elected officials.

There are some social science data that indicate "a civilian making those assertions and describing that material is not going to be as persuasive to a military cadet as a fellow uniformed professional," says General Hosmer. "A civilian is somebody who has a vested interest, you might say."

Another area where changes may be in the offing for the Academy is in its preparatory academy, a small school (approximately 220 students) in Colorado Springs. It enrolls cadet candidates who need further work to meet the Academy's standards.

While this sounds like a relatively

The cost of this schooling has caught the Senate's attention, however. The GAO has estimated that for the Air Force the price is about \$51,000 per student per year. And General Hosmer admits there is an undeniable, superficial case for elimination: Why pay that money when kids who already meet the requirements stand in line to be cadets?

A Pentagon study on the future of the prep schools is under way. Some legitimate cuts can be made in opera-

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RUSSIAN MILITARY ALMANAC



By Tamar A. Mehuron, with William F. Scott and Harriet Fast Scott

Organization of the Russian Armed Forces

For a few weeks in 1992, the leadership of the Russian Federation assumed Russia would not need armed forces of its own. Their initial belief that defense would be provided by the Joint Armed Forces of the Commonwealth of Independent States (CIS) proved short-lived.

The new CIS High Command was under the jurisdiction of the Council of Commonwealth Heads of State, a group notable for its inability to agree on much of anything. The CIS has no juridical status. Moreover, each ex-Soviet republic laid claim to all the weapons and military support equipment on its territory.

New Defense Ministry. In 1992, Russia began plans to establish its own armed forces. Many of President Yeltsin's younger supporters insisted that the Defense Minister be a civilian. The professional military disagreed. As a compromise, Yeltsin signed an edict on March 16 creating a Russian Ministry of Defense and naming himself to the post of Defense Minister. In April 1992, Yeltsin appointed Gen. Col. Pavel Grachev and Dr. Andrei Kokoshin to be his first deputies.

In May 1992, Yeltsin appointed General Grachev to be Defense Minister. In June 1992, Gen. Col. Yuri Dubynin was appointed to be his first deputy and Chief of the General Staff. The Ministry of Defense and the General Staff provide centralized command and control. Immediately subordinate to the Minister of Defense, who is roughly comparable in authority to the US Defense Secretary, is the Chief of the General Staff.

The structure of the Armed Forces of the Russian Federation is very similar to that of the Soviet Armed Forces. However, the five service CINC's are not deputy Russian defense ministers as was previously the case. As before, Russians frequently refer to

the Ground Forces, Strategic Rocket Forces, Troops of Air Defense, and Air Forces as the "Army." Functions performed by the US Air Force are spread across the latter three Russian services.

The Strategic Rocket Forces (RVSN), theoretically under operational control of the CINC, Joint Armed Forces, rank first in importance among the five Russian services. Though the nation is in dire financial straits, missile research and development continues, and plans are under way for the introduction of new intercontinental-range launchers.

The Joint Armed Forces of the Commonwealth of Independent States are something of an anomaly. Their primary purpose is to provide a structure for the control of the old Soviet-built strategic nuclear forces, now located in Russia, Ukraine, Belarus, and Kazakhstan. In theory, the political heads of all CIS nations must agree to their use. Operational control then would pass from the President of Russia directly to the CINC of the Joint CIS Forces, who is also CINC of CIS Strategic Forces. Ukraine insists that it must maintain administrative control over the strategic nuclear forces on its territory.

The Troops of Air Defense (VPVO), the second largest service, face major problems resulting from the loss of former USSR territory where early warning sites, SAM sites, and forward airfields were located. Such facilities must now be constructed on Russian territory. Some Russian planners have proposed abolishing the VPVO by 1995, but this seems unlikely. Though the number of VPVO aircraft has been reduced, a growing percentage of the remaining aircraft are fourth-generation, with Su-27s and MiG-31s accounting for one-third. SA-2 missiles, which first appeared in the late 1950s,

are rapidly being replaced by SA-10s. The Moscow Air Defense District has thirty S-300 (SA-10) regiments, which are able to engage several targets simultaneously and have cruise missile detection capability.

The Air Forces (VVS) are divided into long-range (strategic), frontal (tactical), and transport aviation. Long-range aviation and transport aviation each have a commander. Frontal aviation does not.

The collapse of the Warsaw Pact, followed by the breakup of the Soviet Union, left the Russian Air Forces in a difficult position. Many of the latest aircraft, such as the MiG-29, Su-27, and Tu-160, were based in Ukraine and Belarus. Ukraine claimed all aircraft on its territory; Belarus was more cooperative. President Yeltsin authorized the sale of 1,600 aircraft. Russia retains as its primary force the short-range MiG-29, the longer-range Su-27, and Su-25s and helicopters for direct battlefield support. "Several hundred" Su-24s are kept as front-line fighter-bombers, and Tu-95MSs and Tu-160s provide long-range aviation.

The Il-76 and An-124 remain the primary military transport aircraft. The Russians are very short of airlift capability. Airborne and rapid deployment forces, emphasized by Defense Minister Grachev, will require additional airlift. Previously, Aeroflot, the Soviet airline, had served as a reserve of VTA. Today, Aeroflot has been parceled out to airlines of the various republics and could help only marginally.

The Ground Forces (SV), numerically the largest of the five services, are undergoing major revision. Still divided into motorized rifle, tank troops, airborne troops, rocket and artillery troops, and troops of air defense, the Ground Forces are emphasizing highly mobile forces and

rapid deployment forces. A debate is under way on whether corps and brigades should replace armies and divisions. Today the primary mission of the Ground Forces is internal peacekeeping.

The Navy (VMF) has lost its best ports on the Black Sea to Ukraine and Georgia, and on the Baltic Sea to the three Baltic republics. The Black Sea Fleet is temporarily under joint Russian-Ukrainian control. Many ships and personnel were transferred to the

Northern Fleet, where living conditions are severe. Ships from this fleet operate in the Atlantic and Mediterranean, as well as in northern waters. All six Typhoon ballistic missile-firing submarines, each armed with twenty SS-N-20 weapons, are in the Northern Fleet, along with three aircraft carriers—the *Admiral Kuznetsov*, *Kiev*, and *Admiral Gorshkov*. General Grachev states a goal of three aircraft carriers for each of the four fleets. ■

Lineup of Russian Aerospace Power, 1992

Strategic Forces

1,031—Intercontinental Ballistic Missiles. SS-11: 296. SS-13: 40. SS-17: 44. SS-18: 204. SS-19: 170. SS-24: 43. SS-25: 234.
135*—Long-Range Bombers. Tu-95 Bear-G: 50. Tu-95 Bear-H: 85.

*Control of 20 Tu-160 Blackjacks in Ukraine disputed.

864—Submarine-Launched Ballistic Missiles. SS-N-6: 128. SS-N-8: 280. SS-N-18: 224. SS-N-20: 120. SS-N-23: 112.

57—Strategic Ballistic Missile Submarines. Delta-class: 43. Yankee-class: 8. Typhoon-class: 6.

Air Defense Forces

1,660—Interceptors. MiG-23 Flogger: 800. MiG-25 Foxbat: 300. Su-15 Flagon: 200. Su-27 Flanker: 200. MiG-31 Foxhound: 160.

25—Airborne Warning and Control Aircraft. All Il-76 Mainstay.

100—Strategic Antiballistic Missile Launchers. SH-11 Gorgon: 36. SH-08 Gazelle: 64.

6,100—Strategic Surface-to-Air Missile Launchers. SA-2: 2,000. SA-3: 1,200. SA-5: 1,900. SA-10: 1,000.

Air Forces

175—Medium-Range Theater Bombers. Tu-22M Backfire: 125. Tu-16 Badger: 50.

1,150—Tactical Counterair Interceptors. MiG-23 Flogger: 500. MiG-25 Foxbat: 100. MiG-29 Fulcrum: 400. Su-27 Flanker: 150.

1,425—Ground-Attack Aircraft. MiG-27 Flogger: 600. Su-17/22 Fitter: 300. Su-24 Fencer: 225. Su-25 Frogfoot: 300.

500—Reconnaissance/ECM Aircraft. Tu-16 Badger: 105. Tu-22 Blinder: 75. Il-20 Coot: 20. MiG-25 Foxbat: 50. Su-17 Fitter: 100. Su-24 Fencer: 150.

40—Tanker Aircraft. Tu-16 Badger: 20. Il-78 Midas: 20.

660—Transports of Military Transport Aviation. An-22 Cock: 45. An-12 Cub: 90. Il-76 Candid: 500. An-124 Conder: 25.

Naval Aviation

4—Aircraft Carriers. *Kuznetsov*-class CTOL ship: 1. *Gorshkov*-class and *Kiev*-class VSTOL ship: 3.

260—Bombers and Strike Aircraft. Tu-22M Backfire: 160. Tu-16 Badger: 70. Tu-22 Blinder: 30.

175—Fighter Interceptors. MiG-23 Flogger: 75. MiG-29 Fulcrum: 100.

350—Fighter/Attack Aircraft. Su-17 Fitter: 150. Su-24 Fencer: 100. Su-25 Frogfoot: 50. MiG-27 Flogger: 50.

20—Tankers. All Tu-16 Badger.

75—Reconnaissance/Electronic Warfare Aircraft. Tu-16 Badger: 20. Tu-95 Bear-D: 15. Tu-22 Blinder: 20. Su-24 Fencer-E: 10. An-12 Cub: 10.

435—Antisubmarine Warfare Aircraft. Tu-142 Bear-F: 60. Mi-14 Haze-A: 60. Ka-27 Helix: 100. Ka-25 Hormone-A: 100. M-12 Mail: 75. Il-38 May: 40.

Military Compensation

Exchange Rate: 684 Rubles = \$1 US

Conscripts are called up at age eighteen and are required to serve for eighteen months. Conscripts receive 180 rubles' worth of food daily. Specialists may receive an additional amount equal to thirty to eighty percent of base pay. Hardship allowances increase the pay by fifteen to fifty percent. Pay is in addition to provisions of food and uniforms.

Basic Pay Conscripts	Rubles Per Month	US \$ Per Month
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Lower range	1,900	\$2.78
Higher range	3,800	\$5.56

Contract volunteers are men (aged eighteen to forty) and women (aged twenty to forty) who serve for three-, five-, or ten-year periods as military professionals. Cadets and other military students are to receive larger stipends. Bonuses and pensions will also increase.

Basic Pay Contract Volunteers	Rubles Per Month	US \$ Per Month
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Ground Forces	32,500	\$47.51
Strategic Rocket Forces	33,000	\$48.25
Airborne Units	36,800	\$53.80
Air Forces	38,950	\$56.94
Navy/surface ships	41,100	\$60.09
Navy/nuclear submarines	47,300	\$69.15

Additional Benefits Contract Volunteers	Rubles Per Year
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Uniform stipend	30,000 (\$43.86)
Free rations	96,000 (\$140.35)
Signing bonus	32,500 (\$47.51)

Reenlist for three years
bonus one time basic pay

Reenlist for five years
bonus three times basic pay

Reenlist for ten years
bonus five times basic pay

Free annual leave travel,
free study by
correspondence school
or night school, and
pension at twenty years variable

RUSSIAN DEFENSE MINISTRY



General of the Army Pavel Sergeievich Grachev



Born 1948. Russian. Minister of Defense Russian Federation since May 1992. Opposed August 1991 coup against Gorbachev and Yeltsin. Commander of a detached airborne regiment, then chief of staff, commander of an airborne division in

Afghanistan. Total of nearly five years in two tours in Afghanistan (1981–83, 1987–89). First deputy commander of Airborne Troops. Commander of Airborne Troops (December 1990 to August 23, 1991). First Deputy Minister of Defense USSR and also Chairman of the State Committee RSFSR for Defense Questions (August 23, 1991). First Deputy Commander in Chief Joint Armed Forces CIS (January 1992). First Deputy Minister of Defense Russian Federation (April 3, 1992). Ryazan Higher Airborne Command School (1969). Frunze Military Academy (1981). Military Academy of the General Staff. Hero of the Soviet Union (1988). Promoted May 1992. Married, two sons.

Gen. Col. Mikhail Petrovich Kolesnikov



Born 1939. Russian. Chief of the General Staff and First Deputy Minister of Defense Russian Federation since December 1992. Served thirteen years in the Far East. Commander of a Corps (1983). Commander of an Army in the Transcaucasus Military

District. Chief of Staff and First Deputy Commander of Siberian Military District (1987). Chief of Staff and First Deputy Commander in Chief of the Southern TVD (1988). Chief of the Main Staff and First Deputy Commander in Chief Ground Forces USSR (1990). Deputy Chief of the General Staff, Chief of the Main Organization & Mobilization Directorate (1991). Same for Joint Armed Forces CIS (April–June 1992). First Deputy Chief of the General Staff Armed Forces Russian Federation (June–December 1992). Omsk Tank-Technical School (1959). Malinovski Military Academy of Armored Forces (1975). Military Academy of the General Staff (with gold medal, 1983). Promoted 1990. Married, son and daughter.

Dr. Andrei Afanasyevich Kokoshin



Born 1945. Russian. Civilian First Deputy Minister of Defense since April 3, 1992. Deals primarily with the military-industrial complex. Previously deputy director of the Institute of the United States and Canada, specialist for military-political

questions and national security. Graduated from the Moscow Institute of Technology (1969). Doctor of Sciences (History). Professor. Corresponding Member, Russian Academy of Sciences. Reserve officer. Married, two children.

Gen. Col. Vladimir Mikhailovich Toporov



Born 1946. Russian. Deputy Minister of Defense Russian Federation (for Billeting of Withdrawn Troops) since June 1992. Will coordinate Rear Services (headed by Gen. Maj. V. T. Churanov since July 1992), and the Main Directorate for Construc-

tion and Billeting of the Russian Federation Armed Forces (headed by Gen. Col. N. V. Chekov since August 22, 1992. Chekov had been Deputy Minister of Defense for the same area in the old Soviet Ministry of Defense). Twenty years in Airborne Troops. Chief of Staff and First Deputy Commander Far Eastern

UNIFORMED CHIEFS OF THE MILITARY SERVICES

Gen. Col. Igor Dmitrievich Sergeev



Born 1938. Russian. Commander in Chief Strategic Rocket Troops Russian Federation since August 1992. Operationally subordinate to the Commander in Chief JAF CIS but directly under the Minister of Defense Russian Federation (September 1992).

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 Commander in Chief Rocket Troops USSR for Combat Training (1989 to December 1991). Deputy Commander Strategic Forces JAF CIS (ID in April 1992) and Deputy Commander Strategic Rocket Troops for Combat Training (January to August 1992). Black Sea Higher

Naval School (1960). Dzerzhinski Military Engineering Academy (1973). Military Academy of the General Staff (1980). Promoted in 1991. Married, one son.

Gen. Col. Vladimir Magomedovich Semenov



Born 1940. Karachai. Commander in Chief of the Ground Forces Russian Federation since August 1992. Chief of staff and deputy commander (1975–76), then commander of a division (1979). Commander of an army corps (1982), and

commander of an army (1984). First Deputy Commander Transbaykal Military District (1986–88), then Commander (1988–91). Commander in Chief of the Ground Forces and Deputy Minister of Defense USSR (August 31

to December 31, 1991). Commander of General Purpose Forces JAF CIS (March 1992). Baku Higher Combined Arms Command School (1962). Frunze Military Academy (1970). Military Academy of the General Staff (1979). Promoted in 1989. Two daughters.

Gen. Col. Victor Alexeievich Prudnikov



Born 1939. Russian. Commander in Chief of the Troops of Air Defense Russian Federation since August 1992. Over two years commander of a fighter aviation regiment (1971). Deputy commander (1973), commander air defense division (1975),

first deputy commander of a detached air defense army (1978–79 and 1981), then commander (1983). Deputy Commander of a

Military District (1989–91). Commander of Moscow Military District (September 1991). Odessa Artillery School (1968). Frunze Military Academy (1975). Military Academy of the General Staff (1984). Promoted 1991. Married, two sons.

Gen. Col. Valery Ivanovich Mironov



Born 1943. Russian. Deputy Minister of Defense Russian Federation (for Personnel Training and Placement) since June 10, 1992. From December 1979 to 1982, commander of the 108th Motorized Rifle Division, part of the 40th Army that invaded

Afghanistan. First deputy commander, then commander of an army, Soviet Forces Germany (1984–89). First Deputy Commander of the Leningrad Military District (1989–91). Commander of the Baltic Military District, renamed the Northwest Group of Forces (September 1991). Moscow Higher Combined Arms Command School (1965). Frunze Military Academy (1973). Military Academy of the General Staff (1984). Promoted 1991. Married, daughter and son.

Gen. Col. Georgi Grigorievich Kondratyev



Born 1944. Russian. Deputy Minister of Defense (general questions, troubleshooter for "hot spots" in southern Russia, Transcaucasus, Moldova, and Central Asia) since June 10, 1992. First deputy commander of a tank army in the Turkestan

Military District (1985). First deputy commander of the 40th Army in Afghanistan (1986–88). Commander of an army (1988). First Deputy Commander (1989), then Commander of the Turkestan Military District (1991). Elected People's Deputy in Uzbekistan (1990). Kharkov Guards Tank Command School (1965). Malinovski Military Academy of Armored Forces (1973). Military Academy of the General Staff (with gold medal, 1985). Promoted 1992. Married, daughter and son.

Gen. Col. Boris Vsevolodovich Gromov



Born 1943. Russian. Deputy Minister Defense since June 25, 1992. (He has been a trouble-shooter for withdrawal from Germany, Poland, the Baltics, Transcaucasus, and other areas outside Russia. Oversees arms reductions and services'

flying safety.) From early 1980 to 1982, part of the 108th Division in Afghanistan. Served again in Afghanistan from March 1985 to April 1986. Commander of Army in Belorussian Military District (1986). As the last commander of the 40th Army (1987–89), completed withdrawal

from Afghanistan. Commander Kiev Military District (1989–90). First Deputy Minister of Internal Affairs (December 1990–September 1991). First Deputy Commander of Ground Forces/General Purpose Forces (1992). People's Deputy USSR. Leningrad Higher Combined Arms School (1965). Frunze Military Academy (1972). Military Academy of the General Staff (with gold medal, 1984). Promoted in 1989. Hero of the Soviet Union. First wife killed in airplane accident. Two sons. Remarried.

General of the Army Constantin Ivanovich Kobets



Born 1939. Russian. Chief Military Inspector of the Armed Forces Russian Federation (September 1992). Doctor of Military Sciences. Professor. Chief of Signal Troops USSR and Deputy Chief of the General Staff (1987–91). At Yeltsin's

side in "White House" during critical events of August 1991. In 1991–92, Chairman of the State Committee RSFSR for Defense and Security, state advisor RSFSR on Defense, and, since September 1991, at the same time Chairman of the Committee to Prepare and Carry Out Military Reform. Kiev Military Signals School (1959). Military Signals Academy (1967). Military Academy of the General Staff (1978). People's Deputy Russian Federation. Promoted 1991. Married, one son.

district for Troops of Air Defense. Commander of the Moscow Air Defense District (1989–91). Commander in Chief of the Troops of Air Defense and Deputy Minister of Defense USSR (August 25 to December 31, 1991). Commander of Troops of Air Defense (January 1992). Armavir School for Pilots (1959). Gagarin Military Air Academy (1967). Military Academy of the General Staff (1981). Military Pilot First Class. Promoted in 1989. Married, two sons. Younger son died in September 1991.

Gen. Col. Peter Stepanovich Deynekin



Born 1937. Russian. Commander in Chief of the Air Forces Russian Federation since October 1992. Bomber pilot. Deputy commander (1982), then commander of an air army (1985). Commander of Long Range Aviation (1988). First Deputy Commander

in Chief Air Forces (1990–91). Commander in Chief of the Air Forces and Deputy Minister of Defense USSR (August 31 to December 31, 1991). Commander Air Forces JAF CIS (January–July 1992). Balashov Military Aviation School for Pilots (1957). Gagarin Military Air Academy (1969). Military Academy of the General Staff (with gold medal, 1982). Distinguished Military Pilot (1984). Promoted 1991. Married, three children.

Adm. Felix Nikolaievich Gromov



Born 1937. Russian. Commander in Chief of the Navy Russian Federation since August 1992. Pacific Fleet 1967–76. Chief of staff of training division, Leningrad Naval Base (1977–81). Chief of staff, then 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 (since March 1992). Pacific Ocean Higher Naval School (1959). Naval Academy (1983) (by correspondence). Military Academy of the General Staff (1991) (by examination). Promoted in 1988. Married, daughter and son.



Strategic Nuclear Weapons

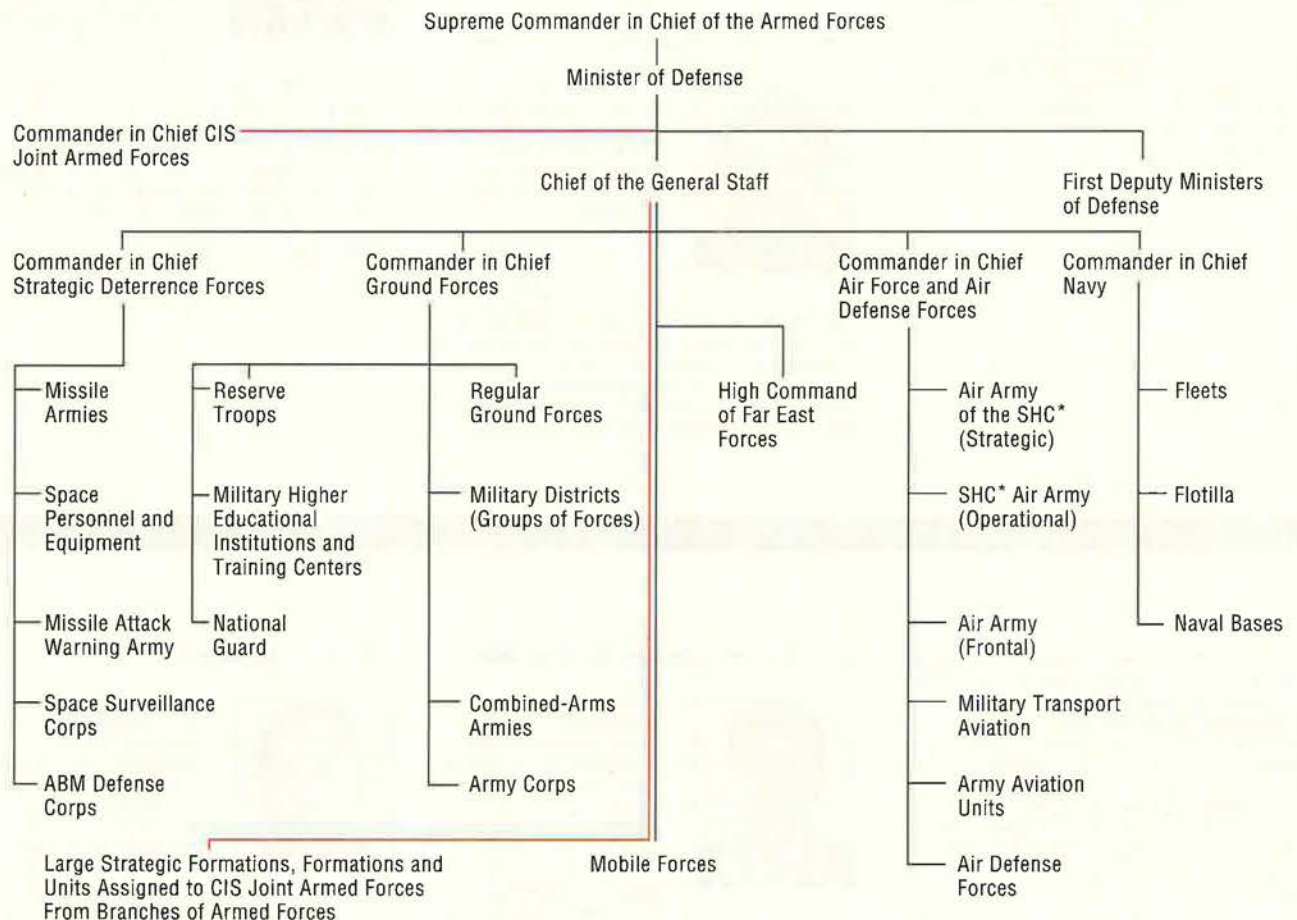
Russia and the Other Nuclear Republics of the Commonwealth

Country	ICBMs	Bombers	SSBNs	Warheads
Russia	1,031	85	57	7,644
Ukraine	176	21	0	1,408
Kazakhstan	104	40	0	1,360
Belarus	54	0	0	54

Theoretically, the Commonwealth of Independent States has operational command and control of the nuclear weapons of Russia, Ukraine, Kazakhstan, and Belarus.

Structure of the Russian Armed Forces

(proposed for the transition period—by 1995)

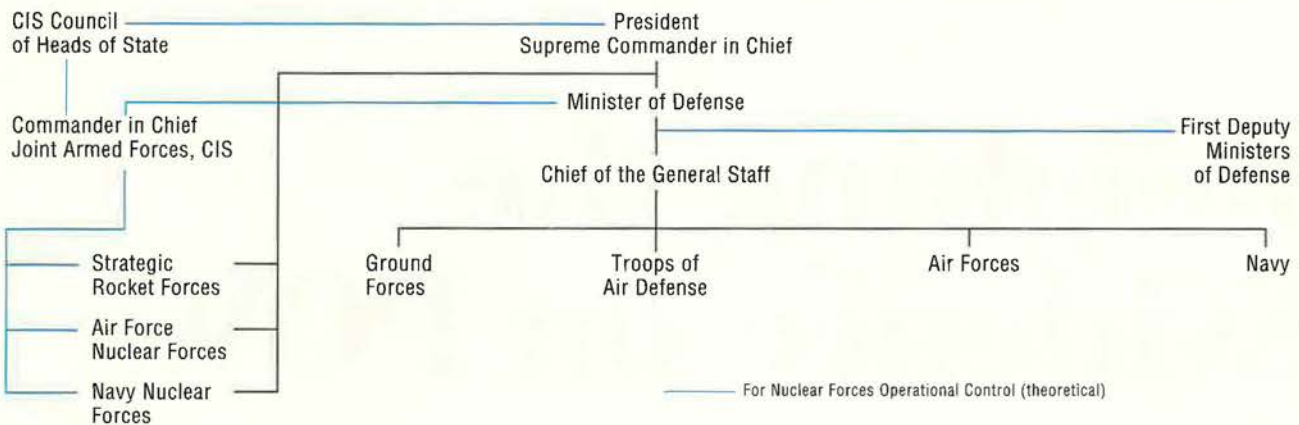


L E G E N D

— Administrative Organization — Organization of Operational Subordination and Coordination * Supreme High Command

As of June 1, 1993

Main Command of the Armed Forces of the Russian Federation



Russian and US Ranks

Naval ranks in italics

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

No Russian officer currently holds the rank of "Marshal of the Russian Federation." Yevgeni I. Shaposhnikov, Commander in Chief, Joint Armed Forces, Commonwealth of Independent States, is a "Marshal of Aviation," comparable to "General of the Army." This rank is not listed in the new regulations of the Russian Armed Forces, however.

Active Military Population

All figures are approximate.

Ground Forces	850,000
Air Forces	167,000
Navy	188,000
Strategic Defense Forces	218,000
Strategic Offensive Forces	148,000
<small>(includes Strategic Rocket Forces and strategic elements of the Air Forces and Navy)</small>	
Command/Rear Services	180,000
	1,751,000

Paramilitary Forces

Internal Troops of the Ministry of Internal Affairs ...	200,000
Border Troops of the Ministry of Internal Security	180,000

Military Pilots and Flying Hours

Russian Air Forces pilots	14,000
Total Russian combat aircraft	5,000
1993 flying hours, per military cargo pilot	
1993 flying hours, per long-range aviation pilot	80
1993 flying hours, per tactical fighter pilot	40

External Deployments and Peacekeeping Forces

External Deployments

Germany	99,500
Latvia	27,000
Lithuania	15,000
Estonia	24,000
Cuba ¹	1,500

Peacekeeping Operations

Tajikistan	1 Division
Dniester Republic	1 Army
Bosnia	1 Battalion

¹ Russian forces in Cuba scheduled for withdrawal in mid-1993.

A Senate panel finds it “arithmetically impossible” that large numbers were left, but a Soviet document rekindles doubt.

Weighing the Evidence on POWs

By Robert S. Dudley, Executive Editor

TWENTY years ago, on May 31, 1973, the Senate debated whether to let President Nixon resume the bombing if he certified that North Vietnam “was not making an accounting, to the best of its ability, of all missing [US] personnel.” The Senate voted no, and direct US involvement in Vietnam flickered out.

The Senate action, however, certainly didn’t extinguish the furor over the basic issue: What happened to the MIAs, the troops who were missing in action when the war ended? Arguments about their fate persisted for two decades, twice as long as heavy US involvement in the war.

Today, the government spends \$100 million a year on various MIA programs, with no end to the controversy in sight. The United States still lacks a full accounting of the missing. Activists assert the nation is “haunted” by the possibility that Americans might still be held in Indochina as prisoners of war (POWs).

Whether or not that claim accurately reflects the public mood, two recent incidents demonstrated anew the power of the issue and the extent of lingering uncertainty about the missing.

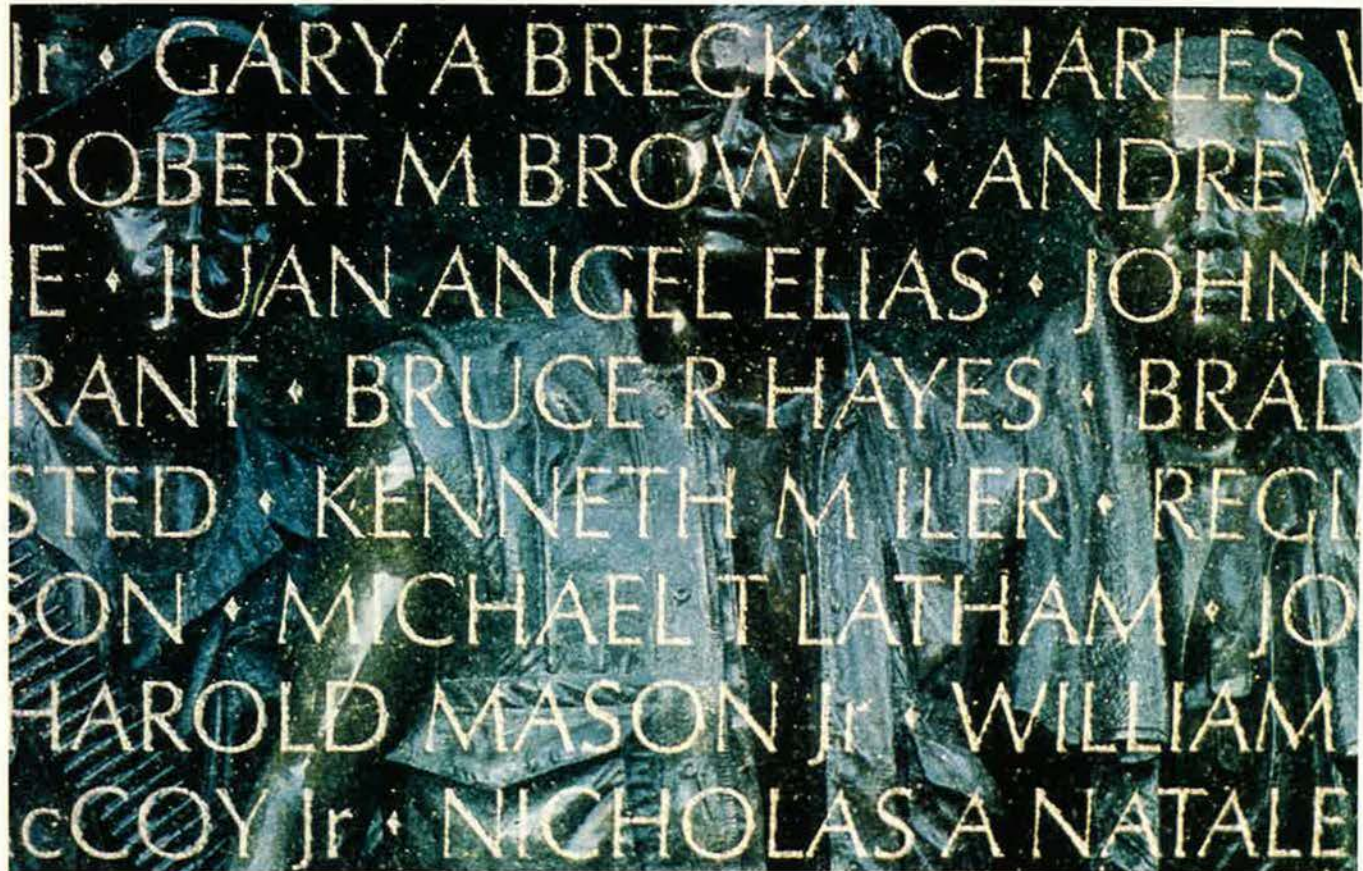
The first came in January with the

release of the final report of the Senate Select Committee on POW/MIA Affairs, chaired by Sen. John Kerry (D-Mass.). Some activists immediately attacked the panel for concluding that there was “no compelling evidence” that any US servicemen are being held in southeast Asia.

In April came a more sensational event: disclosure of a previously secret September 1972 Soviet document purported to be a Russian translation of a contemporary North Vietnamese document. It stated that Hanoi in September 1972 held 1,205 US prisoners, a figure exceeding by 614 the number the Communists repatriated six months later. When one includes the other US troops taken prisoner after September 1972, the discrepancy grows to some 700. The document thus raised stark questions about the fate of those prisoners—assuming they existed.

The original document was not immediately produced. Hanoi denounced the translation as a fraud, and the US launched a new investigation.

As the two events showed, the MIA controversy rolls on, fueled by omissions in the record of the war, the intransigence of Vietnam, tantalizing but ambiguous new information, and



USAF photo by SSgt. Mark Allen

raw emotion. "On a subject as personal and emotional as the survival of a family member," noted the Senate report, "there is nothing more difficult than to be asked to accept the *probability* of death when the *possibility* of life remains."

Not since April 1973, at the end of the US prisoner return called Operation Homecoming, has a missing US serviceman emerged alive from captivity in any southeast Asian nation. (Marine Pvt. Robert Garwood, who returned in 1979, voluntarily stayed behind in Vietnam after the war. He was convicted of desertion.)

Though no new prisoners have emerged, official inquiries yielded new information about the issue, especially regarding early 1973, when the war was ending. Of the postwar investigations, the Kerry Committee's is viewed by many as the most comprehensive, though it, too, has many detractors.

"Arithmetically Impossible"

One key finding of the Kerry panel was that, despite popular perceptions, the number of US servicemen whose fate is truly unknown is quite small. The Senate panel stated flatly that

claims of "hundreds or thousands of Americans languishing in camps or bamboo cages" are "arithmetically impossible."

The Kerry panel reported that the government still listed a total of 2,264 American citizens as "unaccounted-for" as a result of the southeast Asian war. (Figures have changed slightly since the issuance of the report.) Most of these were members of the armed services, though a few were civilians then working on assignment for the government.

The term "unaccounted-for," however, never was synonymous with "status unknown." Even during the war, defense officials knew to a virtual certainty that many of the 2,264 had died, but the US later carried them on the rolls as unaccounted-for because, in each of these cases, no one had actually recovered a body. These cases involved individuals who crashed at sea in aircraft, whose fellow soldiers saw them die in close combat, and so forth.

The Senate panel stated that exactly 1,095 of the total cases—forty-eight percent of the unaccounted-for—were of this type. Individuals in this category were known as "KIA/

BNR" (killed in action/body not recovered).

That left 1,169 cases of Americans who disappeared and had been described as "unaccounted-for" but who fell into a different category. According to the Kerry panel, these individuals never were declared KIA/BNR because no one saw them die. However, senators on the panel said that in most cases there was scant cause for optimism about their status. In the panel's words, "In most, but not all, of these cases, circumstances of disappearance coupled with the lack of evidence of survival make it highly probable that the individual died" at the time of his disappearance.

However, a handful of the cases within this category merited close attention, said the panel. Even as the war was under way, the MIA recovery effort focused on these cases, involving servicemen either thought to have been captured or lost in circumstances in which survival was likely or at least possible. These were the "discrepancy" cases, and the Pentagon identified 305 of them—196 in Vietnam, ninety in Laos, and nineteen in Cambodia.

Since the war, some of the original discrepancy cases have been clari-

fied. The Senate committee reported that investigations had established the deaths of sixty-one of these 305 individuals. The committee did not dispute the Pentagon's conclusion that all sixty-one died in Vietnam before 1973. The panel further stated that, in the remaining 244 cases, the US had evidence in "only a small number" that the person even *might* have been captured.

For the senators, the MIA trail ended there, with no discovery of live prisoners anywhere in Indochina and no real expectation that this might occur.

No "Compelling" Evidence

"There is, at this time, no compelling evidence that proves that any American remains alive in captivity in southeast Asia," declared the report in a key conclusion from which two senators dissented. Though the committee maintained it had not "entirely given up hope" that one or more of the unaccounted-for Americans may have survived, it acknowledged that "neither live-sighting reports nor other sources of intelligence have provided grounds for encouragement."

The committee majority said it could find no motive for anyone to hold prisoners for so many years. "The bottom line," it reported, "is that there remain only a few cases where we know an unreturned POW was alive in captivity and we do not have evidence that the individual also died while in captivity."

Even though it held out little hope for locating any live POWs today, the panel did declare it possible that the Communists may have secretly held onto a few American prisoners for at least some period after the end of the war.

The committee, asserting that the Nixon, Ford, and Carter Administrations dismissed the possibility that POWs survived in southeast Asia after April 1973, stated bluntly, "This committee has uncovered evidence that precludes it from taking the same view." The senators conceded that they had "no proof" that US POWs had been held after Operation Homecoming, but pointed out that no one had any probative evidence establishing that all of the potential prisoners had died.

The committee based its conclusion on two factors. One was that some US troops known or thought to

have been captured did not come back at Homecoming. The second was the huge volume of live-sighting reports and other information that suggested the holding of prisoners was at least possible.

The Paris peace accords, signed by Washington and Hanoi in January 1973, resulted in the release of 591 American POWs during Operation Homecoming in February and April 1973. However, the evidence is that Pentagon authorities were surprised that Vietnam did not produce more prisoners during the operation. According to the Kerry report, they expected about 100 more. These were the "last known alive" cases, so called because the individuals were known to have been captured, survived an accident, or disappeared in circumstances that made it likely that they survived. Examples:

- Navy Lt. Ronald Dodge, who on May 17, 1967, was forced to eject from his F-8 fighter thirty-five kilometers northwest of Vin Tien province in Vietnam. North Vietnamese media later reported his capture and published a photo of the Navy flyer. In Operation Homecoming, however, Hanoi neither produced Lieutenant Dodge nor accounted for him. His fate is still undetermined.

- Army Pfc. John Sparks, whose platoon was ambushed on June 17, 1969. Fellow soldiers saw Private Sparks fall to the ground, wounded, and in May 1970, authorities discovered a letter he had written after his disappearance. Private Sparks also was absent at Homecoming and has not been accounted for.

According to the committee's review of information from 1973, the Pentagon was angry that Vietnam had repatriated so few servicemen originally lost in Laos. Top military and intelligence officials had hoped that as many as forty-one Americans lost in Laos would be returned. Only ten were.

Stonewalled

The Kerry panel noted that, immediately after Operation Homecoming, the White House expected Vietnam to swiftly account for the missing but was stonewalled. Debriefings of returning POWs cleared up some cases, but not all. The panel reported that seventy Americans were carried on the books as POWs for some time after the end of Operation Home-

coming. Today, the Pentagon says it knows that forty-two of these individuals died prior to the exchange; Vietnam repatriated their remains. As for the others, said the committee, their fates "continue unknown to this day."

The committee thought it fair to ask whether US officials knowingly abandoned some POWs. "The answer to that question is clearly no," concluded the report. It explained that, given the evidence with which they had to work, "American officials did not have certain knowledge that any specific prisoner or prisoners were being left behind."

However, the committee said it was also fair to raise yet another question: Were the Americans who were expected to return, as a group, simply "shunted aside" and given short shrift by the government and American people, who should have pressed harder to find out what happened to them? "The answer to that question is essentially yes," said the senators.

The Kerry panel concluded that lingering frustration with the war, Watergate, and other crises pushed the MIA question out of mind, where it stayed until the trail of evidence grew very cold. The senators argued that the White House figuratively lowered its voice on the issue and that, eventually, the POW/MIA operation became "a bureaucratic backwater."

That is not to say the Nixon Administration took no action. The negotiating record indicates that, in early 1973, there secretly existed within the Administration great concern about the possibility of prisoners being left behind.

The committee noted that Henry Kissinger, President Nixon's National Security Advisor and negotiator of the 1973 Paris peace agreement, personally raised the issue of the POWs and lodged protests with leaders of North Vietnam and the Pathet Lao as soon as prisoner lists became available in January 1973.

So great was US dissatisfaction, said the committee report, that some government officials seriously proposed military action aimed at gaining the release of the additional prisoners thought to be held. The US threatened to halt the withdrawal of the last remaining troops unless it got satisfactory answers from Hanoi.

"A Flat-Out Lie"

"I am amazed to see press stories hinting darkly about prisoners abandoned by their own government," Mr. Kissinger told the panel. "There has been talk of conspiracy extending through five administrations. Leaks assert that when President Nixon announced that all prisoners were on their way home, he or his aides knew that many were left behind. That allegation is a flat-out lie."

Ultimately, however, the US did proceed with the troop withdrawal in return for release of only those named on the original Communist prisoner lists. The reason, Mr. Kissinger charged, was that Congress took away from the Administration all military and economic means to either threaten or entice Hanoi.

Also keeping the matter alive for twenty years have been numerous live-sighting reports, alleged photos of captive Americans, ambiguous intelligence data, and the like.

As the committee noted, the United States since the end of the war has checked out more than 1,600 live-sighting reports. It said the Defense Intelligence Agency, which is in charge of looking into such claims, reported that it has resolved 1,553 of 1,638 "sightings."

According to the DIA, 1,111 (sixty-eight percent) correlated to Americans who were actually accounted-for—returned prisoners, missionaries, or civilians jailed for reasons having nothing to do with the war. Another forty-five cases (2.7 percent) correlated to *wartime* sightings of military personnel or civilians who remained unaccounted-for. The last 397 (twenty-four percent) were determined to have been fabrications.

What remained were eighty-five reports, fifty-four of which pertained to Americans allegedly seen in a captive environment. The panel noted that forty of these live-sighting reports were considered promising enough to be under active investigation, and that "it is the committee's view that every live-sighting report is important as a potential source of information" about MIAs.

The panel held public hearings on satellite and reconnaissance imagery showing possible pilot distress symbols. In Vietnam, pilots who flew combat missions received individual authenticator numbers for identification if they went down. Pilots also

received escape and evasion signs to assist those who might come to rescue them.

The committee provided details of several cases of possible signaling, including:

- A 1973 photo of central Laos, said to show a four-digit number that could be an authenticator number, followed by the letters "TH," the primary and backup distress symbols of a downed pilot.

- A 1975 photo of a prison in Vietnam, in which the CIA noted unusual markings on the roof of a building. CIA was skeptical, but noted that the markings could be transposed to the letter "K" in Morse code. "K" was a pilot distress signal.

- A 1980 photo of a prison in Laos, in which appears the number "52," possibly followed by the letter "K."

- A 1988 photo of a valley in Laos, showing the letters "USA" dug into a rice paddy, beneath which was a possible "K" created by ground scarring.

- A June 1992 photo of a Vietnam prison said to contain a faint "GX 2527," which would correlate to the primary and backup distress symbols of a pilot lost in Laos in 1969.

Within the committee, there were disagreements about the authenticity of the alleged signals and whether they were man-made or the result of shadows, foliage, and other natural phenomena. In two cases—that of the "TH" in 1973 and the "USA" in 1988—all agreed that the symbols were man-made, but some argued that there were benign explanations. DIA, for example, said it had established that the "USA" symbol had been created by local Hmong montagnards and had nothing to do with prisoners. It further stated that the "TH" might have been created by a Hmong.

The committee agreed to continue looking for and analyzing such symbols, but at the end of the probe it appeared to have hit a dead end. It stated, "Although the committee cannot rule out the possibility that US POWs have attempted to signal their status to aerial observers, the committee cannot conclude, based on its own investigation and the guidance of imagery experts, that this has definitely happened."

The introduction of the 1972 Soviet document threw the situation into confusion. Taken at face value, it would show that Hanoi told a whopping lie about the number of Ameri-

cans it held, raising the possibility that the Communists might have executed large numbers of prisoners and might even still be holding some.

Stephen Morris, a Harvard researcher, claimed he found the translated document in old Soviet files in Moscow. He said that the original Vietnamese-language version had been authored by Vietnamese Gen. Tran Van Quang, for oral presentation to the Vietnamese Politburo in Hanoi.

One interpretation of events is that someone in Hanoi gave a copy to Soviet intelligence, which translated it and filed it. The key question seems to be whether the document might have been egregiously mistranslated. Some claim that the document may have included hundreds of Vietnamese and other Asians in its count of 1,205 prisoners.

The document, which surfaced after the committee completed its report and disbanded, caused a split among former members. Senator Kerry appeared cautious and skeptical about the accuracy of its data. Sen. Robert Smith, the New Hampshire Republican who served as vice chairman, seemed utterly convinced, terming it "very dramatic information regarding the perfidy that has been committed by the Vietnamese" over two decades. Senator Smith pointed out that the document, plus an official summary, had been signed by senior Soviet officials.

Gen. John W. Vessey, Jr., the retired Chairman of the Joint Chiefs of Staff who is the President's personal envoy for POW and MIA affairs, stated that the document contains "a number of inconsistencies."

He noted that it claims US prisoners were segregated according to rank, which prisoners themselves claim was not the case; that Hanoi was holding many more colonels than was possible at the time; that a 1970 US rescue raid caused the Communists to disperse their prisoners, whereas it actually caused them to concentrate the prisoners; and that the author, General Quang, did not hold the position the document states he did.

"There are two points," said General Vessey. "One is: Is it an authentic Russian document? And I think we've fairly well come to the conclusion that it is. The second thing: Is the information in it accurate? We know that a great deal of the information is inaccurate." ■



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Gallery of US Navy, Marine Corps, and Army Aircraft

US Navy and Marine Corps By Kenneth Munson, Paul Jackson, and Bill Gunston

Patrol and Anti-submarine Aircraft

P-3B/C and TP-3A Orion

Standard shore-based maritime patrol and ASW platform since August 1962, the P-3 Orion now has to remain in that role well into the next century, following cancellation of the planned P-7A replacement. Even a handful of the first (P-3A) version remain until November of this year with Patrol Wing 10 at Moffett Field, Calif., as TP-3A trainers. The P-3B, with more powerful T56 engines, also continues with both Atlantic and Pacific Reserve Patrol Wings.

For many years the first-line Patrol Wings of both the Atlantic and Pacific have operated the P-3C version. First flown on September 18, 1968, this retains the T56-14 engine of the P-3B but introduced "A-NEW" advanced integrated avionics, built around a Univac AN/ASQ-114 digital computer and designed specifically for the ASW role. This system did away with routine log-keeping by the crew, permitting centralized retrieval, display, and transmission of all incoming tactical data. The first P-3C squadron became operational in July 1970, USN deliveries (totaling 267) ending in April 1990. Some 18 active USN shore squadrons and 13 in the Reserve currently operate P-3s in the ASW role.

The P-3C has been the subject of a succession of avionics and other upgrades during its 20-year career. After one YP-3C and 117 initial production P-3Cs, the first upgrade, begun in the early 1970s, was Update I, which from January 1975 introduced on aircraft 118-148 Omega navigation, more sensitive acoustic processing, AN/ASA-66 tactical displays for the two sonar operators, more versatile CMS-2 computer language, and a sevenfold increase (to 393K) in computer memory. In 1977, Update II added to the next 44 P-3Cs an AN/AAS-36 FLIR system, AN/ARS-3 sonobuoy reference system, and Harpoon missile capability. Update II.5, in 1981, introduced new nav/com equipment for aircraft 193-216. Update III, which received go-ahead in 1978, embodied a major upgrade of ASW avionics; it was installed by Lockheed in the last 50 new-build Navy Orions delivered from June 1984 and retrofitted to earlier in-service P-3Cs from 1987 (making them Update IIIRs). Main ingredients of Update III are a new IBM Proteus acoustic processor, a new sonobuoy receiver to replace the earlier AN/AQA-7 DIFAR (directional acoustic frequency analysis and recording), an improved APU, and a modified environmental control system to improve avionics cooling and crew comfort. Current plans are for a force of 138 P-3Cs to Update III or IIIR standard. All 109 I, II, and II.5 aircraft were retrofitted with Update IV, originally intended for the P-7A, produced by a team headed by Boeing Defense and Space Group, but this was canceled in October 1992. They may instead become IIIRs, increasing the III/IIIR fleet to 247. The restructured Lockheed Aeronautical Systems Group has transferred P-3 operations from Burbank, Calif., to Marietta, Ga. (Data for P-3C Update III.)

Contractor: LASG division of Lockheed Corporation.
Power Plant: four Allison T56-A-14 turboprops; each 4,910 ehp.

Accommodation: normal crew of 10, including five in tactical compartment in main cabin.

Dimensions: span 99 ft 8 in, length 116 ft 10 in, height 33 ft 8 1/2 in.

Weights: empty 61,491 lb, max expendable load 20,000 lb, normal gross 135,000 lb.



P-3C Orion of VP-45 "Pelicans"
(Paul Jackson)



S-3B Viking of VS-30 "Diamondcutters" (Paul Jackson)

Performance: econ cruising speed at 25,000 ft at 110,000 lb gross weight 378 mph, patrol speed at 1,500 ft at same weight 237 mph, service ceiling 28,300 ft, T-O run 4,240 ft, landing field length 2,770 ft, mission radius (3 h on station at 1,500 ft) 1,550 miles.

Armament: one 2,000-lb or three 1,000-lb mines, or up to eight depth bombs or torpedoes, or depth bomb/torpedo combinations (including nuclear depth bombs) in internal weapons bay. Ten underwing pylons for torpedoes, mines, rockets, or other stores. Some P-3Cs equipped to carry AGM-84 Harpoon missiles.

S-3A/B Viking

Navy RFPs for an aircraft to replace its Grumman S-2 Trackers in the carrier-based ASW role were issued in January 1968, a contract to develop the S-3 being awarded in August of the following year. Lockheed was prime contractor, with LTV (Vought) selected to manufacture the wings, tail unit, landing gear, and engine pods, and Sperry Univac the central digital computer. First flight was made on January 21, 1972, a production go-ahead was given three months later, and between 1972 and 1978 a total of 187 S-3As were produced for the Navy. Initial deliveries were made to VS-41 at NAS North Island, Calif., in February 1974, and the Viking's first operational deployment, with VS-21 in USS *John F. Kennedy*, followed in July 1975. Contracts in 1980 and 1981 initiated a weapon sys-

tems improvement program (WSIP) for the S-3A, under which it was planned to upgrade up to 160 of these aircraft and give them the new designation S-3B. The main ingredients of this program are to upgrade the AN/AYK-10 central air data computer to AYK-10A(V) standard; replace the Sanders AN/OL-82A acoustic processor with an AN/OL-320/AYS, integrating with the IBM AN/UYS-1 processor; replace the Texas Instruments AN/APS-116 radar with an AN/APS-137(V)1 system incorporating inverse synthetic aperture capability; replace the AN/ARR-76 acoustic system communications link with a Hazeltine AN/ARR-78; modify the Goodyear AN/ALE-39 chaff/flare dispensing system; and add provision for the carriage of McDonnell

Douglas Harpoon air-to-surface missiles. The first of two FSED S-3Bs flew on September 13, 1984. Lockheed delivered 83 kits for updating S-3As of the Atlantic Fleet, and these were installed at NAS Cecil Field, Fla. Conversion of S-3As of the Pacific Fleet has been taking place at NAS North Island and should be completed in 1993. Since the mid-1980s Lockheed and Vought (previously LTV) have been studying an ATS (Advanced Tactical Surveillance) aircraft to replace the E-2C, EA-6B, S-3B, and ES-3A. This would be based on the S-3 airframe, carrying a large triangular dorsal radome containing a fixed electronically-scanned array radar. (Data for S-3B.)

Contractor: LASG division of Lockheed Corporation.
Power Plant: two General Electric TF34-GE-400A/B turbofans; each 9,275 lb st.

Accommodation: crew of four (pilot, copilot, tactical coordinator, and sensor operator).

Dimensions: span 68 ft 8 in, length 53 ft 4 in, height 22 ft 9 in.

Weights: empty 26,650 lb, normal gross for ASW 42,500 lb.

Performance: max cruising speed 426 mph, loiter speed 184 mph, service ceiling more than 35,000 ft, T-O run 2,200 ft, landing run 1,600 ft, combat range more than 2,300 miles.

Armament: internal split weapons bays for bombs, depth bombs, mines, or torpedoes. Two underwing pylons for AGM-84 Harpoon, rocket pods, bombs, mines, flare launchers, or auxiliary fuel tanks.

Fighters

F-4S Phantom II

All Navy and Marine Corps squadrons that once flew this famous fighter have converted to the F/A-18 or been disestablished, the last to go being VMFP-3 on September 30, 1990. A handful of variants, including the EF-4J, F-4S, and radio-controlled QF-4N, still serve the Naval Air Weapons Center at NAS China Lake, Calif., and Point Mugu, Calif.

F-14A/B Tomcat and F-14D(R) Super Tomcat

Development of the swingwing Tomcat began in January 1969 when Grumman's design, in response to a December 1967 RFP, was selected as winner of the US Navy's VFX competition for a new all-weather multirole fighter for fleet air defense, interdiction, and strike. The first of 12 development aircraft was flown on December 21, 1970, and deliveries of production F-14As started in May 1972, initial operational capability (IOC) being achieved in July 1974 and fleet deployment, with VF-1 and VF-2 in USS *Enterprise*, two months later. When production of the F-14A ended in April 1987, a total of 545 of this version had been built and delivered to the Navy. They serve today with

AMRAAM integration is at present deferred). Other upgrades include a twin IRST/TV sensor pod, digital INS, new computer and stores management, NACES seats, and NVG-compatible multifunction cockpit displays. The planned production program was canceled, but a little was salvaged, including 37 new aircraft (final delivery May 1992) and 18 F-14D(R) rebuilds (final delivery November 1993). Training with VF-124 began in October 1990, and users are VF-1, -2, -31, and part of VF-124. No decision has been announced



F-14B Tomcat of VF-74
(Paul Jackson)



F/A-18C Hornet of VFA-82 "Marauders" from USS *America* (Paul Jackson)

some two dozen USN squadrons, in 12 aircraft carriers, and ashore at the Naval Air Stations of Dallas, Tex., Miramar, Calif., and Oceana, Va. In 1980-81, to provide an interim reconnaissance capability pending the arrival of a purpose-built aircraft for this role, 49 F-14As (sometimes referred to unofficially as RF-14As) were equipped to carry an underbelly TARPS (Tactical Air Reconnaissance Pod System) containing a two-position (vertical and forward oblique) KS-87B frame camera, a KA-99 low-altitude panoramic camera, and an AN/AAD-5 infrared linescan camera. The TARPS Tomcat's first deployment was with VF-84 (USS *Nimitz*) in May 1981.

A two-pronged upgrade program for the F-14 was launched in the mid-1980s, aiming ultimately to fit improved performance engines and to replace most major items of the F-14A's analog avionics suite with digital avionics. Budgetary constraints have severely limited what could be achieved. The improved engine, giving not only higher flight performance but also dramatically better reliability and "carefree" piloting, is the F110-GE-400, which has 82 percent commonality with the USAF -100 version. Fitting this engine, without other changes, resulted in a version initially called F-14A+ (A-Plus), changed on May 1, 1991, to F-14B (a designation originally used in 1973 for a version subsequently terminated). The prototype conversion was reflown on September 29, 1986, and Grumman subsequently delivered 38 new-built F-14Bs ending in May 1990. Grumman also produced kits to convert about 50 existing F-14As to B standard. These aircraft serve VF-74, -101 (part), -103, -142, and -143. A second important improvement made to all in-service F-14As is to add new computer software to permit attack on surface targets with free-fall bombs.

Planned as a major follow-on program, the F-14D Super Tomcat combines the F110 engine with largely new digital avionics and weapons. The radar is the Hughes APG-71 with monopulse angle tracking, digital scan control, target identification and raid assessment, and improved ECCM. This is compatible with AIM-54C Phoenix and AIM-120A AMRAAM missiles (though



A-6E Intruders from VA-34
"Blue Blasters" (US Navy)

on a range of proposed and costed advanced Tomcat derivatives to replace the F-14A/D, A-12A Avenger II, and Navalized ATF. (Data for F-14D.)

Contractor: Grumman Aircraft Group.

Power Plant: two General Electric F110-GE-400 turbofans; each with 27,000 lb thrust with max augmentation.

Accommodation: pilot and Naval Flight Officer in tandem.

Dimensions: span 64 ft 1 1/2 in (38 ft 2 1/2 in swept), length 62 ft 8 in, height 16 ft 0 in.

Weights: empty 41,780 lb, gross 64,093-74,349 lb.

Performance: max speed (low level) 912 mph, (at altitude) 1,544 mph, service ceiling above 53,000 ft, max range (with external fuel) 2,000 miles.

Armament: four Sparrow or Phoenix air-to-air missiles semirecessed under fuselage. Pylon under each inboard (fixed) wing section for additional Phoenix/Sparrows, and/or Sidewinders, or various combinations of missiles, including HARM, and up to 14,500-lb bombs. One M61A1 20-mm gun in forward fuselage (port side).

F/A-18A/B/C/D/E/F Hornet

In May 1975 the Navy selected a proposal by McDonnell Douglas based on the Northrop YF-17 light-weight fighter, with new radar, much greater fuel capacity, and carrier equipment, as its NACF (Navy Air Combat Fighter) to replace the A-7 and F-4. The first of 11 development aircraft (nine single-seat and two two-seaters) made its maiden flight on November 18, 1978. Deliveries of a "pilot production" batch of 12 F/A-18s began in May 1980, the first recipients being the US Marine Corps's VMFA-314 squadron at MCAS El Toro, Calif., which achieved IOC with the Hornet in early 1983. The Navy's first Hornet development squadron, VFA-125 at NAS Lemoore, Calif., began flying the F/A-18 from November 1980, and the first seagoing squadron deployment of Hornets was with VFA-25 and VFA-113, in USS *Constellation*, in February 1985. Two years later the Hornet became the new mount of the celebrated "Blue Angels" USN demonstration team. Initial production models were the F/A-18A (single-seat) and F/A-18B (two-seat), of which, excluding prototypes, 410 were produced by 1987. Navy F/A-18s, replacing F-4 Phantoms in the fleet escort fighter/interdictor roles, carry a primary armament of Sparrow air-to-air missiles, while those of the USMC, intended as A-7 attack aircraft replacements, have a FLIR and laser tracker equipment instead of the Sparrow armament. In April 1986 two USN squadrons (VFA-131 and -132) and two from the USMC (VMFA-314 and -323), operating from the USS *Coral Sea*, took part in the first combat deployment of Hornets when they attacked targets in Libya.

Upgraded versions now in service are the F/A-18C and two-seat F/A-18D, deliveries of which began in the fall of 1987. A combined total of 758 C and D models is planned, of which 534 had been funded through FY 1990, with continued procurement planned to maintain a rate of 66 per year. The F/A-18C upgrade includes an AN/ALQ-165 airborne self-protection jammer and capability for AMRAAMs and IIR (imaging infrared) Maverick missiles. In addition, all Cs and Ds delivered from November 1989 have night attack capability, which includes a Hughes AN/AAR-50 thermal imaging navigation system (TINS), a Ford AN/AAS-38 attack FLIR, new Kaiser HUD, GEC Avionics night vision goggles, Honeywell digital moving map, and new Smiths cockpit displays. Up to four Mavericks can be carried underwing, or six AMRAAMs (four underwing and two under the fuselage). The F/A-18D is employed only as a combat trainer by Navy squadrons, but is intended to equip six Marine squadrons by the mid-1990s as the F/A-18D(RC) attack/reconnaissance replacement for their A-6E Intruders (which will be transferred to the Navy), RF-4B Phantoms, and OA-4M Skyhawks.

The Navy's biggest and most costly immediate aircraft program is the F/A-18E/F. These are, respectively, single- and two-seat versions of a significantly upgraded Hornet with a largely new airframe and engines. In 1992, despite being bigger in every respect, the only obvious external change was the greatly improved design of inlet to the more powerful engines. In March 1993, however, the LEX (wing leading-edge extension) was greatly enlarged (from the original 55.9 sq ft to 75.35 sq ft) to give dramatically higher power of maneuver; it also assists the new inlets to keep the engines stall-free at extreme angles of attack. The wings are increased in span from 37 ft 6 in to the figure given in the data, and are also thicker and stronger, with 100 sq ft more area (not including the LEX); the fuselage is 2 ft longer and accommodates an extra 3,600 lb of fuel; the tail surfaces are bigger; the radar is the Hughes APG-73, feeding a large active-matrix tactical-situation display; two extra weapon pylon stations inboard of the tips (for AAMs) make a total of 11; the "bring back" ordnance load is increased to 9,000 lb, saving the cost of jettisoning; and radar cross section has been reduced to 12.81 sq ft. The Navy had hoped to go via seven test aircraft (to fly from 1995) straight into production, but the FY 1994 budget forces the program to be seriously delayed. Now two R&D articles must be built and evaluated before spending anything on production, delaying operational service into the next century and adding at least \$1 billion to the program cost. (Data for F/A-18E/F.)

Contractor: McDonnell Douglas Corporation, St. Louis.
Power Plant: two General Electric F414-GE-400 turbofans; each approx. 22,000 lb thrust with max augmentation.

Accommodation: E, pilot only; F, pilot plus Naval flight officer.

Dimensions: span 44 ft 8 1/2 in (folded, 30 ft 7 1/4 in), length 60 ft 1 1/4 in, height 15 ft 9 1/2 in.

Weights: empty 30,600 lb, gross 66,000 lb.

Performance: max speed more than Mach 1.8, combat ceiling 50,000 ft, combat radius (attack) more than 705 miles.

Armament: 11 external weapons stations for up to 17,750 lb including entire range of Navy offensive and defensive ordnance; M61A1 20-mm gun above nose.

Attack Aircraft

A-6E Intruder

First flown (as the A2F-1) in April 1960, the A-6 has already enjoyed a career approaching 30 years as the airplane flown by the medium attack wings of the Navy and Marine Corps. For almost 20 of those years the model in service has been the A-6E, with completely new solid-state avionics, including the Norden APO-148 multimode radar, IBM computer, and Kaiser cockpit display. Upgrading over those 20 years has been unceasing, current aircraft having the AAS-33 TRAM (target recognition and attack multisensor) package, including a precision-aimed chin turret housing a FLIR and laser, improved inertial navigation, and upgraded communications. Since 1981, newly built and converted A-6Es have been able to carry up to four Harpoon antiship missiles or HARMs (high-speed anti-radiation missiles). Grumman produced 240 aircraft by converting A-6As, followed by 205 new airframes. Intruders flew nearly 5,000 missions during Operation Desert Storm.

Cancellations of an improved A-6F, and of its proposed A-12 successor, have led instead to plans to refit 294 A-6Es with new Boeing-made carbon-reinforced aluminum/titanium wings. About 250 of these rewinged aircraft will undergo a SWIP (systems and weapons integration program) to give them mainly digital avionics and displays, including a new radar and GEC-Marconi wide-angle HUD and NANS (night attack navigation system), better self-defense systems (including AMRAAMs and additional chaff/flare dispensers), and various airframe improvements. The engine will be the J52-P-409 (PW1212), with faster acceleration (giving better performance on bolters and go-arounds) and increased thrust (see data).

Contractor: Grumman Aircraft Group.

Power Plant: two Pratt & Whitney J52-P-408 turbojets, each 9,300 lb thrust; to be replaced by P-409s, each 12,000 lb.

Accommodation: pilot and bombardier/navigator side by side.

Dimensions: span (wings spread) 53 ft 0 in, (folded) 25 ft 4 in, length 54 ft 9 in, height 16 ft 2 in.

Weights: empty 26,746 lb, max gross (catapult launch) 58,600 lb, (field takeoff) 60,400 lb.

Performance: max speed (clean, sea level) 644 mph, service ceiling 42,400 ft, T-O run on land 3,890 ft, landing run 1,710 ft, range with max military load 1,011 miles.

Armament: five attachment points for up to 18,000 lb of external stores, a typical load being 28 bombs of 500 lb plus two AIM-9 Sidewinder AAMs for self-defense. See text regarding Harpoon and HARM missiles.

AV/TAV-8B Harrier II and II Plus

Now in its third decade of Marine Corps service, the Harrier continues to improve and remains an incomparable and essential part of the service's attack force. The original AV-8A, which entered service in 1971, is long gone, having from January 1984 been replaced by the more capable AV-8B. This has a longer-span wing of graphite composites, with larger flaps and drooped ailerons; lift-increasing strakes under the fuselage or gun pods; improved engine inlets and nozzles; redesigned front fuselage (also of composites) with a roomier cockpit; 50 percent more internal fuel and provision for in-flight refueling; a Hughes ARBS (angle rate bombing set) for greater bombing accuracy; greatly upgraded avionics and weapons capability; and other smaller changes. The first operational squadron, VMA-331, was commissioned at MCAS Cherry Point, N. C., on January 30, 1985. The first TAV-8B tandem-seat dual-control trainer, with a completely redesigned front fuselage and taller vertical tail, first flew on October 21, 1986; the first class trained on it graduated in 1988. By early this year, orders totaled 232 production AV-8Bs and 24 TAV-8Bs. Seven Marine Corps VMA attack squadrons, including -223, -231, and -542 at Cherry Point, are now equipped with Harrier IIs, with VMAT-203 at Cherry Point now the training squadron; a few AV-8Bs are also used at Patuxent River, Md., and China Lake, Calif., by the Naval Air Warfare Center.

Progress toward a night attack version began with a prototype that first flew on June 26, 1987, and deliveries of this model began on September 15, 1989, with the 167th AV-8B. It is characterized by an over-nose bulge housing a GEC-Marconi FLIR that can present clear night pictures on color HDDs and a wide-angle HUD; the pilot wears NVGs, and the cockpit also contains a digital moving-map display. The other four squadrons, VMA-211, -214, -311, and -513 at Yuma, Ariz., are night-capable. From December 1990 (182d AV and 16th TAV), all Harrier IIs have had the more powerful Dash 408 version of the unique Pegasus engine (see data). Capability further increased in April



Prototype AV-8B Harrier II Plus



E-2C Hawkeye of VAW-123 "Screwtops" (Paul Jackson)



E-6A Mercury TACAMO aircraft (Ivo Sturzenegger)

of this year with first deliveries (from aircraft number 233) of the AV-8B Harrier II Plus, 30 of which have so far been funded, including six to offset Gulf War attrition of earlier-model AV-8Bs. This has the Dash 408 engine and night attack avionics of its immediate predecessor, but adds a Hughes AN/APG-65 multimode pulse Doppler radar in a 17 in longer fuselage; other features include an eight-pylon wing with bigger LERX (leading-edge root extensions), improved ECM, and expanded weapons capability that includes AMRAAM, Sparrow, Sea Eagle, and Harpoon missiles. Empty weight is increased to 14,860 lb, but max gross weight remains unchanged. There is a requirement to upgrade some 114 earlier Harrier IIs to II Plus standard between FY 1994 and FY 2000. (Data for AV-8B.)

Contractors: McDonnell Douglas Corporation; British Aerospace plc.

Power Plant: one Rolls-Royce F402-RR-406A (Pegasus) vectored-thrust turbofan (to 1990), 21,450 lb thrust. (December 1990 onwards) F402-RR-408, 23,800 lb thrust.

Accommodation: pilot only.

Dimension: span 30 ft 4 in, length 46 ft 4 in (TAV-8B, 50 ft 3 in), height 11 ft 7 7/8 in.

Weights: empty 13,468 lb, max gross 31,000 lb.

Performance: max speed at sea level 661 mph, STOL T-O run 1,427 ft, operational radius with seven Snakeye bombs and two 300 gal tanks 684 miles, deck-launched intercept radius 722 miles.

Armament: one 25-mm GE GAU-12/U five-barrel gun with 300 rounds; six wing pylons stressed to 2,000 lb each (inboard), 1,000 lb (center), and 630 lb (outboard) for very wide range of weapons, pods, dispensers, sensors, or tanks, to normal maximum load of 10,800 lb (-406A engine) or 13,235 lb (with -408).

Reconnaissance and Special-Duty Aircraft

E-2C Hawkeye

Though developed as a highly specialized carrier-based AEW (airborne early warning) aircraft, with an airframe design greatly influenced by the need to fold into a space compatible with a carrier, the Hawkeye has also been sold to several air forces that have land bases only. It fills a unique slot in the spectrum of combat aircraft, infinitely more capable than smaller surveillance platforms yet a fraction of the price of an E-3 AWACS. The prototype flew on October 21, 1960, introducing the concept of a giant (24 ft diameter) rotodome revolving on a pylon high above the fuselage to enable its antenna groups to sweep around all points of the compass. Incoming data are displayed in the ATDS (airborne tactical data system) compartment in the center fuselage to the Combat Information Center Officer, Air Control Officer, and Radar Operator. At the operating altitude of about 30,000 ft the radar can see targets up to 300 miles distant within a six million cubic mile envelope. Electronic emitters, such as hostile radars, can be detected over distances up to 600 miles by the Litton ALR-73 PDS (passive detection system), which has receiver antennas in the nose and tailcone and looking out sideways from the outer vertical stabilizers.

The tail has four vertical stabilizers in order to keep the height within the severe limit imposed by carrier hangars and workshops. They are made of glassfiber to reduce interference with the main radar. The height limit also requires that the rotodome be lowered by a hydraulic jack when aboard ship, reducing overall height to 16 ft 5 in. The outer wings fold, skewed hinges turning each wing to lie upper surface outwards, locked by a jury strut to the tail.

The E-2A (62 built) had 4,050 shp T56 engines and the APS-96 radar. Subsequent models received more powerful engines and, via the APS-125, -138, and -139, the current GE APS-145 radar system with an advanced radar processing system. It can automatically track more than 2,000 targets and control more than 20 airborne intercepts. The first E-2C flew in January 1971, but the Hawkeye has developed greatly since then. Of 139 on Navy order, about 125 had been delivered by early 1992. Universally regarded as a force multiplier, the Hawkeye equips 16 Navy squadrons.

Contractor: Grumman Corporation Aircraft Group.

Power Plant: two Allison T56-A-427 turboprops; each 5,250 shp.

Accommodation: two pilots, plus three tactical officers.

Dimensions: span 80 ft 7 in, (folded) 29 ft 4 in, length 57 ft 6 1/4 in, height (rotodome raised) 18 ft 4 in.

Weights: empty 39,424 lb, max gross 53,288 lb.

Performance: max cruising speed 358 mph, service ceiling 36,300 ft, T-O run 2,000 ft, landing run 1,440 ft, time on station 200 miles from base 3 to 4 h, endurance 6 h 8 mins.

E-6A Mercury

Now having taken over from the EC-130Q Hercules in the TACAMO (Take Charge and Move Out) role, the



EP-3E-II Orion elint aircraft (Paul Jackson)

E-6A was developed to provide a survivable airborne communications link between the national command authorities (NCA) and the Navy's fleet of Trident nuclear submarines (SSBNs). It retains, at least initially, the airborne VLF communications system used in the EC-130Q, and uses a nuclear/EMP-hardened airframe having approximately 75 percent commonality with the USAF's E-3 Sentry AWACS aircraft, minus the latter's dorsal rotodome and its support structure. The E-6A has more anticorrosion treatment than the E-3, a large forward freight door in the windowless main fuselage, wingtip ESM/Satcom pods, and CFM turbofans similar to those powering USAF's KC-135Rs. In operational use the AN/ALR-66(V)4 ESM (electronic support measures) systems in each wingtip pod provide threat information (detection, identification, bearing, and range). This can be relayed upward to other airborne command posts, such as the Presidential E-4 or communications satellites, or downward to VLF ground stations and the SSBN fleet, using two trailing wire antennas (TWAs): one 26,000 ft long (LTWA) reeled out from an underfuselage hatch, and a shorter 4,000 ft antenna (STWA) winched out from the tailcone to act as a dipole. To be effective operationally, the LTWA must be kept at least 70 percent vertical; this is achieved by weighting the end with a 90 lb drogue while the E-6A flies in a tight orbit. Prototype flight testing with full on-board avionics started in June 1987, and the first two production E-6As were handed over to VQ-3 in August 1989. Eight serve with VQ-3 and seven with VQ-4, both now based at Tinker AFB, Okla. The 16th aircraft is currently in use for test flying.

Contractor: Boeing Defense and Space Group.
Power Plant: four CFM International F108-CF-100 turbofans; each 24,000 lb st.

Accommodation: flight crew of four, plus mission crew of five including an airborne communications officer.

Dimensions: span 148 ft 2 in, length 152 ft 11 in, height 42 ft 5 in.

Weights: empty 172,795 lb, gross 342,000 lb.

Performance: cruising speed at 40,000 ft 523 mph, dash speed 610 mph, patrol altitude 25,000-30,000 ft, T-O distance 5,400 ft, landing distance 2,600 ft, mission range (unrefueled) 7,307 miles.

Armament: none.

EA-6B Prowler

These historic aircraft were the first to be designed from the start for the electronic warfare and active jamming mission. The first of three (converted A-6A) prototypes flew on May 25, 1968, and the 170 production Prowlers rapidly became a vital part of each Navy carrier air wing. All attack capability was deleted, and the A-6 forward fuselage was extended by 40 in to accommodate two additional crew. The main group of receiver antennas is housed in a large fairing on top of the tail to give all-round coverage on many wavelengths used by all kinds of hostile emitters. The received information is processed by a powerful AYK-14 central computer. The processing system automatically adjusts the radiated jamming power to match the threat, to make best use of energy, and aims the jamming toward the threat. The jammers are contained in up to five streamlined pods hung on the fuselage and wing pylons. Each pod is self-powered by a windmill generator on the nose. Today's Prowlers have been through a succession of upgrade programs (EXCAP, ICAP-1, and ICAP-2), the current ICAP-2 standard carrying AN/ALQ-99 TJS (tactical jamming system) pods able to generate signals in any of seven frequency bands and to jam in any two simultaneously. They have an ALE-39 chaff/flare dispenser in the rear



EA-6B Prowler

fuselage, and internally mounted ALQ-126 ECCM. Another recent update is the Sanders ALQ-149, a comprehensive system for detecting and jamming hostile communications.

In 1983, development began on ADVCAP (advanced capability). This dramatically upgrades the receiving and processing part of the TJS. The antenna pod on the vertical tail is noticeably larger, and an extra antenna group is added beneath the rear fuselage. This new version will have its own direct antiradar capability by launching HARMs from the inboard pylons, extra pylons being added under the outer wings to preserve the capability of five jamming pods (though usually some pylons carry tanks). The ADVCAP prototype first flew in 1988; four upgraded aircraft had been funded by FY 1993, with nine more planned for FY 1994. Prowlers flew more than 1,600 missions in Desert Storm, "blinding" Iraqi EW and C³I and destroying many radars with their HARMs. They serve aboard every USN carrier (and at two shore stations) in 12 active and two Reserve VAQ squadrons; additional aircraft serve with four active Marine Reserve VMAQs. A few interim EA-6A Intruders also remain, with VAQ-33 at Key West, Fla., until October of this year.

Contractor: Grumman Aircraft Group.
Power Plant: two Pratt & Whitney J52-P-408 turbojets; each 11,200 lb thrust.

Accommodation: crew of four (pilot and three ECM officers) on Martin-Baker GRUEA-7 seats.

Dimensions: span 53 ft 0 in, (folded) 25 ft 10 in, length 59 ft 10 in, height 16 ft 3 in.

Weights: empty 32,162 lb, normal gross 54,461 lb.

Performance (with five pods): max speed at S/L 610 mph, service ceiling 38,000 ft, T-O run 2,670 ft, landing run 2,150 ft, range 1,100 miles.

Armament: up to four AGM-88 HARMs on underwing pylons.

EC-24A

This much-modified DC-8-54F is operated by civilian crews of Chrysler Technologies Airborne Systems for the Fleet Electronic Warfare Support Group. Though based at Waco, Tex., it ranges throughout the world carrying the Orange Force Commander in all major Fleet exercises. It can be identified by the two large "canoe" radomes under the fuselage covering the steerable antennas of the two broadband ALT-40 radar jammers. Other equipment includes dual AN/ASQ-191 communications transceiver/jammers, two AN/ALE-43 chaff dispensers, dual AN/ALR-75 systems for signal identification, and 12 radio transceivers (six UHF, two VHF, and four HF).

Contractor: Electrospace Systems Inc.
Power Plant: four Pratt & Whitney JT3D-3 turbofans; each 18,000 lb st.

Accommodation (typical): flight crew of three, plus seven systems operators (including mission commander). Capacity also for up to 3,000 lb of cargo and seats for 20 maintenance personnel or additional crew members.

Dimensions: span 142 ft 5 in, length 150 ft 6 in, height 42 ft 4 in.

Weights: gross 315,000 lb.

Performance: max cruising speed at 30,000 ft approx 545 mph, T-O field length 10,560 ft, landing field length 5,620 ft, max unrefueled range approx 5,525 miles, max endurance 11 hours.

EP-3E and RP-3A/D Orion

These modified versions of the Lockheed Orion serve with various units, including the Naval Research Laboratory and Pacific Missile Test Center. The 12 EP-3E-II Aries IIs were converted by LASC Greenville (first five) and Naval Air Depot, Alameda, Calif. (seven, last delivery June 1995). They fly elint missions with VQ-1 (Agana, Guam) and VQ-2 (Rota, Spain). They are identified by absence of an MAD "sting" and a profusion of excrescences including radomes above and below the fuselage. Equipment includes a Hughes AN/AAR-37 IR receiver, Raytheon AN/ALQ-76 and Magnavox AN/ALQ-108 jammers, a Loral AN/ALQ-78 passive ECM receiver, UTC AN/ALQ-110 radar signal collector, and a Sanders AN/ALQ-132 infrared countermeasures system. Elint and other clandestine missions are flown by greatly modified EP-3Bs of VPU-1 at NAS Brunswick, Me., and VPU-2 at Barbers Point, Hawaii. They are painted to resemble regular P-3Cs, with spurious unit insignia and serials, and painted-on "sonobuoy tubes." Five other P-3As were converted to RP-3As for oceanographic research and miscellaneous test or evaluation programs, while the RP-3D designation was given to a single P-3C equipped under the US Naval Oceanographic Office's Project Magnet and used by squadron VXN-8 to map the Earth's magnetic field. (Data for EP-3E-II generally as for P-3C, except as follows.)

Accommodation: duty and relief flight crew, plus 15 electronic warfare equipment operators.
Weight: gross approx 142,000 lb.

ES-3A and US-3A Viking

To replace EA-3 versions of the Skywarrior, Lockheed developed kits to convert S-3A Vikings for the elint role. They retain the AN/ARR-76 electronic support measures system of the S-3A but replace some 3,000 lb of ASW installation with more than 5,000 lb of new ESM, broadly similar to those of the EP-3E Orion, plus Omega navigation, GPS, and three AN/AYK-14 digital computers.

The prototype conversion was flown in December 1991. The first of 15 production conversions by NAS Cecil Field flew on January 21, 1992. User units are VQ-5 at Agana, Guam, with conversions undertaken at NAS North Island, Calif., and VQ-6 at Cecil Field. They form the airborne component of the Battle Group Passive Horizon Extension System, being deployed in detachments of two ES-3As to a carrier, to extend the group's threat detection/identification range. Each ES-3A carries a four-man crew of pilot, EW combat coordinator, and two EW systems operators.

Another conversion program in 1982-83 turned four S-3As into US-3A COD (Carrier On-board Delivery) transports, one via a spell as a KS-3A tanker. They carry their payload principally in large containers resembling drop tanks attached to the underwing pylons. (Data generally as for S-3A/B, except performance slightly reduced due to external antenna drag.)

F/A-18D(RC) Hornet

Following rejection of a dedicated reconnaissance version of the Hornet, the F/A-18D(RC) configuration was developed in which a regular F/A-18D can be converted overnight to fly reconnaissance missions. Martin Marietta developed the ATARS (Advanced Tactical Airborne Reconnaissance System), contained in an external centerline pod housing a Loral UPD-8 synthetic-aperture side-looking radar supplementing nose-mounted IR and optical sensors. Images can be transmitted by real-time data link and also viewed in the rear cockpit. The first RC-configured aircraft was delivered to MCAS El Toro in February 1992. The Corps has a requirement for 48, replacing the RF-4B, and still intend the first unit to reach IOC in FY 1994. (Data generally as for F/A-18.)

OV-10A/D/D-Plus Bronco

Marine Corps plans to convert its 28 OV-10As and 14 OV-10Ds to a common OV-10D-Plus standard have been overtaken by a withdrawal schedule. Eighteen enhanced OV-10Ds were modified from As to provide the Marines with a NOS (night observation system) version having 45 percent more powerful T76 engines, increased fuel capacity, a chin-mounted Texas Instruments AN/AAS-37 FLIR turret with integral laser rangefinder/designator, and a reconfigured cockpit.

The **D-Plus** includes rewiring and structural improvements, first deliveries being made to VMO-2 at Camp Pendleton, Calif., in June 1990, then to VMO-4 of the USMC Reserve at Atlanta, Ga., in May 1991. VMO-1 (OV-10A/D) at New River, N.C., disbanded March 1993; VMO-2 and -4 are to follow in March 1994, ending the Bronco's service career. (Data for OV-10D.)

Contractor: North American Aircraft Division of Rockwell International Corporation.

Power Plant: two Garrett T76-G-420/421 turboprops; each 1,040 ehp.

Accommodation: crew of two in tandem.

Dimensions: span 40 ft 0 in, length 44 ft 0 in, height 15 ft 2 in.

Weights: empty 6,893 lb, gross 9,908 lb (normal), 14,444 lb (max).

Performance: max speed at S/L (clean) 288 mph, service ceiling at normal gross weight 30,000 ft, combat radius with max weapon load 228 miles.

Armament: five fuselage stations (one on centerline and two on each sponson) for combined load of 3,600 lb, plus two 600 lb capacity underwing stations, for bombs, rockets, gun pods, flares, or other stores. Two internal 7.62-mm guns in each fuselage sponson fixed firing ahead.

Transports and Tankers

C-2A Greyhound

The C-2A has been the Navy's standard COD aircraft since 1964. Derived from the E-2 Hawkeye, the C-2A has a new fuselage of greater diameter (though still somewhat constricted, with a max width of 7 ft 4 in and max height of 5 ft 5 in). Pressurized accommodation is provided for up to 28 passengers or 12 litters and medical attendants. The floor is stressed for cargo and could be equipped for the 463L pallet system, bulky loads being winched or driven in via the full-width rear ramp door. Maximum cargo payload is 10,000 lb, or 15,000 lb for operations from airfields only. The C-2A is stressed for catapult launch and arrested landing and can fold for compatibility with carrier elevators and hangars.

Grumman delivered 19 in the original batch, all being retired by the end of 1987. From 1985, Grumman delivered a further series of 39 aircraft, multiyear-funded in 1983. These aircraft have updated engines, a new APU for increased self-sufficiency, upgraded avionics, improved passenger comfort, and enhanced anticorrosion protection.

Contractor: Grumman Aircraft Group.

Power Plant: two Allison T56-A-425 turboprops; each 4,910 ehp.

Accommodation: crew of pilot, copilot, and loadmaster; payload, see text.

Dimensions: span 80 ft 7 in, length 56 ft 10 in, height 15 ft 10½ in.

Weights: empty 36,346 lb, max gross 57,500 lb.

Performance: max cruising speed 299 mph, T-O run 2,180 ft, landing run 1,428 ft, range with 10,000 lb cargo more than 1,200 miles.

Armament: none.

C-9B Skytrain II

Seventeen C-9B military DC-9s were built for the Navy as convertible passenger/cargo transports based on the commercial Series 32CF. They entered service in 1973. The cabin can seat up to 90 passengers, hold 32,500 lb of cargo, or accommodate eight standard military pallets loaded via an 11 ft 4 in x 6 ft 9 in cargo door at the front port side. A typical combi load comprises three pallets and 45 passengers. Fifteen C-9B Skytrain IIs remain in service, augmented by 14 more recently acquired DC-9 Series 30 standard transports. Two serve the Marine Corps, the remainder being distributed among 11 Naval Reserve units. (Data for C-9B.)

Contractor: Douglas Aircraft Company Division of McDonnell Douglas Corporation.

Power Plant: two Pratt & Whitney JT8D-9 turbofans; each 14,500 lb thrust.

Accommodation: flight crew of three, plus two cabin attendants. See text for other details.

Dimensions: span 93 ft 5 in, length 119 ft 3½ in, height 27 ft 6 in.

Weights: empty (passenger) 65,283 lb, (cargo) 59,706 lb, gross 110,000 lb.

Performance: max cruising speed at 25,000 ft 576 mph, service ceiling 37,000 ft, military field length 7,410 ft, landing distance 2,580 ft, range with 10,000 lb payload 2,923 miles.

C-20D/G Gulfstream III

Two C-20D Gulfstream III executive transports of Commander Fleet Logistics Support Wing, USN Reserve, Dallas, Tex., are detached to Andrews AFB, Md. A further two C-20G Gulfstream IIs will be delivered to VR-48 of the USNR at Andrews in 1994. (C-20G data as for Army C-20F.)

C-130F/T, LC-130F/R, and TC-130Q Hercules

The C-130F was the original version of the C-130 to be purchased by the Navy, as the GV-1U, in 1961. Seven remain in service: four with VR-22 at Rota, Spain, and three with VXE-6, based at Point Mugu, Calif. They are equivalent to the C-130B. The generally similar LC-130F has retractable skis, coated with Teflon to reduce adhesion to ice. Engines are 4,910 ehp T56-A-15, and attachments are provided for four JATO rockets on each side. The four aircraft have had eventful careers in Antarctica. The current Antarctica transport is the LC-130R, based generally on the C-130H, with greater fuel capacity and various other upgrades. The Navy received one as a Lockheed 382C-9D, three Model 382C-26Ds procured via USAF, and two Model 382C-65Ds operated by the Navy for the National Science Foundation. These aircraft have had fantastic histories flying with VXE-6 (previously VX-6) with home base at Christchurch, New Zealand.

The C-130T is an advanced transport, with secondary tanker capability, equivalent to the C-130H with upgraded avionics including INS and Omega. The requirement is for 28, the first two being delivered to VR-54 at NAS New Orleans, La., in August 1991. TC-130Q is the designation of two surplus EC-130Q (TACAMO) Hercules with the long trailing wire antenna removed to enable cargo to be loaded through the rear ramp door. Other ex-TACAMO aircraft are stored and could be converted. (Data generally as for KC-130.)



C-2A Greyhound of VR-2 "Lifting Eagles" (Paul Jackson)



TC-130Q Hercules support aircraft for the "Blue Angels" display team (Paul Jackson)



KC-130T Hercules (Paul Jackson)

CT-39E/G Sabreliner

Although only a few of the Navy's original 42 T-39D Sabreliners are still in service today, two other variants of this small business jet still perform useful duties as tactical support transports. The CT-39G (seven ordered, of which some are still in service with VRC-40 at Norfolk, Va., and VRC-50 at Andersen AFB, Guam) corresponds to the commercial Sabreliner 40. A fuselage longer by 3 ft 2 in, with five cabin windows per side (instead of three), characterizes the CT-39G (Sabreliner 60), which also features engine thrust reversers. The Navy had 13 of these (most still in service, with Sigonella Base Flight [three] in Sicily, Marine Corps Hq, Squadron 1 in Okinawa, and other miscellaneous Navy and MC units).

Contractor: North American Aircraft Division of Rockwell International Corporation.

Power Plant: two Pratt & Whitney JT12A-8 turbojets; each 3,300 lb thrust.

Accommodation: crew of three; up to nine (-39E) or ten (-39G) passengers.

Dimensions: span 44 ft 5¼ in, length 43 ft 9 in (-39E), 46 ft 11 in (-39G), height 16 ft 0 in.

Weights: empty 9,845 lb (-39E), 10,486 lb (-39G), gross 18,650 lb (-39E), 19,615 lb (-39G).

Performance: max speed at 21,500 ft (both) 563 mph, service ceiling (both) 45,000 ft, T-O field length (-39E) 4,800 ft, landing field length (-39E) 2,200 ft, range (-39E) 2,118 miles.

KA-6D Intruder

First flown on May 23, 1966, the KA-6D is the standard in-flight refueling tanker of the Navy carrier air wings (ten active and two Reserve squadrons). All are conversions, Grumman having rebuilt 78 A-6A and nine A-6E aircraft. Main features are the hose-reel installation in the rear fuselage and addition of Tacan and other avionics. The KA-6D was originally able to fly day bomber missions, but the latest configuration deletes all weapons capability and enables the tanker to carry five 400 gal drop tanks. Approximately 65 remain in front-line service. The KA-6D can transfer more than 21,000 lb of fuel immediately after takeoff, or 15,000 lb at 288 miles from the carrier. (Data generally as for A-6E.)

KC-130F/R/T Hercules

First flown (as the GV-1) in January 1960, the KC-130F was bought by the Marine Corps as a multirole tanker/transport. Based on the C-130B, with 4,050 ehp T56-A-7 engines, it was fitted with tanks with a capacity of 3,600 gallons of fuel in the main cargo compartment, and with two quickly installable or removable hose-reel units under the outer wings for refueling two aircraft simultaneously. All Marine Corps tankers can refuel anything from jets to probe-equipped helicopters. They also can, and often are, reconfigured

for conventional transport duties. The F version, 46 of which were purchased, can transfer 31,000 lb of fuel at a distance of 1,000 miles from its base. In 1975, squadron VMGR-352, which had by that date transferred nearly 5,000,000 gallons of fuel (mainly on transpacific deployments), was the first of three Marine Corps squadrons to employ 14 of the extended-range KC-130Rs, based on the C-130H. These have more powerful engines (see data) and pylon-mounted external tanks. The KC-130T is similar to the R but has upgraded avionics including INS, Omega, and Tacan, a solid-state APS-133 color radar, flush antennas, and orthopedically designed crew seats. The 22 so far procured include a small number of KC-

130T-30s, with the stretched fuselage of the C-130H-30. Except for VMGR-152 in Okinawa, Japan, all USMC Hercules tanker units are normally US-based. One aircraft of Marine Reserve squadron VMGR-452 underwent special modification for Operation Desert Storm as a comint aircraft code-named Senior Warrior. A few KC-130Fs were, until March 1993, based in Rota, Spain, with the Navy's VR-22, providing tanker support for USN forces in the Mediterranean. (Data for KC-130R.)

Contractor: Lockheed Aeronautical Systems Company.

Power Plant: four Allison T56-A-15 turboprops; each 4,508 shp.

Accommodation: normal crew of four to seven.

Dimensions: span 132 ft 7 in, length 97 ft 9 in, height 38 ft 3 in.

Weights: empty 79,981 lb, gross 109,744-166,301 lb.

Performance: max cruising speed at 30,000 ft 374 mph, max fuel offload 70,000 lb (10,769 gal), or 52,000 lb (8,000 gal) at a distance from takeoff of 1,150 miles.

Armament: none.

HV/MV/SV-22A Osprey

Few US defense programs of recent years have provoked such strong for-and-against arguments as those concerning Bell/Boeing's unique tiltrotor, which first flew on March 19, 1989. Despite stop-go funding and other setbacks, however, the V-22 development program is safe until at least FY 1994. If it continues to survive its detractors, the main version will be the Marine Corps **MV-22A** assault transport (requirements for 552). Navy plans are for 50 **HV-22As** for CSAR (combat search and rescue), special warfare, and fleet logistics support, and possibly also an antisubmarine **SV-22A** with AN/APS-137 detection radar. (Data for MV-22A.)

Contractors: Bell Helicopter Textron Inc.; Boeing Helicopters.

Power Plant: two Allison T406-AD-400 turboshafts; each 6,150 shp.

Accommodation: flight crew of three; 24 combat troops and two gunners, 12 litters plus medical attendants, or 8,300 lb of internal cargo.

Dimensions: span (excluding nacelles) 46 ft 0 in, fuselage length 57 ft 4 in, height (nacelles vertical) 22 ft 7½ in.

Weights: empty 31,886 lb, normal gross 47,500 lb for vertical takeoff, 55,000 lb for forward (short) takeoff. One or two external cargo hooks for single load of 10,000 lb or combined load of 15,000 lb.

Performance: max cruising speed (airplane mode) at optimum altitude 361 mph, service ceiling 26,000 ft, T-O run less than 500 ft, max unrefueled self-deployment range 2,418 miles.

UC-12B/F/M and RC-12F/M

Navy Department procurement of this Super King Air variant began with 66 **UC-12Bs** (49 for the USN and 17 for the Marine Corps), deliveries of which were completed by the spring of 1982. Assigned to numerous base flights, the UC-12B has PT6A-41 engines, a 4 ft 4 in square cargo door aft of the wing (port side), and high-flotation landing gear. The later **UC-12F** (12 delivered from 1986) corresponds to the civil Model B200C, with PT6A-42s of the same power rating and hydraulic (instead of electric) gear actuation. The **UC-12M** (also 12) is similar. Conversions to Range Surveillance Aircraft (RANSAC) comprise two **RC-12Fs** at Barking Sands, Hawaii, and two **RC-12Ms** at Point Mugu, Calif. (Data for UC-12F.)

Contractor: Beech Aircraft Corporation.

Power Plant: two Pratt & Whitney Canada PT6A-42 turboprops; each 850 shp.

Accommodation: crew of two plus up to eight passengers or equivalent cargo.

Dimensions: span 54 ft 6 in, length 43 ft 9 in, height 15 ft 0 in.

Weights: empty 8,060 lb, gross 12,500 lb.

Performance: max cruising speed at 25,000 ft 333 mph, service ceiling more than 35,000 ft, range at 27,000 ft at econ cruising speed of 325 mph 2,142 miles.

UP/VP-3A/B Orion

All five **VP-3As**, three of them converted from former WP-3A weather reconnaissance variants of the Orion, remain in service as Navy VIP transports. The more numerous **UP-3As**, some 37 of which were produced for more mundane transport duties, were converted by the Navy from retired P-3As by removing the ASW systems and installing seats in the cabin. Standards of furnishings vary. User units include: CINCPACFLT, Barbers Point; VP-30, NAS Jacksonville, Fla.; VP-31, Moffett Field; VPU-2, NAS Sigonella, Sicily; NAS Bermuda; NAS Keflavik, Iceland; and, with special avionics, Naval Air Warfare Center. Four **UP-3Bs**, converted in 1991-92, are shared by VQ-1, Agana, Guam, and VQ-2, Rota, Spain.

Trainers

F-5E/F Tiger II

The original 10 **F-5E** lightweight fighters and three tandem-seat, dual-control **F-5Fs**, acquired in the 1970s to supplement A-4 and TA-4 Skyhawks in the Aggressor role at Top Gun establishments, have since been augmented by 24 ex-USAF single-seaters. Since arrival of the F-16N they have been retired from the Top Gun schools, but are still active with VMFT-401 at Yuma, Ariz., and the Navy's VF-43 and -45 in the eastern US. (Data: see May 1993 USAF Gallery.)



Fourth prototype V-22 Osprey



UC-12B in Kuwait (Paul Jackson)



F-5E Tiger II "Aggressor" (Paul Jackson)



T-45A Goshawk Navy undergraduate trainer



TA-4J Skyhawk (Paul Jackson)

F/TF-16N Fighting Falcon

Noted for its ability to hold 9 g's in a sustained turn, the Navy F-16 is lighter, higher-powered, and thus even more agile than other versions of this outstanding fighter. The internal gun is deleted, and the only normal external stores are inert AIM-9 missiles, an air combat maneuvering instrumentation pod, and external tanks. The radar is the APG-66. Based respectively on the Block 30 F-16C and the F-16D, 22 **F-16Ns** and four two-seat dual-control **TF-16Ns** were received in 1987-88 for the DACT (dissimilar air combat training, more familiarly known as Aggressor) role. They serve with VF-43 at NAS Oceana, Va., VF-45 at Key West, Fla., and with VF-126 and the Naval Fighter Weapons School, both at Miramar, Calif. (Data as for F-16C/D—see May 1993 USAF Gallery—except as follows.)

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

Weights (F-16N): empty 18,815 lb, max gross (no tanks) 25,071 lb.

Armament: normally confined to two AIM-9 training Sidewinder AAMs.

P-3J Orion

This electronic-warfare trainer is a P-3B equipped with the AN/USQ-113 communications intrusion and deception system and with external pods housing ALQ-167, ALQ-170, and AST-4/6. Two are assigned to VAQ-33 at Key West, Fla., and (from November 1993) VP-94.

T-2C Buckeye

With the recent retirement of the last T-2Bs (in service since 1965), the T-2C is the sole remaining variant of the first aircraft specifically designed from the start as a Navy jet trainer. The T-2C has itself been in service since 1969, and most of the 231 delivered survive, but their replacement by the T-45A Goshawk has now begun. Principal training squadrons are VT-4, -10, -19, -23, and -86; some also serve with the Aggressor squadron VF-43. (Data: see December 1992 Trainers Gallery.)

T-34C Mentor

Navy procurement of the turboprop version of the Beech Mentor amounted to 352, the great majority of which remain in service, principally with training squadrons VT-2, -3, -4, -6, -10, and -27, and the Naval Air Warfare Center. Student training began in January 1978, and has been outstandingly attrition-free. A few earlier piston-engined T-34Bs remain in service as recruiting hacks. (Data: see December 1992 Trainers Gallery.)

T-38A Talon

More than 1,000 of the 1,189 T-38As built were for USAF, and of 18 originally acquired by the Navy, more than half were later droned as DT-38As, but about half a dozen survive with the Naval Test Pilots' School at Patuxent River, Md. (Data: see December 1992 Trainers Gallery.)

T-39D/N Sabreliner

About a dozen **T-39N** Sabreliners are operated under civil contract for short-term Naval Flight Officer radar training at Pensacola, Fla. (VT-10 and -86). Of 42 earlier **T-39Ds** received, only about half a dozen remain, used mainly for communications and test purposes. (Data generally as for CT-39E except as follows.)

Power Plant: two Pratt & Whitney J60-P-3A turbojets; each 3,000 lb thrust.

Weights: gross 17,760 lb.

Performance: max speed at 20,000 ft 540 mph, service ceiling 42,000 ft, typical range 1,375 miles.

T-44A/B Pegasus

The Beech King Air was selected in 1976 to fill the Navy's VTAM(X) requirement for a twin-turboprop instrument trainer for pilots of multiengine aircraft. Combining features of the civil C90 and E90 King Airs, its standard commercial avionics were augmented by Tacan, UHF radio, and UHF/DF equipment. **T-44A** procurement totaled 61, all being delivered by mid-1980 to replace TS-2A Trackers. Student training began in July 1977, and some 54 T-44As are still in service with VT-28 and -31 at NAS Corpus Christi, Tex. Five **T-44Bs**, with more modern avionics, were purchased recently to offset attrition. (Data for T-44A.)

Contractor: Beech Aircraft Corporation.

Power Plant: two Pratt & Whitney Canada PT6A-34B turboprops; each flat rated to 550 shp.

Accommodation: one instructor, two students, and two observers.

Dimensions: span 50 ft 3 in, length 35 ft 6 in, height 14 ft 2½ in.

Weights: empty 6,326 lb, gross 9,650 lb.

Performance: max cruising speed at 12,000 ft 287 mph, service ceiling 27,620 ft, max range 1,456 miles.

T-45A Goshawk

Development background of the T-45A is given in the December 1992 Trainers Gallery; the data below update that entry. Based on the Series 60 BAe Hawk, changes to meet Navy requirements have included new landing gear, a deck hook and catapult launch bar, twin airbrakes, strengthened airframe, customer-specified avionics and cockpit displays, a more powerful version of the Adour engine, and full-span leading-edge slats. Integration of so many disparate factors has naturally delayed service entry, but deliveries to VT-21 at NAS Kingsville, Tex., began in June 1992, the first course began in October, and 10 T-45As had been delivered by the beginning of this year, including two to the NATC at Patuxent River, Md. Other slated units are VT-7 and -19 at Meridian, Miss., and VT-22 and -23 at Kingsville. The training carrier is USS *Forrestal*. It is planned to introduce a "glass" cockpit from the 73d aircraft (1996); meanwhile, 48 T-45As had been funded by January 1993. The Navy still appears less than happy with the Adour power plant, and the Garrett F124 is being considered as a possible alternative.

Contractors: McDonnell Douglas Corporation; British Aerospace plc.

Power Plant: one Rolls-Royce Turbomeca F405-RR-401 (navalized Adour MK 871) turbofan; 5,845 lb thrust.

Accommodation: instructor and pupil in tandem.

Dimensions: span 30 ft 9 1/4 in, length 39 ft 4 in, height 13 ft 4 1/4 in.

Weights: empty 10,184 lb, gross 14,028 lb.

Performance: max speed at 8,000 ft 625 mph, service ceiling 40,000 ft, T-O field length 3,610 ft, landing field length 3,310 ft, ferry range (internal fuel) 952 miles.

Armament: two underwing pylons for practice bombs, rocket pods, or drop tanks; provision for centerline stores pod.

TA-4F/J Skyhawk

Of the 241 TA-4Fs and 281 TA-4Js originally delivered, the US Navy claimed a February 1993 inventory of 175 aircraft, almost all of which are now TA-4Js. The majority are with Training Wings 1 (VT-7) and 2 (VT-22) at Meridian, Miss., and Kingsville, Tex., respectively, plus a few with Marine Aviation Logistics Squadrons MALS-42 and -49 at Alameda, Calif., and Willow Grove, Pa. (Data for TA-4J except where indicated.)

Contractor: McDonnell Douglas Corporation (Douglas Aircraft Co. Division).

Power Plant: one Pratt & Whitney J52-P-6 turbojet; 8,500 lb thrust.

Accommodation: instructor and pupil in tandem.

Dimensions: span 27 ft 6 in, length (excluding pod) 42 ft 7 1/4 in, height 15 ft 3 in.

Weights (TA-4F): empty 10,602 lb, normal gross 15,783 lb.

Performance (TA-4F): max speed at S/L 675 mph, service ceiling approx 49,000 ft, T-O run 3,380 ft, typical range (clean) 1,350 miles.

Armament: one 20-mm gun in wingroot (not always fitted).

TC-4C Academe

Eight TC-4Cs (four each) equip VA-42 at Oceana, Va., and VA-128 at Whidbey Island, Wash., as crew trainers for the A-6E Intruder. Ordered in late 1966, they were modified from standard Gulfstream I business transports to have a radome and TRAM "ball" in the extended nose, plus a replica two-person flight deck and four radar training positions in the main cabin.

Contractor: Gulfstream Aerospace Corporation (originally Grumman Aircraft Corporation).

Power Plant: two Rolls-Royce Dart Mk 529-8X turboprops; each 2,185 ehp.

Accommodation: flight crew of two; up to six students and an instructor.

Dimensions: span 78 ft 4 in, length 67 ft 10 3/4 in, height 23 ft 4 in.

Weights: empty 24,575 lb, gross 36,000 lb.

Performance: max cruising speed at 25,000 ft 348 mph, service ceiling 33,600 ft, T-O field length 3,000 ft, landing field length 2,180 ft, typical range 1,980 miles.



TC-4C Academe A-6E crew trainer
(Paul Jackson)



AH-1W SuperCobra (Paul Jackson)



CH-46E Sea Knight in Kuwait
(Paul Jackson)

mission in Vietnam on February 22, 1971. Production totaled 67 for the USMC, all armed with a three-barreled General Electric M197 20-mm cannon and with wing pylon attachments for four LAU-61 or -68 rocket pods, SUU-11A Minigun pods, or similar ordnance up to 2,200 lb maximum.

In the AH-1T Improved SeaCobra (57 built), dynamic components from the Bell 214, a 3 ft 7 in fuselage stretch, and a change to a higher-rated version of Pratt & Whitney Canada T400 Twin-Pac turboshaft bestowed significant performance advantages in agility and a more than doubled payload. Most were retrofitted to carry the TOW antiarmor missile system. The AH-1T served with HMLA-269 at New River, N. C., and HMT-303 at Camp Pendleton, Calif., but all 42 remaining have been converted to AH-1W standard, deliveries having begun January 26, 1989.

With yet further power, provided by General Electric T700s, the AH-1W SuperCobra has expanded weapons capability, including Hellfire and Sidarm missiles. Deliveries of more than 120 on order began on March 27, 1986. Already equipped are HMLA-169, -267, -367, and -369 at Camp Pendleton and HMLA-167 and -269 at New River, providing detachments of between four and six Cobras to LPH and newer LHA assault vessels for antiarmor, troop-carrier escort, armed reconnaissance, multiple weapon fire-support, and target acquisition missions. A few AH-1Ws also serve with USN's VX-5 at China Lake, Calif., and the Naval Air Warfare Center. All six HMLA squadrons, and training squadron HMT-303 at Camp Pendleton, were due to be equipped fully with the AH-1W by the middle of FY 1993, and Reserve units HMA-773 and -775 should also be all-W by 1995.

Night capability for the helicopter's M65 TOW sight, consisting of FLIR and a laser-ranger, has been developed jointly by the USMC and Israel, based on a Rafael thermal imaging sight. From January 1991, new-build AH-1Ws have Doppler navigation and an enhanced EW system, and retrofit is planned of a four-blade bearingless main rotor. An AH-1(4B)W (four-blade Whiskey) prototype, evaluated in 1990, offers a 2,050 lb increase in gross weight, uprated transmission, increased internal fuel, six-station stub wings, a digital flight-control system, and night targeting sights, but there are no plans to acquire this version. (Data for AH-1W.)

Contractor: Bell Helicopter Textron.

Power Plant: two General Electric T700-GE-401 turbo-shafts; each 1,690 shp.

Accommodation: pilot and gunner.

Dimensions: rotor diameter 48 ft 0 in, fuselage length 45 ft 6 in, height 14 ft 2 in.

Weights: empty 10,200 lb, gross 14,750 lb.

Performance: max speed at S/L 175 mph, service ceiling more than 14,000 ft, max range 395 miles.

Armament: turreted M197 20-mm gun; up to eight TOW/Hellfire ATMs, two Sidewinder AAMs, or two Sidarm ARMs; or four rocket/gun pods.

CH/HH/UH-46D, CH-46E, and VH-46F Sea Knight

Principal combat assault helicopter of the Marine Corps since 1964, and still the Navy's major Vertrep aircraft (15,000 hours flown in Desert Shield/Storm), the Sea Knight is destined to serve until at least the early 2000s. Relatively few early CH/HH/UH-46As now remain, but unmodified examples of the corresponding -46D models, with uprated -10 version of the GE T58 turboshaft, can still be found with four Navy HC squadrons (-3, -6, -8, and -11). New production ended in 1971 with the 624th CH-46, final production models being the CH-46F (168 built) and six VIP transport VH-46Fs for HMX-1. Starting in 1977, 273 D and F models were updated at MCAS Cherry Point, N. C., as CH-46Es, with T58-GE-16 turboshafts delivering one-third more power, crash-resistant crew seats and fuel system, and improved rescue equipment. New glassfiber rotors have also been added to the CH-46E fleet. Another 38 (approx) CH-46Ds were modified to HH-46D for search-and-rescue duties at four Marine Corps base stations.

To keep the remaining unmodified CH/UH-46Ds, and the CH-46E, in operation beyond the turn of the century, contracts were awarded to Boeing during the 1980s for SR&M (safety, reliability, and maintainability) modifications. These included revision of the hydraulic control system, flight controls, electric, rotor drive, airframe, and landing gear in 357 helicopters. All have been updated at Cherry Point with Boeing-supplied kits of parts, the first redelivery taking place in July 1985. Beginning in 1990, the HEFS (Helicopter Emergency Flotation System) will be installed in all CH-46s, while 171 CH-46Es are to receive modifications to increase fuel capacity, and others are to gain Doppler navigation systems. Relunched production of a "CH-46X" with updated avionics is one proposed alternative to the Osprey.

Fifteen Marine medium helicopter squadrons operate CH-46Es from Kaneohe Bay, Hawaii, New River, N. C., Tustin, Calif., and Futenma, Japan, and two more of the Reserve fly from Tustin and Norfolk, Va. Deployments are made regularly on LPH and LHA vessels. Additionally, HMT-204 and -301 are training squadrons. (Data for CH-46E.)

Contractor: Boeing Helicopters.

Power Plant: two General Electric T58-GE-16 turboshafts; each 1,870 shp.

Accommodation: flight crew of two and 17 troops, 15 litters, or 10,000 lb of cargo.

Dimensions: rotor diameter (each) 51 ft 0 in, fuselage length 44 ft 10 in, height 16 ft 8 1/2 in.

Weights: empty 16,000 lb, gross 24,300 lb.

Performance: max speed at S/L 166 mph, service ceiling 9,400 ft, range 173 miles.

CH-53A/D, RH-53D, and VH-53D Sea Stallion

Delivered to the Marine Corps from September 1966, early CH-53A Sea Stallions proved their worth soon after in Vietnam, operating in the heavy assault role, but few, if any, of the 139 original CH-53As remain. The CH-53 employs the dynamic components of the Army's CH-54 Tarhe, married to a watertight hull (for emergency sea landings) fitted with clamshell rear doors. Maneuvering of heavy cargo is assisted by hydraulic winches and a floor roller track, typical loads including pallets, vehicles, and a 105-mm howitzer and carriage. For storage aboard LPH and LHA assault carriers, the CH-53 has a folding tail and main rotors. From 1969, the CH-53As were followed by 126 CH-53Ds with an enlarged cabin for 55 instead of 38 troops and uprated T64-GE-412/413 engines. Deliveries ended in January 1972, the D variant remaining in service with heavy helicopter squadrons HMM-363 and -462 at Tustin, Calif.; HMM-362 at New River, N. C.; and HMM-463 at Kaneohe Bay, Hawaii, plus Reserve HMM-772 at Willow Grove, Pa., and detachments. HMT-302 provides training at Tustin. Two aircraft were modified to VH-53D and serve as VIP transports with HMX-1 at Quantico, Va.

Navy use of the Sea Stallion for MCM (mine-countermeasures) missions began when HM-12 was issued with 15 RH-53A conversions of USMC helicopters. Thirty purpose-built RH-53Ds followed in September 1973, these having provision for aerial refueling and two 0.5-in machine guns on flexible mountings. T64-

Helicopters

AH-1J SeaCobra and AH-1W SuperCobra

Twin-engine versions of the Cobra are in service with Marine Corps light attack helicopter squadrons, which have mixed complements of Bell UH-1N Hueys and one of two varieties of Cobra. First of these, the AH-1J, continues to serve the USMC Reserve at Atlanta, Ga. (HMA-773), having staged its first combat



CH-53E Super Stallions refueling from a KC-130F of VMGR-252

GE-415 power plants of 4,380 shp were retrofitted. Current operators are HM-18 at Norfolk, Va., and Reserve's HM-19 at Alameda, Calif. (Data for CH-53D.)
Contractor: Sikorsky Aircraft Division of United Technologies Corporation.
Power Plant: two General Electric T64-GE-412/413 turboshafts; each 3,695/3,925 shp.
Accommodation: flight crew of three and up to 55 equipped troops or 24 litters.
Dimensions: rotor diameter 72 ft 3 in, fuselage length 67 ft 2 1/4 in, height 24 ft 10 1/2 in.
Weights: empty 23,485 lb, max gross 42,000 lb.
Performance: max speed at S/L 196 mph, service ceiling 18,000 ft, max range (with reserves) 250 miles.

CH-53E Super Stallion

The Western world's largest and most powerful helicopter is a three-engined Stallion variant with a longer fuselage, revised transmission, and doubled lifting capacity. As a result, its principal Marine Corps role is cargo transport (rather than troop airlift) and recovery of downed aircraft. The Navy employs the helicopter for vertical replenishment of ships at sea and airlifting unserviceable aircraft incapable of leaving carriers under their own power. Maximum payload is 36,000 lb underslung. Orders currently total 158 of the 177 required, of which about 130 (including 15 USN) had been delivered by early 1993.

Several upgrades are in prospect, including the HNVS (Helicopter Night Vision System) for low-level night/adverse weather operations. This comprises a Martin Marietta pilot's NVS, Honeywell integrated helmet and display sighting system, and Northrop-developed equipment from the Bell AH-1S surrogate trainer system. Also planned are Omega navigation, composite tail rotor blades, ground proximity warning, improved cargo handling equipment, missile warning, chaff/flame dispensers, and an inerting (nitrogen-based) fuel system. Sidewinder AAMs may be fitted for self-defense. Operational use of the CH-53E began in 1983 with HC-4 at Sigonella, Sicily. Other operators include HC-1 at North Island, Calif., HC-2 at Norfolk, Va., and the Naval Air Warfare Center; and the Marines' HMMH-361, -461, -464, -465, and -466, plus HMT-302 for training. Eventually, six USMC active squadrons will have CH-53Es.

Contractor: Sikorsky Aircraft Division of United Technologies Corporation.
Power Plant: three General Electric T64-GE-416 turboshafts; each 4,380 shp.
Accommodation: flight crew of three, up to 55 equipped troops or 24 litters, or 32,000 lb of cargo.
Dimensions: rotor diameter 79 ft 0 in, fuselage length 73 ft 4 in, height 29 ft 5 in.
Weights: empty 33,226 lb, gross 73,500 lb.
Performance: max speed at S/L 196 mph, service ceiling 18,500 ft, max ferry range 1,290 miles.

HH-60H Seahawk

This Seahawk variant (18 ordered, in service from 1990) is generally similar to the SH-60F except for deletion of the ASW suite, addition of extra ECM and warning systems, an NVG-compatible cockpit, and a pair of door-mounted 7.62-mm M60 machine guns. Intended for combat search and rescue and support of covert operations, it can transport eight Navy SEALs or pick up four rescues; it has also been used alongside SH-60Fs for carrier plane-guard duties. The HH-60H is allocated on an occasional basis to Navy SH-60F squadrons. (Data similar to SH-60.)

MH-53E Sea Dragon

Following successful use of the RH-53D Sea Stallion in the MCM (mine-countermeasures) role, this much



MH-53E Sea Dragon



SH-2F Seasprite of HSL-33 "Sea Snakes" (Paul Jackson)

more powerful version was first flown September 1, 1983. It is identified by grossly enlarged sponsons carrying nearly 1,000 gallons of additional fuel; improved hydraulic and electrical systems; and minefield, navigational, and AFC systems, including automatic tow couplers and automatic approach to/depart from hover features. Operational equipment towed by the helicopter comprises mechanical, acoustic, and magnetic hydrofoil sweeping gear weighing up to 26,000 lb. Deliveries total 36 of a requirement for 56, and (remarkably) Congress doubled FY 1994 procurement from four to eight. Users are HM-12 and -14 at Norfolk, and -15 at Alameda. (Data as for CH-53E, except empty weight 36,336 lb.)

SH-2F Seasprite and SH-2G Super Seasprite

Extensive modifications are keeping the Seasprite operational until well into the next century, having begun in 1967 when all utility UH-2A/2Bs were converted to twin-engine (General Electric T58) UH-2Cs or HH-2C/Ds. Twenty became ASW SH-2Ds aboard USN destroyers. Addition of more comprehensive antisubmarine and surveillance equipment to meet the LAMPS I (Light Airborne Multipurpose System 1) requirement resulted in further reworking of the Seasprite fleet to SH-2F standard, 142 being delivered by 1989 plus 16 SH-2D conversions. Six new-build helicopters have been ordered to SH-2G Super Seasprite standard, and 18 SH-2Fs will be converted. These have much more powerful engines, composite rotor blades with 10,000 h life, dual 30-kVA electric, gas-turbine APU, in-flight refueling, and many other upgrades. Avionics are digital (1553B databus), with LN-66P radar, ASQ-81(V)2 MAD, ALR-66(V)1 ESM/warning, ASN-150 tactical management, 15 DIFAR/DICASS sonobuoys, ARR-84 sonobuoy receiver, UYS-

503 processor, AKT-22(V)6 data link, ARN-146 on-top indicator, ASQ-188 torpedo presetter, ALE-39 chaff/flame dispenser, two torpedoes, eight markers, provision for two pintle-mounted machine guns, and a 4,000 lb hoist. In Fleet service, additions include AAQ-16 FLIR, AAR-47 missile warning, ALQ-144 IR jammer, and ARC-184 secure radio. For subsurface mine detection the ML-30 (Magic Lantern) laser sensor was tested in the Gulf War, and prototypes of the ML-90 were delivered in October 1992. ML funding was more than doubled in the FY 1994 budget. SH-2G deliveries to HSL-84 began in December 1992; HSL-94 is also to receive this version. (Data for SH-2G.)

Contractor: Kaman Aerospace Corporation.
Power Plant: two General Electric T700-GE-401 turboshafts; each 1,723 shp.
Accommodation: pilot, tactical coordinator, and sensor operator.

Dimensions: rotor diameter 44 ft 4 in, fuselage length 40 ft 0 in, height 15 ft 0 1/2 in.
Weights: empty 7,600 lb, gross 13,500 lb.
Performance: max speed 159 mph, service ceiling 23,900 ft, max range (two external tanks) 500 miles.
Armament: two Mk 46/50 torpedoes or AGM-119B Penguin antiship missiles. Optionally, two pintle-mounted 7.62-mm machine guns.

SH-3G/H Sea King

Replacement of the Sea King in ASW roles aboard aircraft carriers continues, but the helicopter will continue to play a vital role in defense of the fleet for many more years. Current versions are conversions of A and D airframes. ASW systems are removed in the SH-3G utility version, produced by converting 103 SH-3As and two SH-3Ds for plane-guard and light transport duties aboard attack carriers. The interior holds 15 canvas seats and long-range fuel tanks.

The antisubmarine SH-3H, of which 145 were remanufactured (including 12 by Agusta in Italy), was announced in 1971 with the aim of increasing fleet helicopter capability against submarines and low-flying missiles. It also undertakes the former SH-3G roles of "Pedro" and general-purpose communications. Revised equipment includes AQS-13B lightweight sonar, active and passive sonobuoys, ESM sensors, H-240 chaff dispenser, ASQ-81 towed MAD, and Canadian Marconi LN-66HP surveillance radar in a belly radome. The radar and ESM were later removed as a weight-saving measure, allowing the fit of an improved tactical navigation system and sonar processing equipment without exceeding the 21,000 lb gross weight limitation. Structural and dynamic components have been upgraded in parallel with operational equipment. Atlantic Fleet carriers are served by HS-5, -7, and -11 at Jacksonville, Fla.; and the Pacific Fleet by HS-8 and -12 at North Island, Calif. HS-75 and -85 are Reserve squadrons at Jacksonville and Alameda, Calif. (Data for SH-3H.)

Contractor: Sikorsky Aircraft Division of United Technologies Corporation.
Power Plant: two General Electric T58-GE-10 turboshafts; each 1,400 shp.
Accommodation: flight crew of two and two systems operators.
Dimensions: rotor diameter 62 ft 0 in, fuselage length 54 ft 9 in, height 16 ft 10 in.
Weights: empty 12,350 lb, gross 21,000 lb.
Performance: max speed 166 mph, service ceiling 14,700 ft, max range 625 miles.

SH-60B/F Seahawk

Assigned for several years to small and medium-size Navy warships, the Seahawk is now being taken aboard aircraft carriers to replace Sea Kings. Produced to meet the LAMPS III (Light Airborne Multipurpose System 3) requirement, in which commonality with the Army's chosen utility helicopter was a prerequisite, the initial SH-60B Seahawk version entered production in 1983 and has been operationally deployed since 1984. Role equipment added to the basic H-60 includes chin-mounted pods for ESM equipment, underfuselage Texas Instruments AN/AP-124 search radar, pylons for two torpedoes or additional fuel tanks, Texas Instruments AN/ASQ-81 towed MAD to starboard, a sensor operator's position in the cabin, a 25-round sonobuoy launcher to port, an IBM AN/UYS-1 acoustic processor, folding main rotors, a rescue hoist, folding tailboom, modified undercarriage, deck haul-down equipment, and emergency buoyancy features.

The USN has a requirement for 260 SH-60Bs, of which 180 had been received by early 1993. These helicopters are due to form 95 ship's flights—replacing Kaman Seasprites (LAMPS I) in some cases—aboard Perry-class frigates, Spruance-class destroyers, and Ticonderoga-class guided missile destroyers. They provide all-weather capability for detection, classification, localization, and interdiction of surface vessels and submarines and are able to communicate with their parent vessel by data link. Secondary missions include SAR, vertical replenishment, medevac, fleet

support, and radio relay. Operating squadrons are HSL-40, -42, -44, -46, and -48 at Mayport, Fla., for Atlantic Fleet vessels; HSL-41, -43, -45, -47, and -49 at North Island, Calif., on the Pacific seaboard; HSL-51 at Atsugi, Japan; and part of VX-1 at Patuxent River, Md.

For the closing stages of the Gulf War, 25 SH-60Bs received a special fit of IR jammers, chaff/flare dispensers, missile warning equipment, and a 7.62-mm machine gun in the cabin doorway. Six of these (and later a seventh) were equipped additionally with FLIR. New-build SH-60Bs (delivered from August 1992 to HSL-43) have provision for NPT Penguin antiship missiles, the Mk 50 advanced lightweight torpedo, an upgraded sonobuoy receiver, GPS, and other avionics improvements. Some earlier helicopters will be retrofitted to provide the Navy with a total of 115 Penguin-capable Seahawks.

In March 1985, Sikorsky was contracted to develop the SH-60F, or "CV-Helo" version, to replace SH-3H Sea Kings in the provision of antisubmarine protection within the immediate area of a carrier battle group. All LAMPS III sensors, avionics, and sonobuoy launchers are removed, being replaced by Allied Signal AN/AQS-13F dipping sonar and an additional weapon pylon on the port side of the fuselage, to which may be added a third auxiliary fuel tank. Four crew members are carried. Possible later additions include search radar, FLIR, night vision systems, sonobuoy data link, passive ESM, and MAD in conjunction with a gross weight increase to 23,500 lb. Immediate requirements are for 76 SH-60Fs from 175 eventually planned. Deliveries began in 1989 to HS-10 at North Island, Calif., other operational units being HS-2, -4, and -6 at the same base, and HS-3 at Jacksonville, Fla. (Data for SH-60B.)

Contractor: Sikorsky Aircraft Division of United Technologies Corporation.

Power Plant: two General Electric T700-GE-401C turboshafts; each 1,900 shp.

Accommodation: pilot, tactical officer, and sensor operator.

Dimensions: rotor diameter 53 ft 8 in, fuselage length 50 ft 0 3/4 in, height 17 ft 0 in.

Weights: empty 13,648 lb, gross 20,244 lb.

Performance: max speed 145 mph, service ceiling 19,000 ft, endurance (SH-60F) 4 hours.

Armament: two Mk 46/50 torpedoes or AGM-119B Penguin missiles. (Two pintle-mounted machine guns in HH-60H.)

TH-57B/C SeaRanger

Based on the commercial Bell 206 JetRanger, the SeaRanger has been standard USN helicopter pilot trainer since 1968, and a replacement, the Bell TH-67 (described in "US Army" section), is being studied. The TH-57B and -57C were new-production helicopters, related to the Bell 206B JetRanger III, with uprated 250-C20J engines and Navy-specified avionics. The TH-57B, of which 51 were built for the primary stage of instruction, has a basic VFR panel only and lacks a stability augmentation system (SAS). The TH-57C (89 built), however, is configured for advanced instrument training, with a SFENA three-axis SAS and full IFR avionics that include VOR, Tacan, ADF, HSI, and CDI. Among other features of the C are a rotor brake, jettisonable doors, and a 150 lb capacity external cargo hook. All 140 TH-57B/Cs are shared by two squadrons within Training Air Wing Five (HT-8, basic rotary, and HT-18, advanced) at Whiting Field, Fla., where they are used to instruct more than 600 Navy, Marine Corps, Coast Guard, and foreign pilots per year. (Data for TH-57C.)

Contractor: Bell Helicopter Textron.

Power Plant: one Allison 250-C20J turboshaft; 420 shp.

Accommodation: instructor (on left) and pupil; three rear seats for student "familiarization rides."

Dimensions: rotor diameter 33 ft 4 in, fuselage length 31 ft 2 in, height 9 ft 6 1/2 in.

Weights: empty 1,852 lb, gross 3,200 lb (3,350 lb with external load).

Performance: max cruising speed 131 mph, max range 527 miles.

UH/HH-1N Iroquois

Much preferred for overwater operations because of its twin-engine reliability, the UH-1N is based on the Bell 212 originally sponsored by Canada with a PT6T (T400) Turbo Twin-Pac installation. This is, itself, a UH-1H airframe with 220 cubic ft of interior space and the ability to carry 3,383 lb of cargo. Deliveries began to the Navy and Marine Corps in 1971, and 211 were received, including six VVIP VH-1Ns for the VXE-1 (since converted to HH-1N, as were 38 of the 205 UH-1Ns). Most are in USMC service, about a dozen UH-1Ns serving with each of the six AH-1 Cobra squadrons, equipped with chaff/flare and IR decoys and used for light attack and forward air control duties. A further two dozen or so UH-1Ns are in service with three USMC Reserve units. The HH-1Ns are used mainly aboard LHA and LPH amphibious assault ships or with shore-



OV-1D Mohawk with SLAR pod and drop tanks (Paul Jackson)



RC-12D Guardrail battlefield surveillance aircraft (Paul Jackson)

based search-and-rescue flights. The USN has two partly equipped squadrons: HC-16 at Pensacola, Fla., for training base rescue flights, and VXE-6 at Point Mugu, Calif., which is assigned to Antarctic operations. (Data for UH-1N.)

Contractor: Bell Helicopter Textron.

Power Plant: Pratt & Whitney Canada T400-CP-400 (Turbo Twin-Pac); combined 1,250 shp (individual 900 shp).

Accommodation: pilot and 8-10 Marines or six litters and medical attendant.

Dimensions: rotor diameter 48 ft 2 1/4 in, fuselage length 42 ft 4 3/4 in, height 14 ft 4 3/4 in.

Weights: empty 6,370 lb, gross 10,500 lb.

Performance: max speed at S/L 139 mph, service ceiling 15,000 ft, range 198 miles.

Armament: provision for door-mounted 0.50-in or 7.62-mm machine gun(s) and/or 2.75-in rockets.

VH-60N Black Hawk

Transport of the President and other VVIPs by helicopter is entrusted to the Executive Flight Detachment of Marine Corps squadron HMX-1 at Quantico, Va. Beginning November 30, 1988, the unit was augmented by the first of nine VH-60Ns. Though based on the Army's Black Hawk, these special mission helicopters have a Seahawk-type flight-control system and ASI, soundproofing, radio operator's station, EMP hardening, additional avionics, and special interior fittings. (Data similar to those for SH-60.)

US Army By Paul Jackson

Reconnaissance and Special-Duty Aircraft

OV-1D and RV-1D Mohawk

Out of production since the early 1970s, the Mohawk has been upgraded in subsequent years to provide the Army with radar, IR, photo, and electronic intelligence in all weather. Attributes of three earlier versions are combined in the current OV-1D. This has the KS-113A photo-survey system comprising KA-60C and KA-76 panoramic cameras and may also carry either ECM-resistant APS-94F SLAR in a rapidly removable "canoe" or an AN/AAS-24 IR detection system in the lower

fuselage. A mission equipment payload of up to 2,129 lb may be carried, but the OV-1D is no longer tasked with armament. Wing pylons normally mount two 100 gal fuel tanks and a Sanders AN/ALQ-147 "Hot Brick" kerosene-powered IR jamming pod.

Only 37 new OV-1Ds were built, but another 79 OV-1B/Cs were converted to this standard, the fleet now having been reduced to 50. The aircraft's AN/UPD-7 airborne radar surveillance system allows transmission of information via data link to a ground station, where it is converted to a film image for near-real-time analysis. UPD-7 can also interface with the Ground Station Module of Joint STARS.

Addition of the Quick Look I elint package in OV-1Cs gave rise to the RV-1C, while the definitive Quick Look II is fitted to the RV-1D. Tasked with locating opposing radar sites, the RV-1 may be distinguished by rectangular sensor pods on outboard underwing pylons. Thirty RV-1Ds were converted, all of which are being replaced by Beech RC-12Ks beginning in 1991. RV-1 equipment includes AN/ALQ-133 jammers, an AN/MSA-34 antenna group, and an AN/USQ-161 digital data set. There are 14 in service.

Mohawks serve in Military Intelligence Battalions (Aerial Exploitation) at Pyongtaek, South Korea (3d), in California (304th), in Forces Command at Hunter AAF, Ga. (224th), and at Robert Grey AAF, Fort Hood, Tex. (15th). ARNG operators are Area Exploitation Battalions at Hunter AAF (151st) and Salem, Ore. (641st), plus 158th Military Intelligence Company, also at Hunter. Last Europe-based Mohawks were withdrawn earlier this year. (Data for OV-1D.)

Contractor: Grumman Aircraft Group.

Power Plant: two Textron Lycoming T53-L-701 turboprops; each 1,400 shp.

Accommodation: pilot and systems operator on Martin-Baker J5 ejection seats.

Dimensions: span 48 ft 0 in, length 41 ft 9 in, height 13 ft 0 in.

Weights: basic 12,054 lb, gross 18,109 lb.

Performance: cruising speed 253 mph, service ceiling 25,000 ft, T-O field length 1,175 ft, landing field length 1,060 ft, max range 945 miles.

RC-12D/G/H/K/N/P Guardrail

Six RC-12 versions are operational or about to enter service. The RC-12D Improved Guardrail V attained IOC in 1985 for battlefield surveillance duties in Europe. The aircraft provides a platform for the AN/USD-9(V)2 remotely controlled communications intercept and direction-finding system, which operates in the 20-75, 100-150, and 350-450 MHz bands and is able to report directly to tactical commanders at corps level and below. It is fitted with an aircraft survivability equipment suite, a Carousel IV-E inertial platform with Tacan, and mission equipment including a data link, AN/ARW-83(V)5 airborne data relay, and ESM antennas in the wingtip pods. Prominent vertical "winebottle" antennas are located above and below the wing, while another protrudes from the rear fuselage. Dielectric panels cover other sensors in the tail and an undernose pod. Data processing is by an AN/TSQ-105(V)4 system, which senses and analyzes radio and radar signals, comparing them with a "threat library" and classifying accordingly. Direction and range parameters are included. With ESL Inc. as prime system contractor, Beech converted 13 C-12D airframes to RC-12D standard, 12 of them based in Europe with the 1st and 2d Military Intelligence Battalions at Wiesbaden and Stuttgart, Germany, the other at Hq. FORSCOM, Fort McPherson, Ga. On disbandment of 2d MIB, the 11 European survivors were withdrawn in September 1991 and issued to 224th MIB, Hunter AAF, Ga. (augmenting Mohawks), 138th Aviation Company, Orlando, Fla. (also RU-21s), or earmarked for RC-12N/P conversion.

A further three C-12Ds became RC-12Gs in 1985 for operations from Howard AFB, Panama. Additionally, six conversions were completed in 1988 as Guardrail Common Sensor (Minus) RC-12Hs, with gross weight increased from 14,200 to 15,000 lb. All are with the 3d MIB at Pyongtaek, South Korea.

Nine RC-12K Guardrail Common Sensor aircraft, ordered in October 1985 with 1,280 shp PT6A-67 turboprops and 16,000 lb gross weight, were delivered to 1st MIB in May 1991 (eight) or converted to RC-12N prototype (one). A further 21 RC-12 variants are in process of delivery to XVIII Airborne Corps in FY 1993 and Forces Command in FY 1995. Twelve RC-12P conversions from RC-12N were ordered in early 1993 for 1994-95 delivery, and five more for 1995-96. (Data for RC-12D.)

Contractor: Beech Aircraft Corporation.

Power Plant: two Pratt & Whitney Canada PT6A-41 turboprops; each 850 shp.

Accommodation: two flight crew; eight passengers optional.

Dimensions: span 55 ft 6 in, length 43 ft 10 in, height 15 ft 5 in.

Weights: basic 8,143 lb, gross 14,200 lb.

Performance: cruising speed 300 mph, service ceiling 31,000 ft, endurance 5 h 45 min.

RU-21A/B/C/D/H Ute

Several electronic versions of the U-21 transport remain in service, although replacement of some is gradually under way by the RC-12 derivatives. First to appear, and still in service, were the **RU-21B** and **RU-21C**, which introduced 620 shp PT6A-29 turboprop engines and a 10,900 lb gross weight. Only three B and two C versions were produced, both having a prominent external aerial array (which differed slightly between the models) for sigint and electronic warfare missions. Similarly tasked were seven **RU-21A** conversions from U-21A, which grossed at 10,200 lb. RU-21Ds (16 new; 18 conversions) were converted via RU-21E to **RU-21Hs** (total 21) with some structural strengthening, improved electronic equipment, and revised wingtips and landing gear doors. RU-21Hs employ the Guardrail V sigint package described in the RC-12 entry above. Principal operators are 15th MIB at Fort Hood, Tex., and 224th MIB at Hunter AAF, Ga. Eight RU-21A/B/Cs are concentrated at Orlando, Fla., with the 138th Aviation Company (EW), Army Reserve, operating the AN/TLQ-11 Cefrim Leader system with RU-21As for transmitter location, RU-21Bs supplying

Contractor: Beech Aircraft Corporation.
Power Plant: two Pratt & Whitney Canada PT6A-41 turboprops; each 850 shp.
Accommodation: two pilots and eight passengers.
Dimensions: span 54 ft 6 in, length 43 ft 10 in, height 15 ft 5 in.
Weights: basic 8,084 lb, gross 12,500 lb.
Performance: cruising speed 300 mph, service ceiling 35,000 ft, max range 2,273 miles.

C-20E/F Gulfstream III/IV

Two late-production Gulfstream III executive jets were funded in FY 1987 and delivered the following year to Davison Air Command at Andrews AFB, Md., for **C-20E** VIP transport duties. They were joined by a **C-20F** Gulfstream IV in 1991. An older turboprop Gulfstream II (VC-11A) was obtained in 1989. (*Data for C-20F.*)

Contractor: Gulfstream Aerospace Corporation.
Power Plant: two Rolls-Royce Spey Mk 611-8 turbofans; each 13,850 lb thrust.
Accommodation: two or three crew and up to 19 passengers.
Dimensions: span 77 ft 10 in, length 88 ft 4 in, height 24 ft 5 in.
Weights: basic 35,500 lb, gross 73,200 lb.

announced plans to order 10 (later increased to 16) **C-23Bs** to replace C-7 Caribous in the role of transporting aviation spares and components between Army National Guard bases and Aviation Classification Repair Activity Depots (AVCRADs). Changes from the USAF C-23A variant include strengthened wings and landing gear, modernized flight-deck instrumentation, an air-opening facility for the freight ramp, greater payload (7,280 lb), and uprated engines with five-blade propellers. The C-23Bs were delivered over 24 months from September 1990 and augmented by nine ex-USAF **C-23As**. Operators also include State Area Commands (STARCs) of the Guard. Four Shorts 330s, used since 1985 by the Pacific Missile Test Center, were temporarily withdrawn in March 1992 and will be fitted with rear ramps at NAS Lakehurst, N. J., as **C-23Cs**. Five C-23Bs, equipped with RWR, IRCM, and chaff/flare dispensers, were used in Desert Shield/Storm in 1990-91. (*Data for C-23B.*)

Contractor: Short Brothers plc, UK.
Power Plant: two Pratt & Whitney Canada PT6A-65AR turboprops; each 1,424 shp.
Accommodation: two pilots and one flight mechanic.
Dimensions: span 74 ft 10 in, length 58 ft 0 1/2 in, height 16 ft 5 in.
Weights: basic 16,040 lb, gross 25,600 lb.
Performance: cruising speed at 10,000 ft 223 mph, T-O run 1,850 ft, landing run 1,130 ft, max range 1,188 miles.

T-42A Cochise

This military version of the B55 Baron was formerly used as an instrument trainer at the Fort Rucker, Ala., aviation school. The 15 which remain are used for liaison by units of the Reserve (two aircraft) and Army National Guard.

Contractor: Beech Aircraft Corporation.
Power Plant: two Teledyne Continental IO-470-L piston engines; each 260 hp.
Accommodation: four persons including pilot.
Dimensions: span 37 ft 9 3/4 in, length 27 ft 3 in, height 9 ft 7 in.
Weights: basic 3,075 lb, gross 5,100 lb.
Performance: cruising speed at 6,000 ft 225 mph, service ceiling 19,700 ft, T-O run 1,400 ft, landing run 1,467 ft, max range 1,225 miles.

U-8F Seminole

The U-8F is a military parallel of the Queen Air 65, powered by two 340 hp IGSO-480 piston engines. During the 1980s, a further nine Beech 65s were acquired from civilian sources, together with three Beech 80 Queen Airs. Most of the 48 remaining U-8Fs have been modified by Excalibur Aviation of San Antonio, Tex., to Queenair 800 standard with uprated power plants and propellers, while a few are **VU-8FX** conversions with turboprop engines. The 48 remaining U-8s are used by Army Reserve (17) and Army National Guard (31) for communications and light transport. (*Data for Queenair 800.*)

Contractor: Beech Aircraft Corporation.
Power Plant: two Textron Lycoming IO-720-A1B piston engines; each 400 hp.
Accommodation: pilot and up to five passengers.
Dimensions: span 45 ft 11 in, length 33 ft 4 in, height 14 ft 2 in.
Weights: basic 5,490 lb, gross 7,700 lb.
Performance: cruising speed at 8,300 ft 231 mph, service ceiling 19,700 ft, T-O field length 1,706 ft, landing field length 2,176 ft, max range 1,523 miles.

U-21A/D/F/G/H Ute and VC-6A

Designation **U-21A** was assigned to 124 of a hybrid comprising a Queen Air 65-80 fuselage and King Air 65-90 wings. These were followed by 17 similar **U-21Gs** and five **U-21Fs**—a King Air A100 derivative with 680 shp PT6A-28s and space for 13 passengers—which are operated for the Military District of Washington from Andrews AFB. A few RU-21s relegated to transport duties have become **U-21Ds** (basically similar to the U-21A) and **U-21Hs** (620 shp power plants). One **VC-6A** (King Air 90) is in service, alongside two ex-civil 90s and one King Air 100. The 114 remaining U-21s (including 17 Guard and 16 Reserve) are used for communications and light transport. (*Data for U-21A.*)

Contractor: Beech Aircraft Corporation.
Power Plant: two Pratt & Whitney Canada PT6A-20 turboprops; each 550 shp.
Accommodation: two pilots and up to ten passengers.
Dimensions: span 45 ft 11 in, length 35 ft 10 in, height 14 ft 2 in.
Weights: basic 5,383 lb, gross 9,500 lb.
Performance: cruising speed 242 mph, service ceiling 26,150 ft, max range 1,216 miles.

UV-18A Twin Otter

Acquired in 1976-82, six of these rugged STOL transports are used on wheels, floats, or skis by four detachments of Company B, 1/207th Aviation, Alaska Army National Guard.



C-12F Huron in Somalia (Paul Jackson)

command and control, and RU-21Cs providing jamming. Other RU-21s serve with Army National Guard units, having been assigned as light transports. (*Data for RU-21H.*)

Contractor: Beech Aircraft Corporation.
Power Plant: two Pratt & Whitney Canada T74-PC-700 turboprops; each 550 shp.
Accommodation: two pilots and two equipment operators.
Dimensions: span 50 ft 11 in, length 35 ft 10 in, height 14 ft 2 in.
Weights: basic 6,814 lb, gross 10,200 lb.
Performance: cruising speed 236 mph, service ceiling 26,000 ft, endurance 4 h 15 min.



US Army C-23

Transports

C-12C/D/F/L Huron

Closely related to some of the later U-21 variants (which see), the C-12 (civilian equivalent, Super King Air 200) is used throughout the world as an executive and light cargo (2,000 lb) transport, specialist RC-12 conversions being described separately. First in the inventory were three FY 1971 Guardrail-configured RU-21Js, which have since been converted for transport for ERADCOM at Warrenton, Va., and given the more appropriate designation **C-12L**. Sixty C-12As were supplied with 750 shp Pratt & Whitney Canada PT6A-38 turboprops and subsequently converted to **C-12Cs** with PT6A-41s, joining 14 new-built to this standard, plus one from the USAF. They are used by several headquarters, including some overseas, at least seven having been loaned to the Customs Service. Of 40 cargo-door-equipped **C-12Ds** procured in FYs 1978-84, 22 have been converted to RC-12D/G/Hs. Span over tiptanks is 55 ft 6 in. The Army bought 20 **C-12Fs** in FYs 1985-87, features including 850 shp PT6A-42 engines and a cargo door. Of 122 C-12s in service, 27 are assigned to the Guard. (*Data for C-12C.*)



U-21A Ute (Paul Jackson)

Performance: cruising speed at 31,000 ft 586 mph, service ceiling 45,000 ft, T-O field length 5,280 ft, landing field length 3,386 ft, range (with 8 passengers) 4,859 miles.

C-23A/B/C

The C-23 is a military version of the Shorts 330 commuterliner, first ordered by USAF and equipped with a rear-loading ramp. In October 1988, the Army

Contractor: de Havilland Inc., Canada.
Power Plant: two Pratt & Whitney Canada PT6A-27 turboprops; each 620 shp.
Accommodation: two crew and up to 20 passengers.
Dimensions: span 65 ft 0 in, length 51 ft 9 in, height 19 ft 6 in.
Weights: basic 5,850 lb, gross 12,500 lb.
Performance: cruising speed at 10,000 ft 210 mph, service ceiling 26,700 ft, T-O run 860 ft, landing run 1,940 ft, max range 806 miles.

Helicopters

AH-1S/P/E/F and TH-1S/F Cobra

Now eclipsed in US Army units overseas by the AH-64 Apache, the Cobra remains, numerically, the prime antiarmor/attack helicopter of American ground forces. Initial manufacture totaled 1,075 AH-1Gs, deployed in Vietnam from 1967, none of which remain in original configuration. Modification of 92 AH-1Gs to carry Hughes TOW antiarmor missiles produced the AH-1Q, all of which were further reworked to later standards.

Combination of the TOW weaponry with an 1,800 shp Textron Lycoming T53-L-703 power plant (replacing the AH-1G/Q's 1,100 shp T53-L-13) restored the Cobra's agility under the designation AH-1S. Four standards of AH-1S have been produced, generating so much confusion that three were redesigned in March 1987 with redundant H-1 series suffix letters. **AH-1S** (previously known as Mod AH-1S) now applies only to the 92 AH-1Qs updated before 1979 and 285 AH-1Gs similarly treated. They include unarmed **TH-1S** Night Stalker training helicopters, which provide experience with the Martin Marietta FLIR-based night vision system and Honeywell integrated helmet and display sighting system of the AH-64 Apache, based with **TH-1Fs** at Hanchey Heliport, Fort Rucker Aviation School, and 1/285th Aviation, Arizona ARNG, Marana.

New-production variants are the AH-1P (previously known as the Production AH-1S), AH-1E (ex-Up-Gun AH-1S), and AH-1F (ex-Modernized AH-1S). One hundred **AH-1Ps** were delivered in 1977-78, their most obvious external modification being the change to a cockpit canopy composed of flat, reinforced panels to reduce glinting and improve crew protection. Instrumentation and avionics were also upgraded to ease nap-of-the-earth flying, and (from the 6th) the rotor blades changed to Kaman-designed units in composite materials with tapered tips. The engine exhaust duct is turned upwards to reduce the IR signature. (This "toilet bowl" exhaust and the Kaman blades have been retrofitted to some AH-1Ss.) **AH-1E** covers the next 98 helicopters, built in 1978-79 and equipped with a universal 20-mm or 30-mm gun turret and an improved stores management system. (The long-barrel, 20-mm weapon is normally fitted.) The wing stores management system is improved, and there is automatic compensation for off-axis cannon-firing.

In the definitive **AH-1F**, comprising 149 new-built and 378 conversions from AH-1G, Bell added a new fire-control system incorporating an AN/AAS-32 laser-ranger and tracker, pilot's HUD, air data sensor and ballistics computer, AN/ALQ-144 infrared jammer (to the rear of the rotor mast), AN/APR-39 radar warning receiver, an IR-suppressing exhaust, and secure communications. Upgrades applied to the Cobra fleet include C-Nite night sighting systems in 52 AH-1Fs of 77th Aviation in Korea, from 1990; AN/AVR-2 laser warning; ATAS for adding air-to-air Stinger SAMS; and C-Flex life-extension modifications. A total of 960 Cobras remain (320 AH-1Ss, 80 Es, 80 Ps, and 480 Fs), including 389 with Guard and 45 in Army Reserve.

Contractor: Bell Helicopter Textron.
Power Plant: one Textron Lycoming T53-L-703 turboshaft; 1,800 shp.
Accommodation: pilot (rear) and gunner in tandem.
Dimensions: rotor diameter 44 ft 0 in, length of fuselage 44 ft 7 in, height 13 ft 6 in.
Weights: basic 6,598 lb, gross 10,000 lb.
Performance: cruising speed 135 mph, service ceiling 10,550 ft, endurance 3 h 0 min.
Armament: nose turret for 20-mm M197 or 30-mm gun; M65 system of eight TOW antiarmor missiles and two pods of rockets (M158/M200/M260), grenades, or machine guns.

AH-6C/G/J and MH-6H/J "Little Bird"

The failed 1980 bid to rescue US hostages in Iran was the spur to formation of Task Force 160—officially the 160th Special Operations Aviation Regiment—based at Fort Campbell, Ky. TF-160 was established to operate night-capable helicopters that could be internally airlifted to an operational area by Lockheed



AH-64D Longbow Apache prototype



CH-47D Chinook in Kuwait (Paul Jackson)

MC-130 Hercules transports and made ready to fly within four minutes. Initially, the Army converted existing equipment in the form of the Hughes (now MDH) OH-6A Cayuse, at least 42 of these small helicopters emerging as EH-6B, MH-6B, MH-6C, and AH-6C versions for electronic surveillance, night interdiction, and attack duties. These were nearly all sold, apart from eight AH-6Cs. Next in operational use were 30 new-built helicopters: three **EH-6Es**, 15 **MH-6Es**, eight **AH-6Fs**, and four **AH-6Gs**, all based on the MDH 500MG Defender, fitted with an Allison 250-C20 turboshaft. Most have been reengineered with 250-C30 power plants for increased hot-and-high performance, making them equivalent to the civilian MDH 530. At least 11 became **MH-6Hs**, joining two new-built examples funded in FY 1988; many Es have been converted to Hs. Multifunction displays and other improvements are reported also to have been installed.

MH- versions have "Black Hole" IR-suppressing exhausts, are equipped with FLIR and NVG-compatible cockpit lighting, and may carry light armament comprising 7.62-mm Miniguns and 2.75-in rockets. Alternatively, four external seats can be installed for airlifting troops. The AH- models dispense with FLIR and instead mount heavier armament, such as TOW antiarmor missiles. TF-160's combat debut was in the 1983 Grenada invasion, but it came to prominence when H-6s operating from USS *Jarrett* attacked the Iranian minelayer *Iran Ajr* in the Persian Gulf in September 1987. Its specially modified helicopters were also used in the Panama operation in December 1989.

The Army has converted at least four MH-6Es to **MH-6J** standard, equivalent to the MD530NS NOTAR (no tail rotor), but plans to upgrade 39 more H-6s have been abandoned. Instead, FY 1988-91 funding has provided up to 30 new H-6Js (mostly AHs, with a few MHs), increasing the complement of 1/160th Aviation to about 60 H-6s, including some 30 NOTARs, the balance being AH-6C/Gs and MH-6Hs. (Data for AH-6J.)

Contractor: McDonnell Douglas Helicopter Company.
Power Plant: one Allison 250-C20R turboshaft; 450 shp (derated).
Accommodation: pilot and gunner, plus up to four internal passengers; alternatively, four external passengers.
Dimensions: rotor diameter 27 ft 4 in, fuselage length 25 ft 0 in, height 9 ft 0 in.
Weights (approximate): basic 2,000 lb, gross 3,350 lb.
Performance (approximate): cruising speed 150 mph, service ceiling 14,000 ft, endurance 2 h 20 min.
Armament: combinations of TOW antiarmor or Stinger antihelicopter missiles, 2.75-in rocket pods, and 7.62-mm Miniguns.

AH-64A/C/D Apache

Designed to meet the advanced attack helicopter (AAH) requirement, the Apache is optimized for rapid reaction, day and night, and is capable of withstanding 23-mm fire in critical areas. Combat debut was in Panama during December 1989, serving with the 1st Battalion, 82d Airborne Division. Apaches fired the opening shots of Desert Storm, and the 288 deployed destroyed more than 600 tracked and 500 wheeled vehicles, as well as 65 bunkers and radar sites and 22 parked aircraft. For long-range reinforcement, the AH-64 can self-deploy or be airlifted inside a C-141B Starlifter (two) or C-5 Galaxy (six).

Apache production for the Army is due to end in December 1994 with the 811th example. IOC was achieved in 1986, and by the end of 1992, 29 of the planned 40 Apache battalions were operational. AH-64As are based in the US at Fort Hood (1/127th Apache Training Brigade) and Fort Bragg and (from 1987) with Army National Guard battalions in North Carolina, South Carolina, Florida, Hawaii, Texas, Arizona, and Utah. Peak of eight battalions converted in Europe, each with an established strength of 18 Apaches, 13 scouting OH-58Cs, and three support UH-60As, but force reduced to six in 1992 and further cuts likely. Training at the Fort Rucker complex is undertaken from Guthrie and Hanchey AHPs.

Primary sensors, mounted in the nose, are a Martin Marietta Orlando Aerospace target acquisition and designation sight and an AN/AAQ-11 pilot's night vision sensor (TADS/PNVs). The system includes a laser for designation. PNVs includes a FLIR, with imagery projected in a single monocular, to permit night/adverse-weather nap-of-the-earth flying.

In August 1989, MDH received a contract to convert four prototypes to **AH-64D Longbow Apache** configuration, of which the prominent feature is a mast-mounted Martin Marietta/Westinghouse Longbow millimeter-wave radar. With this, the helicopter will achieve "fire and forget" capability with the RF version of Hellfire. Other changes include 1,857 shp T700-GE-701C turboshaft engines, double-capacity power distribution system, MIL-STD-1553B digital databus, more efficient crew stations, and improved cooling. The prototype flew on April 15, 1992, and 227 AH-64As are to be converted to AH-64Ds from mid-1996 onward.

In addition, all remaining AH-64As will be upgraded to **AH-64C**, beginning in mid-1995. This incorporates all AH-64D features apart from -701C engines and Longbow, but includes provisions for rapid installation of both. Two AH-64C prototype conversions were authorized in September 1992. (Data for AH-64A.)

Contractor: McDonnell Douglas Helicopter Company.
Power Plant: two General Electric T700-GE-701 turboshafts; each 1,696 shp.
Accommodation: pilot (rear) and gunner in tandem.
Dimensions: rotor diameter 48 ft 0 in, fuselage length (tail rotor turning) 48 ft 2 in, height 14 ft 1 in.
Weights: basic 11,225 lb, gross 17,650 lb.
Performance (with 16 Hellfire): cruising speed 170 mph, service ceiling 21,000 ft, endurance 2 h 30 min.
Armament: turreted 30-mm M230 Bushmaster Chain Gun; 16 Hellfire ASMs or up to 76 2.75-in rockets in M200 or M260 pods of seven or 19. Planned additional stub-wingtip hardpoints for total of four Stinger or two Sidewinder AAMs (or two Sidearm ARMs).

CH-47C/D Chinook

The Army has almost completed the conversion of its Chinook medium-lift helicopter fleet to a common CH-47D standard, having now returned all those remaining from 354 CH-47As and 108 CH-47Bs to Ridley Township, Pa., for remanufacture by Boeing. Currently

passing through Boeing are the remainder of 270 CH-47Cs, powered by a pair of 3,750 shp T55-L-11A turboshafts and having a gross weight of 46,000 lb. Eleven further CH-47Cs of Company G, 104th Aviation, Pennsylvania Army National Guard, are unusual in having been built by Meridionali in Italy to an embargoed Iranian order.

In 1982, deliveries began of Chinooks rebuilt to CH-47D configuration, current contracts calling for 472 to be thus upgraded, including 51 MH-47Es (which see), for service well into the next century. IOC was achieved in February 1984, and all intended active Army recipients in the US and Europe had been equipped by the end of 1988, in which year the Army National Guard began receiving the first of almost 100 CH-47Ds. Deliveries to units in Korea followed in 1989 and more than 30 are used by the Reserve. The last Guard-operated Sikorsky CH-54 Tarhees are being replaced by Chinooks this year. Battalion strength is normally 16 Chinooks. The CH-47D is able to lift a useful load of 22,800 lb over 35 miles and a maximum weight on the central hook of 26,000 lb. A typical cargo would comprise an M198 155-mm howitzer underslung, plus the 11-man gun crew and 32 rounds of ammunition in the cargo hold. Over short distances, it is the only Army helicopter capable of transporting a 24,750 lb D5 bulldozer.

Changes incorporated in the CH-47D include uprated transmission, a reconfigured flight deck to reduce crew workload, redundant and improved electrical systems, modular hydraulic systems, single-point pressure refueling, provision for night vision goggles, an advanced flight control system, and improved avionics. (Data for CH-47D.)

Contractor: Boeing Helicopters.

Power Plant: two Textron Lycoming T55-L-712 turboshafts; each 3,750 shp.

Accommodation: two pilots, two crew, and up to 55 troops or 24 litters.

Dimensions: rotor diameter 60 ft 0 in each, fuselage length 51 ft 0 in, height 18 ft 11 in.

Weights: basic 23,402 lb, gross 50,000 lb.

Performance: cruising speed 185 mph, service ceiling 22,100 ft, endurance 3 h 0 min.

Armament: (optional) M24 system of two 7.62-mm machine guns; and/or XM41 system of 7.62-mm gun on rear cargo ramp.

EH-60A Quick Fix II and MH-60A/K Black Hawk

Between 1987 and 1989, 66 UH-60A helicopters were retrofitted with 18,000 lb Tracor AN/ALQ-151(V)2 Quick Fix IIB systems for the location and monitoring of enemy communications in the 2-76 MHz band, and appropriate jamming by a Fairchild AN/TLQ-17A at up to 150 W. The EH-60A (for which the designation EH-60C is reserved, but not used) can operate at up to 10,000 ft (3,000 ft being more usual) in almost all weather, communicating via a secure link with other Army aircraft and ground stations. Extensive self-protection aids include engine ER suppressors, IR and radar jammers, missile detectors, and chaff/flare dispensers. Quick Fix aircraft are organic to divisions and armored cavalry regiments, assignments being two or three helicopters per unit. Nine units used 29 EH-60s in Desert Storm, and the type has recently replaced EH-1H Hueys with Company D, 135th Aviation, Kansas ArNG. Recognition features are prominent dipole aerials on the rear fuselage, accompanied by a deployable whip antenna. Four crew are carried, and endurance is 2 h. In 1997, redelivery will begin of 32 EH-60s modernized to Advanced Quick Fix with upgraded avionics and -701C engines for increased weight and 4 h 30 min endurance.

Due to enter service next year, the MH-60K is a special operations aircraft (SOA) Black Hawk variant ordered in January 1988. All 23 ordered have been built, but software problems have delayed the start of training until at least February 1994. The MH-60Ks are assigned to the 160th Special Operations Aviation Regiment's 3d Battalion at Savannah, Ga.; 1/160th Aviation at Fort Campbell, Ky.; and 1/245th Aviation, Oklahoma ArNG. The 160th and 245th currently operate 30 interim MH-60A Black Hawks with FLIR, Omega navigation equipment, and multifunction display instrument panels, and with a door-mounted 7.62-mm machine gun. The definitive MH-60K will have Hughes AN/AAQ-16 FLIR, Texas Instruments AN/APQ-174 terrain-following radar, uprated (1,857 shp T700-GE-701C) engines and gearbox, refueling probe, provision for additional cabin and external fuel tanks, folding tailplane, two 0.50-in pintle-mounted machine guns, Stinger AAMs, wire-strike protection, Seahawk-type AFCS, rescue hoist, and self-protection similar to EH-60. (Data for MH-60K similar to those for UH-60A except as follows.)

Accommodation: four crew plus up to 12 troops.

Weight: mission weight 24,500 lb.

Performance: cruising speed 140 mph, endurance 7 h 35 min (unrefueled).

MH-47E Chinook

Newest Chinook variant—first flown June 1, 1990—the MH-47E is a special forces helicopter based on the CH-47D. A larger counterpart of the MH-60K Black Hawk, the Boeing helicopter will be able to conduct a 5½-hour, deep-penetration mission over a 345-mile radius in adverse weather, day or night, over all terrain, with a 90 percent success probability. The MH-47E has much more powerful engines, larger external fuel tanks, an in-flight refueling probe, and the capability to self-deploy to Europe; seating for 42 troops; and comprehensive self-defense capability in the form of weapons and ECM. Principal sensors are a Texas Instruments AN/APQ-174 radar with terrain-following provision down to 100 ft, and Hughes AN/AAQ-16 FLIR in a chin turret. Other features include an integrated avionics system with four-screen EFIS cockpit compatible with NVGs; two dual high-speed MIL-STD-1553 digital data buses; jam-resistant radios; automatic target handoff system; inertial, Doppler, GPS, and terrain-reference navigation systems; laser- and radar-warners; and a 600 lb rescue hoist with 200 ft of usable cable. The longer nose of the civilian Chinook is fitted to allow possible addition of a second radar, and there are plans to retrofit Stinger missiles for self-defense.

The Army requires 51 MH-47Es, all of which will be converted to low-hour CH-47Cs taken from the total of 472 CH-47D conversions now funded. To date, 25 have been authorized, the first two to be delivered in September of this year. Training due to begin May 1994 by the 160th Special Operations Aviation Regiment's 2d Battalion at Fort Campbell, Ky.; if further 25 ordered, these will go to 3/160th Aviation at Savannah, Ga., and 1/245th Aviation, Oklahoma Army National Guard. TF-160 presently operates 15 interim MH-47D Chinooks fitted with 29 ft 3½ in extending refueling probes, which allow them to be completely replenished from a KC-130 Hercules tanker in six minutes. The MH-47D also has FLIR and self-defense Miniguns. (Data for CH-47D, except as follows.)

Power Plant: two Textron Lycoming T55-L-714 turboshafts; each 4,867 shp.

Dimensions: fuselage length 52 ft 1 in.

Weight: mission weight 54,000 lb.

Performance: cruising speed 159 mph, endurance 10 h 20 min.

Armament: two pintle-mounted 0.50-in machine guns.



EH-60A Quick Fix II elint helicopter
(Ivo Sturzenegger)



MH-47E Special Operations Chinook



Mockup of the Boeing/Sikorsky RAH-66 Comanche

OH-6A Cayuse

Partner of the AH-1 Cobra in Vietnam, the "Loach" is a light-combat/escort helicopter based on the civilian Hughes Model 500 and currently operated by the Army National Guard. Aviation Companies of seven AH-1s include four OH-6As, but these are now being replaced by OH-58s. Army National Guard Cayuse units are located in Colorado, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont, with a total of 140 helicopters.

Contractor: McDonnell Douglas Helicopter Company.

Power Plant: one Allison T63-A-5A turboshaft; 253 shp.

Accommodation: pilot and observer/gunner; two passengers optional.

Dimensions: rotor diameter 26 ft 4 in, fuselage length 23 ft 0 in, height 8 ft 1½ in.

Weights: basic 1,163 lb, gross 2,400 lb.

Performance: cruising speed 139 mph, service ceiling 15,800 ft, endurance 3 h 45 min.

Armament: XM27E-1 system of 7.62-mm Minigun.

OH-58A/C Kiowa and OH-58D Kiowa Warrior

Some 1,850 of the 2,200 Vietnam-era OH-58A scout/liason helicopters remain, although only 310 with the regular Army, 540 ArNG, and 90 Reserve are still A models. Under a 1976 contract, 588 Kiowas (of which about 550 remain) were upgraded to OH-58C standard with features including infrared suppression measures, a new instrument panel, revised navigation equipment, and an observation sight above the port seat. Of these, 278 have antiglint flat-glass modifications and are designated OH-58C(FG), the rest being in original OH-58C(RG [round-glass]) configuration. Allocations are to attack helicopter, cavalry, and field artillery units. A welcome boost to performance has been obtained by replacing the 317 shp Allison T63-A-700 turboshaft by an A-720 delivering 420 shp. Some earlier Kiowas thus modified are known as OH-58A+. Bell AH-1 Cobra and AH-64 Apache battalions each include OH-58As or Cs.

Seeking to obtain what it describes as its first true scout, under the Army Helicopter Improvement Program (AHIP), the Army is converting OH-58As to four-blade OH-58D standard, the initial deliveries to Europe (partly replacing OH-58Cs) having taken place in 1987. Fitted with IR jammers, laser warning equipment, chaff/flare dispensers, airborne target handoff system, and crew night vision equipment, the OH-58D is most readily recognized by its mast-mounted sight. This contains a 12x TV camera, thermal imaging sensor, and laser-ranger/designator for day and night target acquisition and marking. A total of 363 are currently funded, including 243 for regular units, those bought in and after FY 1991 being for the ArNG. Some 300 are in current service, attached directly to cavalry attack helicopter squadrons or to units supporting other attack battalions.

Work began in September 1987 on an armed OH-58D. Three months later, the first of 15 "Prime Chance" conversions was preparing to deploy to the Persian Gulf operations against Iranian gunboats threatening international shipping, armed with air-to-air Stinger (ATAS) anti-aircraft and Hellfire missiles, 0.50-in machine guns, and 2.75-in rocket pods. Current operator is 4/17th Aviation at Fort Bragg, N. C.

The Army has decided to arm, at the time of conversion and through a retrofit program, all OH-58Ds, assigning them the name of **Kiowa Warrior** early in 1990. Warriors have a much more powerful engine, transmission uprated by 95 shp to 550 shp, structural improvements, and an integrated weapons control system. Armament introduced on production line at 202d conversion; FY 1992-93 budgets fund first 103 retrofits. Up to 81 helicopters will be further modified for special duties with a "squatting" landing gear, folding main blades, and tilting vertical stabilizer to allow them to fly within ten minutes of being taken from the hold of a C-130 Hercules transport aircraft. These Multipurpose Light Helicopters (MPLHs) will also receive a cargo hook for loads of up to 2,000 lb and external attachments for six troop seats or four medevac litters.

OH-58Ds are based at Fort Eustis, Va., Fort Rucker, Ala. (for training), and with operational units in the CONUS, Korea, and Europe. Germany-based OH-58Ds have real-time video down link which can be relayed via Guardrail-capable aircraft. A "stealth kit," including a new chisel-shaped nose, was tested for possible use in Desert Storm, but not deployed in time. Having a 23 mph speed penalty, it has not been adopted for peacetime use. (Data for OH-58D Kiowa Warrior.)

Contractor: Bell Helicopter Textron.

Power Plant: one Allison 250-C30R turboshaft; 650 shp.

Accommodation: pilot and observer/gunner.

Dimensions: rotor diameter 35 ft 0 in, fuselage length 33 ft 10 in, height 12 ft 9½ in.

Weights: basic 3,289 lb, gross 5,500 lb.

Performance: cruising speed 129 mph, service ceiling 12,000 ft, endurance 2 h 24 min.

RAH-66 Comanche

Having been relegated to an avionics and power plant development program, the RAH-66 regained its priority early this year with reinstatement of the previously deferred production phase—to begin in FY 2001, with IOC being achieved two years later. Winner of the LH (Light Helicopter) competition in April 1991, the Boeing-Sikorsky design will replace nearly 3,000 existing AH-1, OH-6, and OH-58 helicopters, although production is planned of only 1,292, plus a possible follow-on order for 389. Attack battalions of light divisions will reduce from 21 AH-1s and 13 OH-58s to only 25 RAH-66s; and heavy division and corps attack battalions from 18 AH-64s and 13 OH-58s to 15 AH-64s and 10 RAH-66s, despite which, operational capability will be doubled.

First of three prototypes will fly in August 1995. Lighter, but only slightly smaller than the AH-64 Apache, the Comanche is optimized for low detectability—both radar and infrared—and can carry part of its weapon load internally until just before launch. Eight may be airlifted inside a C-5 Galaxy transport, requiring only removal of the all-composites, bearingless main rotor; RAH-66 is ready for flight 20 minutes after the C-5 lands. Combat turnaround time is 13 minutes. All Comanches will have provision for Longbow radar, although this will be fitted only in one-third of the fleet at any time. Avionics have high commonality with the Lockheed F-22A ATF.

Contractor: Boeing Helicopters and Sikorsky Aircraft consortium.

Power Plant: two LHTEC T800-LHT-800 turboshafts, each 1,344 shp.

Accommodation: pilot (front) and WSO in identical, stepped cockpits.

Dimensions: rotor diameter 39 ft 0½ in, fuselage length 43 ft 4½ in, height 11 ft 1½ in.

Weights: empty (target) 7,750 lb (plus 500 lb with Longbow), gross 17,174 lb.

Performance: max level speed 204 mph, endurance 2 h 30 min.

Armament: integral 20-mm gun; internal stowage for six Hellfire ATMs or 12 Stinger AAMs; further eight Hellfire or 16 Stingers on optional stub-wing.

TH-67 Creek

The Army's NTH (New Training Helicopter) competition was won in March by Bell with a variant of the Model 206B-3 JetRanger which, in other incarnations, is known as OH-58 Kiowa and (US Navy) TH-57 SeaRanger. Deliveries will be made from October onward to the main pilot training school at Fort Rucker, Ala., to replace veteran Bell UH-1H Iroquois at Lowe Heliport, and student training begins in April 1994. Three variants are being produced: with VFR capabilities only; with IFR instrumentation; and VFR with provision for later IFR systems installation. The initial contract covers 102 helicopters and nine procedures trainers, plus options on a further 55 plus three.

Contractor: Bell Helicopter Textron, Canada.

Power Plant: one Allison 250-C29JN turboshaft; 317 shp (flat rated).

Accommodation: pilot and two students.

Dimensions: rotor diameter 33 ft 4 in, fuselage length 31 ft 2 in, height 9 ft 6½ in.

Weights: basic 1,635 lb, gross 3,200 lb.

Performance: cruising speed 133 mph, service ceiling 13,500 ft, max range 465 miles.

UH-1H/Iroquois

Supplanted in many first-line units by Black Hawks, the ubiquitous "Huey" will serve the Army for many more years and has been proposed for upgrading with a T53-L-703, GE T700, or LHTEC T800 power plant. By December 1967, Army receipts totaled 9,325 UH-1s, including more than 4,800 new-built UH-1Hs. Of these, 2,600 remain. The UH-1H may be armed if required, but more than 300 were converted to unarmed UH-1V medevac configuration, and 280 of these also remain.

The UH-1H has been upgraded for its extended life. Changes have included an IR jammer, IR suppression measures, radar altimeter, radar-warning receiver, chaff/flare dispenser, crash-resistant fuel system, closed-circuit refueling, improved main drive shaft, and new radios. In 1988, deliveries began of new composite-materials main rotor blades, which provide a 6 percent improvement in hovering capability and a 5-8 percent reduction in fuel consumption in forward flight. Re-equipment of the UH-1H fleet continues, including the 1,200 in Army National Guard and 350 in Army Reserve.

Contractor: Bell Helicopter Textron.

Power Plant: one Textron Lycoming T53-L-13 turboshaft; 1,400 shp.

Accommodation: two pilots and 11 troops, or six litters and attendant.

Dimensions: rotor diameter 48 ft 0 in, fuselage length 41 ft 10¼ in, height 14 ft 5½ in.

Weights: basic 5,132 lb, gross 9,500 lb.

Performance: cruising speed 138 mph, service ceiling 12,600 ft, endurance 2 h 45 min.



UH-1H Iroquois (Paul Jackson)



UH-60A Black Hawk in Somalia (Paul Jackson)

Armament: M23 subsystem of two 7.62-mm pintle-mounted machine guns; or M56 mine-dispensing pods; or M59 subsystem of paired 7.62-mm and 0.50-in machine guns.

UH-60A/L, MH-60A/L, and UH-60Q Black Hawk

With more than 1,100 in service out of a target of 1,496 to be purchased by FY 1996, the Black Hawk is well on the road to its stated goal of replacing the UH-1 Iroquois in air assault, air cavalry, and aeromedical evacuation units of the regular Army. Though carrying the same 11-man squad as the Huey, a Black Hawk has more than twice the payload and better speed. Having entered service in 1978, it is the first utility/transport helicopter to increase division-level mobility, in that it can transport (for example) a 105-mm howitzer, its six-man crew, and 30 rounds of ammunition in a single mission. Underslung load limit is 8,000 lb.

Design aspects include armored or redundant components to resist small-arms fire, an impact-absorbing airframe to protect occupants in a crash, and maintainability features to ease servicing in the field. A compact design allows one Black Hawk to be airlifted by C-130 Hercules, two by C-141 StarLifter, and six by C-5 Galaxy.

Companies previously using 23 UH-1Hs now operate 15 Black Hawks. Armored cavalry regiments reporting directly to corps have, typically, 17 UH-60As operating alongside 26 AH-1s, 27 OH-58Cs, and three EH-60Cs; while divisional task forces use 15 UH-60As to support six UH-1Hs, six OH-58As, six OH-58Ds, and three EH-60As.

Beginning in 1989, the Corpus Christi Army Depot has been retrofitting new UH-60s with Enhanced Black Hawk modifications, including Omega navigation, satellite UHF, a specific threat radar-warning receiver, and provision to replace the M60 doorway-mounted machine guns with M134 Miniguns. The first 15 were delivered to the US Army in South Korea, achieving IOC in November 1989. From FY 1982 contracts onward, Black Hawks have been able to carry an ESSS (External Stores Support System), which allows up to 10,000 lb of external equipment to be carried, including Hellfire and other weapons, or fuel tanks for self-deployment. NVG-compatible cockpits were introduced in 1985 and have been retrofitted. Similarly, a HIRSS (Hover Infrared Suppression System) is now being installed to provide protection against heat-seeking missiles even while hovering.

From the 986th Black Hawk, production switched to the UH-60L, which replaces the T700-GE-700 turboshafts with -701Cs delivering almost 300 more shp, and has an improved gearbox. The first UH-60Ls were delivered in November 1989 to 1/149th Aviation, Texas ArNG. Pending delivery of the MH-60Ks (which see),

the 160th Special Operations Aviation Regiment operates an interim MH-60L variant, its earlier MH-60As now serving with 1/245th Aviation, Oklahoma ArNG. The UH-60Q conversion of the UH-60A (nicknamed "Dustoff") first flew on January 1, 1993, and will be adopted for medevac if current trials are successful. Equipment includes patient monitoring and treatment systems, dual-mode IR/white searchlight, and navigation and survivability upgrades. (Data for UH-60A.)

Contractor: Sikorsky Aircraft.

Power Plant: two General Electric T700-GE-700 turboshafts; each 1,560 shp.

Accommodation: three crew and up to 14 troops; or four litters and six walking wounded.

Dimensions: rotor diameter 53 ft 8 in, fuselage length 50 ft 0¼ in, height 16 ft 10 in.

Weights: basic 11,284 lb, gross 22,000 lb.

Performance: cruising speed 167 mph, service ceiling 19,000 ft, endurance 2 h 45 min.

Armament: M23 system of two 7.62-mm pintle-mounted machine guns; M56 mine-dispensing pods; 16 Hellfire antiarmor missiles; or Stinger AAMs.

Miscellaneous

Antonov An-2 "Colt": One Ukrainian-designed transport biplane for Airborne Special Operations Test Board, El Paso, Tex.

Beech T-34C: Three turboprop trainers on loan from the US Navy as photochase aircraft at Army Engineering & Flight Activity, Edwards AFB, Calif.

Cessna 182: Two aircraft based at West Point Military Academy for use by engineering students.

Cessna 310: Three communications aircraft with units including South Dakota STARC.

Cessna 402B: One light twin transport aircraft acquired in FY 1982.

Cessna O-2A: Two ex-USN, ex-USAF twin-boom light aircraft used by Army Intelligence Center, Fort Huachuca, Ariz.

de Havilland Canada DHC-7: Three STOL commuterliners fitted with sensors in Airborne Reconnaissance Low program for drug interdiction. Further 15 required.

Fairchild C-26B: Two communications and light transport aircraft with Colorado and District of Columbia STARCs.

Fokker C-31A: Two Friendship airliners used by the "Golden Knights" demonstration parachute team, based at Fort Bragg, N.C.

Learjet C-21A: One communications aircraft with Davison Aviation Command, Andrews AFB, Md.

Pilatus UV-20A Chiricahua: Two PC-6 Turbo-Porter STOL lightplanes (formerly in Berlin) used by "Golden Knights" parachute team.

Pilatus Britten-Norman BN-2B-21 Islander: One aircraft acquired in FY 1988 for light transport.

Piper PA-31T Cheyenne: One confiscated drug-running aircraft operated from Pope AFB, N.C.

Rockwell Turbo Commander 690W: One light transport operated by the Army from Fort Hood, Tex.

Sikorsky H-3: Nine ex-USAF JCH-3E and 12 JHH-3E Jolly Green Giants acquired in 1991 for Army Aviation Test Center, Fort Rucker, Ala.

Volpar D18S: One updated Beech 18 light twin acquired in FY 1989. ■

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By John L. Frisbee, Contributing Editor

Unsung Heroes of World War II

Aerial gunners deserve a major share of credit for the Allied victory over the Axis.

IN THE years of World War II, the Army Air Forces trained 193,000 pilots, 50,000 navigators, and 45,000 bombardiers, but top spot in the aircrew training programs went to aerial gunners. Flexible gunnery schools turned out 297,000 graduates, most of them enlisted men. A high percentage were volunteers who, like bombardier trainees, knew they had but one destination on graduation—combat.

The success of bombing campaigns in every theater of operations rested heavily on the aerial gunners, whose lot was not easy. Of all crew positions, the gunners had the most physically demanding, especially in heavy bombers that flew at altitudes where temperatures ranged down to -60° Fahrenheit. There was no heat and no armor protection in the gunners' positions. Despite the perils and physical suffering of their trade, a surprising number of gunners volunteered for second and even third combat tours.

Many acts of heroism by gunners have been recounted in this column. (You can find more in Roger Freeman's *The Mighty Eighth* and other books on World War II aviation.) Three of the four USAAF enlisted men awarded the Medal of Honor in World War II were gunners: SSgt. Archibald Mathies, Sgt. Maynard Smith, and TSgt. Forrest Vosler, all subjects of previous "Valor" articles.

There is no valid basis for measuring the number of enemy aircraft shot down by aerial gunners as compared to fighter pilots. Certainly there were many aces among the gunners, but none appears in the official list of credits for enemy aircraft destroyed in World War II because of the difficulty of assigning individual credit when several gunners were firing at the same bandit. Some numbered air forces did credit gunners with confirmed victories. Several of their names appear in "The Aces That His-

tory Forgot," by Bruce D. Callander [*April 1991, p. 92*]. While many readers can name a dozen fighter aces, few will remember the name of a single gunner—ace or not.

There is, however, one gunner whose name was celebrated in a popular World War II song, "Johnny Zero." Those whose memories go back that far probably thought, as I did, that he was a fighter pilot. His name is John Foley, a B-26 top-turret gunner in the Pacific, whose story is told in *Aerial Gunners: The Unknown Aces of World War II*, by Col. Charles Watry, USAF (Ret.), and Duane Hall.

Foley enlisted in the Army Air Forces in November 1941, determined to fly. By virtue of the snafus following Pearl Harbor, he ended up in Australia without so much as basic training. After wangling an assignment in the armament shop at Brisbane, he was assigned to clean the guns of a 22d Bomb Group B-26. His diligence caught the attention of the bomber's pilot, who picked the untrained Foley to replace his injured top-turret gunner. Foley, who had never been in an airplane, was given a quick introduction to the intercom and turret, taken on one practice mission, and pronounced qualified.

Two days later, John Foley had his baptism of fire during an attack on Japanese shipping near Rabaul, New Britain. He shot down a Zero, confirmed by a member of another crew. Foley, it seems, was a natural. He had not been taught how to use the gunsight, so he depended on tracer ammunition for aiming and worked out his own system for estimating range. Two weeks later, he downed two more Zeros over Lae, New Guinea, and was dubbed "Johnny Zero" by a news correspondent. The name was picked up by two songwriters in the US.

Before he was sent home with malaria, John Foley flew thirty-two missions, survived three crashes, and scored seven confirmed kills with three probables. After a speaking tour in the US and unwanted duty as a gunnery instructor, he volunteered for



combat and ended his war as a B-24 gunner in Europe.

Few combat stories about gunners had such happy endings. On January 3, 1943, Eighth Air Force sent eighty-five B-17s against submarine pens at Lorient, France. Four B-17s were shot down by enemy fighters.

One 306th Group bomber, *Sons of Fury*, piloted by Lt. Charles Cranmer, was crippled by flak, losing two engines and the nose, along with both the navigator and bombardier. Unable to hold position, the bomber descended to 1,500 feet over the English Channel's icy waters. Forty miles from shore, six FW-190s opened fire on the straggler. The tailgunner of another B-17 saw four chutes before *Sons of Fury* ditched, still apparently under control. As the sea rose around the top turret, its gunner, TSgt. Arizona Harris, continued to fire at the attackers until his bomber disappeared beneath the waves. He was posthumously awarded the Distinguished Service Cross—one of several gunners to be so honored for extraordinary valor.

Thousands of aircrew members survived the war because of the dedication of the aerial gunners. Their contribution to Allied victory was immeasurable. ■



Edited by Daniel M. Sheehan, Assistant Managing Editor



National Guard Bureau Chief Lt. Gen. John B. Conaway (second from right), this year's winner of the Maxwell A. Kriendler Award, meets with (from left) Iron Gate Chapter President Robert H. Batta, AFA National President James M. McCoy, and National Air Force Salute Foundation Chairman Thomas J. McKee.

Three Decades of Support

When the **Iron Gate (N. Y.) Chapter** hosted its first National Air Force Salute, Lyndon B. Johnson was President of the US, Robert F. Wagner was mayor of New York, Gen. Curtis E. LeMay was USAF Chief of Staff, and the F-4 and the F-111 were considered the state of the fighter art. After countless political, military, and technological changes, one thing remains constant: The Iron Gate Chapter is still going strong in its support of the AFA mission, evidenced by its thirtieth annual black-tie fund-raiser held this spring, which pushed the total of charitable donations garnered by the event closer to the \$3 million mark.

This year's salute honored three key elements of the Air Force—the enlisted force, the Air National Guard, and the Air Force Reserve. National Air Force Salute Foundation Chair-

man Tom McKee presented three Aerospace Education Foundation Ira Eaker Fellowships to representatives of the three elements. CMSAF Gary R. Pfingston accepted a fellowship on behalf of the enlisted force; AFRES Chief Maj. Gen. John J. Clossner III was the Reserve's recipient; and ANG Director Maj. Gen. Philip G. Killey was the Air Guard's representative.

The Iron Gate Chapter's highest honor, the Maxwell A. Kriendler Memorial Award (named for the chapter's founder), was presented to National Guard Bureau Chief Lt. Gen. John B. Conaway. The award saluted his stewardship of the National Guard and its 500,000 personnel and \$3.4 billion budget. Under General Conaway, the National Guard continued to improve its readiness, turning in sterling performances in Operation Desert Storm and Operation

Restore Hope, the humanitarian mission to Somalia.

In the words of the citation accompanying the award, General Conaway's inspirational leadership has helped "add value to America and the world at community, national, and international levels."

In addition to its support of AEF, the annual event also provides money for the Air Force Assistance Fund, Falcon Foundation, USAF Museum, National Aviation Hall of Fame, Civil Air Patrol and Air Force Academy flight awards, and the Soldiers', Sailors', and Airmen's Club, founded in 1919 to provide affordable food and lodging to transient military personnel.

Guests at the salute were entertained by selections from "The Best of Forbidden Broadway." No date has been chosen for the 1994 salute.

—James A. McDonnell, Jr.

Gen. E. W. Rawlings Honored

A man who has been termed "The Father of Air Force Logistics," Gen. Edwin W. Rawlings, USAF (Ret.), was recently inducted into the Minnesota Aviation Hall of Fame, another in the long list of honors he has received during a distinguished career in the Air Force, business, and AFA.

General Rawlings capped a distinguished USAF career with an eight-year stint (1951-59) as commander of Air Force Materiel Command. Since his retirement from active duty, he has been a tireless supporter of the Air Force Academy, AFA, and numerous philanthropic ventures. His second career—at General Mills—was every bit as successful as his first, including terms as vice president, president, and chairman of the board.

General Rawlings can also take pride in the AFA chapter named for him. Since 1990, the **General E. W. Rawlings (Minn.) Chapter** has contributed more than \$300,000 in scholarships and charitable donations in Minnesota and neighboring states. The chapter has also been an avid supporter of the "Visions of Exploration" program, sponsoring more than 130,000 students' participation in the aviation, science, and space studies project in conjunction with *USA Today*.

The chapter sent a strong contingent to the induction ceremony, including President Vic Seavers, Vice President Coleman Rader, Historian Paul Markgraf, and Vice President (Education) Ken Wofford. National Vice President (North Central Region) Doyle E. Larson also attended.

Texas AFJROTC Symposium

Texas AFA, in conjunction with the **Alamo Chapter**, sponsored a symposium for 700 Air Force Junior ROTC cadets with an emphasis on space education and research. The cadets came from Texas, Oklahoma, and Louisiana to the seventeenth annual event to hear NASA education specialist Angelo Casaburri and astronaut Ronald Sega discuss the US space program. Texas Vice President (Aerospace Education) Kaye Biggar praised both the speakers and the students, who designed and built model rockets for aerial demonstration and static display.

Chapter News

When an Air Force base marks the fiftieth anniversary of its opening, a host of organizations take part in the celebration. Such was the case when Andrews AFB, Md., commemorated a half century of service to the nation with a rededication ceremony at the

base. **Thomas W. Anthony (Md.) Chapter** President Sam O'Dennis, who also represented the Tuskegee Airmen, was on hand, as was Maryland President Robert B. Roit. Col. Charles X. Suraci, Jr., CAP Middle East Region Headquarters Inspector, represented the Civil Air Patrol, and national, state, and local politicians, including US Sen. Paul Sarbanes, ap-

Forster also commanded during Operation Desert Storm, offloaded thirty million pounds of fuel during the Persian Gulf War without a single mission failure.

Air refueling was also the topic at a March meeting of the **Fort Wayne (Ind.) Chapter**. Capt. Dawn Reeder, a navigator on a 434th Air Refueling Wing KC-135 at nearby Grissom AFB,



National Vice President (Far West Region) H. A. Strack presents a national Gold Community Partner Award to representatives from the Robert H. Goddard (Calif.) Chapter at a POW/MIA memorial banquet. Accepting the award are (from left) Louis Dillard, Chapter Vice President (South) TSgt. Catherine Finch, and Chapter Vice President (Membership) Col. James Simmons.

plauded remarks by 89th Airlift Wing Commander Brig. Gen. Bobbie L. Mitchell.

General Mitchell urged the audience of 250 to remember the base's pride, heritage, and history. "We should and must look back on our heritage if we are to take full advantage of the lessons forged by our predecessors," he said. "The people assigned to Andrews are responsible for the successes of the base and deserve credit."

General Bruce K. Holloway (Tenn.) Chapter member and former State President Jack K. Westbrook recently paid tribute to fellow chapter member Col. Fred H. Forster, who was selected to be one of only thirty participants in the prestigious Senior Seminar of the US State Department's Foreign Service Institute. Mr. Westbrook called Colonel Forster, who commands ANG's 134th Air Refueling Group at McGhee Tyson Airport, Tenn., a "staunch supporter of AFA" and notes that the 1713th Air Refueling Wing (Provisional), which Colonel

related her Desert Storm experiences to a receptive audience. Chapter President Ted Huff, Jr., presented a chapter membership to Captain Reeder in appreciation for her remarks.

The Fort Wayne Chapter is also busy on the education front, sponsoring attendance to Civil Air Patrol Flight School and helping to establish an AFJROTC unit at Wayne High School. Also, chapter member Gene Foster is teaching aerospace education twice a week to interested middle school students.

The **Tacoma (Wash.) Chapter** has stepped up its participation in the "Visions" program. It now sponsors ten schools in the Clover Park District and several more in the University Place District. The effort has been spearheaded by Chapter Vice President (Aerospace Education and Veterans Affairs) Karl Berg, who also serves as chapter chaplain.

The **Columbia (S. C.) Chapter** has also been supporting education at all levels. At a Triservice Awards Day at

the University of South Carolina, cadet John Culbertson was recognized as the outstanding AFROTC cadet in the state. Cadet Lt. Col. Victor Ward received the chapter's award for his outstanding record as an AFJROTC cadet. The chapter was ably represented at both events by Columbia Chapter Vice President (Aerospace Education) Worth Allen, who also holds that post at the state level.

In Arizona, **Phoenix Sky Harbor Chapter** President Glenn Plaumann presented the AFA Award to outstanding AFJROTC cadet Kris Agee at Dobson High School in Mesa, Ariz. Cadet Agee is the AFJROTC squadron commander.

AFJROTC cadets were also the focus of a recent awards ceremony held by the **Gold Coast (Fla.) Chap-**

ter. Chapter President Edward Charbonneau and State Vice President Howard Eichner handed out awards, ribbons, and certificates to the following students: Cadet Sgt. Heather D. Heap (first year), Cadet Capt. Patricia Goebel (second year), Cadet Maj. Heather B. Namie (third year), and Cadet Col. Daniel P. Jacobs (fourth year). More than 200 cadets and their families and guests attended the awards banquet.

From kindergarten through twelfth grade, the **College Park Airport (Md.) Chapter** supports aerospace education through a variety of programs. Chapter members made twenty-one presentations to more than 1,200 students, filling them in on aerospace opportunities, advances, and technologies. Chapter Vice President (Aero-

space Education) Capt. Scott A. Lausman cited Chapter President Erwin Nase and chapter member Col. Kyle Rensler for their assistance in reaching out to Maryland students and helping to spark increased interest in aviation.

Have AFA/AEF News?

Contributions to "AFA/AEF Report" should be sent to Dave Noerr, AFA National Headquarters, 1501 Lee Highway, Arlington, VA 22209-1198. ■



At an air show honoring the NATO Air Chiefs held at Sheppard AFB, Tex., the host, USAF Commander in Chief Gen. Robert C. Oaks (center), thanks National Board Chairman O. R. Crawford (right), who flew his P-40 Warhawk, and Ak-Sar-Ben (Neb.) Chapter member Reg Urschler, who flew his P-51 Mustang.

Coming Events

July 9-10, **Illinois State Convention**, Quad Cities, Ill.; July 9-11, **Georgia State Convention**, Columbus, Ga.; July 9-11, **Missouri State Convention**, Whiteman AFB, Mo.; July 10, **Virginia State Convention**, Charlottesville, Va.; July 16-17, **Arkansas State Convention**, Jacksonville, Ark.; July 16-18, **Pennsylvania State Convention**, Trevoise, Pa.; July 16-18, **Texas State Convention**, College Station, Tex.; July 23-24, **Kansas State Convention**, Wichita, Kan.; July 30-August 1, **Florida State Convention**, Cypress Gardens, Fla.; August 5-7, **California State Convention**, Sacramento, Calif.; August 6-7, **Montana State Convention**, Three Forks, Mont.; August 7, **North Dakota State Convention**, Grand Forks, N. D.; August 13-14, **Air Force Ball of Mid-America**, St. Louis, Mo.; August 13-14, **Colorado State Convention**, Colorado Springs, Colo.; August 20-21, **Mississippi State Convention**, Jackson, Miss.; August 28, **Indiana State Convention**, Indianapolis, Ind.; September 13-15, **AFA National Convention and aerospace exhibition**, Washington, D. C.

Unit Reunions

AACS Alumni Association

Members of the Airways and Air Communications Service will hold a reunion September 30-October 2, 1993, in Callaway Gardens, Ga. **Contact:** W. A. Randall, P. O. Box 149, Dawson, GA 31742. Phone: (912) 995-4389.

Combat Arms Personnel

Air Force Combat Arms Career Field personnel will hold a reunion October 8-10, 1993, at Lackland AFB, Tex. **Contact:** SMSgt. Rita M.

Duprat, Air Force Combat Arms Association, P. O. Box 27538, San Antonio, TX 78227. Phone: (210) 521-3770 or DSN: 487-2755.

Del Valle AAB/Bergstrom Field

Military personnel stationed at Del Valle AAB/Bergstrom Field, Tex., between 1942 and 1945 will hold a reunion September 16-18, 1993, in Chattanooga, Tenn. **Contact:** Wayne Taylor, 5015 S.W. 20th Terrace, Topeka, KS 66604-3576. Phone: (913) 272-2584.

Ellington Navigators/Observers Ass'n

Navigators and observers who served at Ellington AFB, Tex., will hold a reunion October 1-4, 1993, at the Holiday Inn-River Walk North in San Antonio, Tex. **Contact:** Lt. Col. Sigmund Alexander, USAF (Ret.), 12110 Los Cerdos, San Antonio, TX 78233-5953. Phone: (210) 653-5361.

George Field

Veterans stationed at George Field, Ill., during World War II will hold a reunion September 10-

12, 1993, at the Executive Inn in Vincennes, Ind. **Contacts:** David Kiefer, Vincennes Area Chamber of Commerce, P. O. Box 553, Vincennes, IN 47591. Phone: (1-800) 886-6443. Allie DeLoria, 707 12th St., Lawrenceville, IL 62439. Phone: (618) 943-2307.

Moselle Control Personnel

CORRECTION: In our April 1993 issue we incorrectly reported that the Royal Canadian Air Force Association was organizing a reunion for Moselle Control personnel. The veterans of the Moselle Control Area Control Center of Metz, France, are organizing a reunion. The planned dates are September 30–October 3, 1993. **Contact:** M. J. "Bud" Wilds, 1151 Gregory Rd., Kelowna, British Columbia V1Z 2W4, Canada. Phone: (604) 769-4431 or (604) 763-0811 (John Degelman).

National LSM Ass'n

Members of the National LSM Association will hold a reunion August 21–25, 1993, in Charleston, S. C. **Contact:** Richard S. Schatz, 66 Summer St., Greenfield, MA 01301. Phone: (413) 774-2397.

Nha Trang AB

Military, civilian, and contractor personnel who were stationed at Nha Trang AB, Vietnam, will hold a reunion November 12–15, 1993, in Dallas, Tex. **Contact:** Charles R. Timms, 1199-B Ashborough Dr., Marietta, GA 30067-6925. Phone: (404) 514-8382.

P-51 Mustang Pilots Ass'n

P-51 Mustang pilots will hold a reunion October 2–6, 1993, at the Hampton-Coliseum Hotel and Conference Center in Hampton, Va. **Contact:** Col. Robert Klump, 1443 Big Bethel Rd., Hampton, VA 23666. Phone: (804) 766-3485.

Randolph Field Flight Training Group

Members and students who were assigned to AAF Central Instructor School (CIS), Single-Engine Flight Training Group at Randolph Field, Tex., will hold a reunion September 8–11, 1993, at the Seven Oaks Resort in San Antonio, Tex. **Contact:** Lt. Col. Phillip Coady, USAF (Ret.), 12935 Rio Oso Rd., Auburn, CA 95602. Phone: (916) 269-2302.

SHAEF/ETOUSA Veterans Ass'n

Veterans of the Supreme Headquarters, Allied Expeditionary Force (SHAEF), and European Theater of Operations, US Army (ETOUSA), will hold a reunion September 10–13, 1993, at the Doubletree Hotel in New Orleans, La. **Contact:** Alan F. Reeves, 2301 Broadway, San Francisco, CA 94115. Phone: (415) 921-8322.

Skyraider Ass'n

Members of the A-1 Skyraider Association will hold a reunion October 1–3, 1993, in Fort Walton Beach, Fla. **Contact:** Reuben Ware, P. O. Box 633, Randolph AFB, TX 78148.

USAF Senior NCOs

Former members of the USAF Senior Noncommissioned Officer Academy staff and faculty will hold a reunion July 22–24, 1993, at Maxwell AFB, Gunter Annex, Ala. **Contact:** CMSgt. Donald B. Hines, USAF, USAF Senior Noncommissioned Officer Academy, 550 McDonald St., Maxwell AFB, Gunter Annex, AL 36114-3107. Phone: (205) 416-3320. DSN: 596-3320.

1st Strategic Air Depot Ass'n

Members of the 1st Strategic Air Depot Association (Honington-Troston, England) will hold a reunion October 7–10, 1993, in Reno, Nev. **Contact:** Earl A. Dosey, 7336 Mikesell Dr., Indianapolis, IN 46260. Phone: (317) 251-0097.

2d Bomb Group/Wing

Members of the 2d Bomb Group/2d Bomb Wing, 15th Air Force, will hold a reunion September 9–12, 1993, in Houston, Tex. **Contact:** Kemp F.

Martin, 8433 Katy Fwy., Suite 102, Houston, TX 77024-1997. Phone: (713) 467-5435.

2d Space Operations Squadron

Members of the 2d Space Operations Squadron (formerly 2d Satellite Control Squadron) will hold a reunion July 30–31, 1993, at the Farish Memorial Recreation Area, Woodland Park, Colo. Past and present employees are invited. **Contacts:** Maj. Thomas Clifford, USAF, or Capt. Shawn Gordon, USAF, 300 O'Malley Ave., Suite 41, Falcon AFB, CO 80912-3041. Phone: (719) 550-6392, DSN: 560-6392 (Major Clifford) or (719) 550-6389, DSN: 560-6389 (Captain Gordon).

4th Fighter Squadron

Members of the 4th Fighter Squadron (F-82 Twin Mustang) will hold a reunion October 1993, at Hill AFB, Utah. **Contact:** Keith Morehouse, 117 Worcester Ct., Falmouth, MA 02541.

4th Photo/Long-Range Mapping Squadron

Members of the 4th Photo/Long-Range Mapping Squadron are planning to hold a reunion September 10–12, 1993, at the Radisson Inn—Colorado Springs Airport in Colorado Springs, Colo. **Contacts:** Dorance D. Greer, 215 Barry Ave., S., #222, Wayzata, MN 55391. Richard R. Ruess, 19431 Surfside Ln., Huntington Beach, CA 92648.

Readers wishing to submit reunion notices to "Unit Reunions" should mail their notices well in advance of the event to "Unit Reunions," AIR FORCE Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information.

5th Fighter Squadron

Veterans of the 5th Fighter Squadron, 52d Fighter Group (World War II), will hold a reunion October 7–10, 1993, at the Park Place Hotel in Traverse City, Mich. **Contact:** John Hughes, 508 W. Petoskey St., Gaylord, MI 49735. Phone: (517) 732-5641.

7th Photorecon Group Ass'n

Veterans of the 7th Photoreconnaissance Group, 8th Air Force (World War II), will hold a reunion with the 8th Air Force Historical Society September 28–October 4, 1993, in Chicago, Ill. **Contact:** Claude Murray, 16810 Boswell Blvd., Sun City, AZ 85351. Phone: (602) 972-3991.

8th Photorecon Squadron Ass'n

Veterans of the 8th Photoreconnaissance Squadron, 5th Air Force (World War II), will hold a reunion October 6–10, 1993, in Colorado Springs, Colo. **Contact:** Andy Kappel, 6406 Walnut St., Kansas City, MO 64113. Phone: (816) 363-0261.

17th Bomb Group/Bomb Wing

Veterans of the 17th Bomb Group and 17th Bomb Wing will hold a reunion September 8–12, 1993, at the Sheraton Gunter Hotel in San Antonio, Tex. **Contact:** Bill Baird, 6776 E. Northwest Hwy., Dallas, TX 75231. Phone: (214) 348-9124.

19th Bomb Group Ass'n

Veterans of the 19th Bomb Group will hold a reunion September 9–11, 1993, in Albuquerque, N. M. **Contact:** Robert E. Ley, 3574 Wellston Ct., Simi Valley, CA 93063-1145. Phone: (818) 703-7717.

19th Troop Carrier Squadron

Veterans of the 19th Troop Carrier Squadron

(Hickam Field/John Rodgers Airport) will hold a reunion October 14–16, 1993, in Reno, Nev. **Contact:** Jesse E. McSwain, 1012 N. Larrimore St., Arlington, VA 22205-1413. Phone: (703) 533-1390.

27th Air Transport Group

Members of the 27th Air Transport Group, which included the 310th, 311th, 312th, and 325th Ferrying Squadrons; the 86th, 87th, 320th, and 321st Transport Squadrons; and the 519th and 520th Service Squadrons, will hold a reunion September 23–25, 1993, at the Hilton Inn—Northwest in Oklahoma City, Okla. **Contact:** G. Ralph Jenks, 2524 Clermont Ln., Oklahoma City, OK 73116. Phone: (405) 842-5774.

27th Bomb Group

Veterans of the 27th Bomb Group will hold a reunion October 11–13, 1993, at Robins AFB, Ga. **Contact:** Paul H. Lankford, 105 Hummingbird Dr., Maryville, TN 37801. Phone: (615) 982-1189 (home) or (615) 984-7004 (work).

29th Bomb Group Ass'n

Veterans of the 29th Bomb Group will hold a reunion October 7–10, 1993, in Colorado Springs, Colo. **Contact:** Fred Pawlikowski, 5624 S. Menard Ave., Chicago, IL 60638. Phone: (312) 735-5008.

32d Fighter Squadron

Veterans of the 32d Fighter Squadron, 36th Fighter Group, 6th Air Force (World War II), will hold a reunion September 30–October 2, 1993, at the Holiday Inn in Fort Walton Beach, Fla. **Contact:** Frank J. Dutko, 316 Florida Ave., Gulf Breeze, FL 32561-4242. Phone: (904) 932-3467.

37th Fighter Squadron

Veterans of the 37th Fighter Squadron will hold a reunion September 23–26, 1993, at the Holiday Inn in Portsmouth, N. H. **Contact:** Frank C. Gallup, P. O. Box 415, Sunapee, NH 03782. Phone: (603) 763-2710.

39th Bomb Group

Veterans of the 39th Bomb Group will hold a reunion September 15–19, 1993, in Kansas City, Mo. **Contacts:** James W. Wyckoff, 2714 E. Hayt Corners Rd., Ovid, NY 14521. Phone: (607) 869-2574. Robert E. Weiler, 516 Canal Rd., Sarasota, FL 34242. Phone: (813) 346-0188.

39th Fighter Squadron Ass'n

Veterans of the 39th Fighter Squadron will hold a reunion September 25–28, 1993, at the Antlers Doubletree Hotel in Colorado Springs, Colo. **Contact:** Roy Seher, P. O. Box 352, Hydesville, CA 95547. Phone: (707) 768-3573.

40th Bomb Group Ass'n

Veterans of the 40th Bomb Group and the 28th Air Service Group will hold a reunion October 20–24, 1993, at the Menger Hotel in San Antonio, Tex. **Contact:** Flo Mallory, P. O. Box 9252, Treasure Island, FL 33740. Phone: (813) 360-3613.

48th Troop Carrier Squadron

Veterans of the 48th Troop Carrier Squadron, 313th Troop Carrier Group, will hold a reunion September 17–19, 1993, in Omaha, Neb. **Contact:** Daryl King, 821 W. 8th St., Grand Island, NE 68801. Phone: (308) 384-1352.

Class 53-B

Members of Class 53-B will hold a reunion October 11–14, 1993, at the Imperial Palace in Las Vegas, Nev. **Contact:** Frank J. O'Brien, 6 Westham Ct., Palmyra, VA 22963. Phone: (804) 589-5839.

64th Troop Carrier Group

Veterans of the 64th Troop Carrier Group will hold a reunion October 1993, in Midland, Tex. **Contact:** John D. Hardgrave, P. O. Box 384, Imperial, TX 79743. Phone: (915) 536-2486.

89th Troop Carrier Group

Veterans of the 89th Troop Carrier Group and

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Unit Reunions

807th AAB Unit (Bergstrom Field, Tex.) who served during World War II will hold a reunion September 16-18, 1993, in Chattanooga, Tenn. **Contact:** Wayne Taylor, 5015 S. W. 20th Terrace, Topeka, KS 66604-3576. Phone: (913) 272-2584.

96th Bomb Group
Veterans of the 96th Bomb Group, 8th Air Force (World War II), will hold a reunion in conjunction with the 8th Air Force Historical Society September 28-October 3, 1993, in Chicago, Ill. **Contact:** Thomas L. Thomas, 1607 E. Willow Ave., Wheaton, IL 60187. Phone: (708) 668-0215.

98th Bomb Group Ass'n
CORRECTION: The phone number for the 98th Bomb Group reunion contact was reported incorrectly in the May 1993 issue. The number is (402) 483-5548. **Contact:** Sam Wareham, 639 Mulder Dr., Lincoln, NE 68510. Phone: (402) 483-5548.

321st Alumni Ass'n
Members of the 321st Bomb Group/321st Missile Wing will hold a reunion August 7-9, 1993, in Grand Forks, N. D. **Contact:** Capt. Dave Thomson, P. O. Box 183, Emerado, ND 58228.

330th Bomb Group Ass'n
Veterans of the 330th Bomb Group will hold a reunion September 16-19, 1993, at the Marriott Hotel in Colorado Springs, Colo. **Contact:** Robert C. Flischel, 413 E. Center St., Germantown, OH 45327. Phone: (513) 855-7946.

349th Troop Carrier Group
The 349th Troop Carrier Group, which included the 23d, 311th, 312th, 313th, and 314th Troop Carrier Squadrons, will hold a reunion August 26-29, 1993, at the Holiday Inn-Crowne Plaza in Atlanta, Ga. **Contact:** Albert E. Allen, 160 Ferguson Dr., Martinsville, IN 46151. Phone: (317) 342-2280.

398th Bomb Group
Veterans of the 398th Bomb Group, 8th Air Force, will hold a reunion September 15-18, 1993, in Buffalo, N. Y. **Contact:** George R. Hilliard, 7841 Quartermaine Ave., Cincinnati, OH 45236-2313. Phone: (513) 891-8533.

405th Fighter Squadron
Veterans of the 405th Fighter Squadron, 371st Fighter Group, will hold a reunion October 19-24, 1993, at the Holiday Inn-Market Square in San Antonio, Tex. **Contact:** Milton Seale, 310 Charleston Dr., Victoria, TX 77904. Phone: (512) 572-8000 (work) or (512) 573-9333 (home).

438th Troop Carrier Group
Veterans of the 438th Troop Carrier Group will hold a reunion September 17-19, 1993, at McGuire AFB, N. J. **Contact:** Keith Nelson, 3215 W. Willow, Lansing, MI 48917.

454th Bomb Squadron Ass'n
Veterans of the 454th Bomb Squadron, 323d Bomb Group, 9th Air Force (World War II), will hold a reunion September 15-19, 1993, at the Sheraton World Resort Hotel in Orlando, Fla. **Contact:** Joseph R. Havrilla, 1208 Margaret St., Munhall, PA 15120-2048. Phone: (412) 461-6373.

455th Bomb Group Ass'n
Veterans of the 455th Bomb Group will hold a reunion September 29-October 2, 1993, in Norfolk, Va. **Contact:** Col. Louie O. Hansen, USAF (Ret.), P. O. Box 1625, Spencer, IA 51301. Phone: (712) 262-7237.

455th Bomb Squadron Ass'n
Veterans of the 455th Bomb Squadron, 323d Bomb Group, 9th Air Force (World War II), will hold a reunion September 16-19, 1993, in Chi-

cago, Ill. **Contact:** Frank Cronin, 304 Sycamore Dr., Naperville, IL 60540.

482d Bomb Group
Veterans of the 482d Bomb Group, which included the 36th, 812th, 813th, and 814th Bomb Squadrons and attached units who served at RAF Alconbury, England (World War II), will hold a reunion September 28-October 4, 1993, at the Hyatt Regency O'Hare in Chicago, Ill. Send SASE for additional information. **Contact:** Dennis R. Scanlan, Jr., One Scanlan Plaza, St. Paul, MN 55107. Phone: (612) 298-0997.

494th Bomb Group
Veterans of the 494th Bomb Group, 7th Air Force (World War II), will hold a reunion September 3-7, 1993, at the Fairmont Hotel in New Orleans, La. **Contacts:** Newt Wilson, 401 Connolly Cir., Lockhart, TX 78644. Phone: (512) 398-3770. Rusty Restuccia, 100 Willard St., West Quincy, MA 02169-1204. Phone: (617) 479-4678.

557th Bomb Squadron
The 557th Bomb Squadron, 387th Bomb Group, will hold a reunion September 9-12, 1993, at the Marriott Hotel in Dayton, Ohio. **Contact:** Walt St. Pierre, 6118 Millbrook Dr., Dayton, OH 45459. Phone: (513) 434-9612.

582d Air Resupply Group
The 582d Air Resupply Group (RAF Molesworth, England) will hold a reunion September 30-October 3, 1993, in Albuquerque, N. M. **Contact:** Tony Mance, 6317 Ponderosa Ct., N. E., Albuquerque, NM 87110. Phone: (505) 881-6579.

780th Bomb Squadron
The 780th Bomb Squadron will hold a reunion September 15-19, 1993, at the Hilton Hotel in Colorado Springs, Colo. (The cutoff date for hotel reservations is August 15.) **Contact:** Louis Lindeman, 616 E. 7th St., Oakley, KS 67748. Phone: (913) 672-3600.

868th Bomb Squadron
Veterans of the 868th Bomb Squadron and the 63d Bomb Squadron will hold a joint reunion September 16-18, 1993, at the Holiday Inn-University Plaza in Springfield, Mo. **Contact:** Fred Stanley Howell, 33233 Ave. F, Yucaipa, CA 92399. Phone: (909) 795-5658.

1611th ATW
Members of the 1611th Air Transport Wing who served at McGuire AFB, N. J., between 1955 and 1963 will hold a reunion October 3-6, 1993, at the Riviera Hotel and Casino in Las Vegas, Nev. **Contact:** Dale Hardin, 433 Water St., Suite A, Kerrville, TX 78028. Phone: (210) 257-5000 or (800) 324-5680.

6147th Tactical Group
Veterans of the 6147th Tactical Group "Mosquitos" who served in 5th Air Force in the Korean War will hold a reunion September 15-19, 1993, at the Hilton Airport Hotel in Wichita, Kan. **Contact:** Robbie Blackburn, 1301 Azure Ln., Wichita, KS 67235. Phone: (316) 721-4322.

Air Transport Command
Seeking contact with veterans of the Air Transport Command who served in the North African Division (World War II) for an October reunion in San Antonio, Tex. **Contact:** C. L. Parrott, 140 Sugar Hill Dr., Sparks, NV 89433.

Class 42-D
Seeking contact with members of Class 42-D (Columbus AFB, Miss.) for the purpose of holding a reunion. **Contact:** Paul F. Landt, P. O. Box 5146, Fort McEllan, AL 36205. ■

Bulletin Board

Seeking information on mass autopsies of **Americans in Vietnam** by US personnel for research on effects of diet, carbon monoxide, and Agent Orange on vital organs. **Contact:** Emmett Bailey, Rte. 6, Box 190-B, Henderson, NC 27536.

Patch collector seeking contact with other collectors for trading, especially **medical and air evacuation** unit memorabilia. **Contact:** Bob Mebane, 2506 Toron Ct., Alexandria, VA 22306.

Seeking contact with former pilots/flight crews of the **90th Bomb Squadron**, 3d Bomb Group, Yokota AB, Japan, from 1946 to 1949. Photos and personal stories are needed for comprehensive unit history. **Contact:** Jean-George Marcotte, 1237 East Lake Rd., Dundee, NY 14837.

Seeking information on **Morris M. Sargent** and **Edward M. Rogers**, who were stationed at RAF Sculthorpe, England. **Contact:** William R. Morris, 4924 Pinkney St., Omaha, NE 68104.

Seeking patches or drawings of wing insignia for F-100s of the **27th Tactical Fighter Wing**, Cannon AFB, N. M., 1963-64, and B-57s of the 405th TFW, Clark AB, the Philippines, 1964-66, for a ribbon display case. **Contact:** Colin E. Feeney, 3909 Lewis Ave., Erie, PA 16507.

Seeking contact with **Dick Lombard**, who was a navigator, meteorologist, and copilot at Johnson AB, Japan, and returned in May or June of 1950. **Contact:** H. B. Smith, 164 Edeal Rd., Los Lunas, NM 87031.

Collector seeking **manufacturer's name plates** from military, civilian, and foreign aircraft, old and new. **Contact:** Lt. Col. Lewis R. Fisher, USAF (Ret.), 344 St. Cloud Dr., Friendswood, TX 77546.

Collector seeking original **screen printed scarves** from the 393d BMS, 509th AREFS, and 509th BMW (Pease AFB, N. H.) and scarves from the 528th BMS, 529th BMS, 530th CCTS, and 380th BMW (Plattsburgh AFB, N. Y.). **Contact:** Curtis J. Lenz, 32 June St., Nashua, NH 03060-5345.

Seeking information on **James O'Connor**, an Irishman who became a US citizen and belonged to the 47th Bombardment Wing in 1955. He was based at RAF Sculthorpe, England. **Contact:** A. M. Carter, 19 Lorne Rd., Clarendon Park, Leicester LE2 1YH, UK.

Seeking contact with members of the **6594th Test Group**, Hickam AFB, Hawaii, from the time it was activated until it was deactivated in October 1986. **Contact:** CMSgt. John A. Ashe, USAF (Ret.), P. O. Box 1484, Tehachapi, CA 93561.

Seeking information from pilots who bombed the road from **Kuwait City to Basra** for a book on war and morality from a participant's perspective. Particularly interested in personal accounts and relevant publications about these missions. **Contact:** Dr. John Popiden, Campus Box 516, Loyola Marymount University, Los Angeles, CA 90045.

Seeking contact with members of the **100th Air Refueling Squadron**, Pease AFB, N. H., who are not on the mailing list. **Contact:** Charles R. Wagner, P. O. Box 150, St. Peter, MN 56082-0150.

Collector seeking World War II **9th TCC Pathfinder Group** sleeve insignia. **Contact:** Maj. Lester J. Vohs, USAF (Ret.), 1455 Kenesaw Ave., Knoxville, TN 37919.

Seeking information from any Air Force member who flew or directed air strikes in support of the

1st Air Cavalry at LZ X-Ray or LZ Albany in Vietnam, November 14-20, 1965. **Contacts:** Col. Bruce M. Wallace, Jr., USAF (Ret.), 1007 Fifth Ave., Suite 902, San Diego, CA 92101. Paul Winkel, 46467 Saffron Ct., Sterling, VA 20165.

Seeking contact with **Capt. Davis Kramer** and his wife. He was stationed at Craig AFB, Ala., in the 1960s. His wife is a descendant of F. M. Perkins. **Contact:** Cartledge W. Blackwell, Jr., P. O. Box 592, Selma, AL 36702.

Collector seeking patches from **A-10 Units** at 104th Fighter Group, Barnes MAP, Mass.; 110th FG, Battle Creek, Mich.; 111th FG, Willow Grove, Pa.; 128th FW, Truax Field, Wis.; 175th FG, Martin Airport, Md.; 355th FW, Davis-Monthan AFB, Ariz.; 917th FW, Barksdale AFB, La.; and 930th FG, Grissom AFB, Ind. **Contact:** Anthony Abbott, PSC 76, Box 6484, APO AP 96319-6484.

Collector seeking fighter, bomber, and competition color **squadron patches** from any squadron from any Air Force. **Contact:** Richard Rochon, 36 de Sauternes, #3, Gatineau, Quebec J8R 2P0, Canada.

Seeking information on **1st Lt. Al Lampart**, who flew P-40s in North Africa and was a student instructor at the Engineering School at Chanute Field, Ill., in 1945. **Contact:** Gil Vizcarra, 1229 Eisner Pl., Anaheim, CA 92801.

Seeking information on and contact with **Lt. Malcolm H. O'Brien**, who was stationed at

Sampson AFB, N. Y., in the 1950s. Also seeking contact with **Capt. George F. Nisius**, a flight surgeon stationed at Waller Field, Trinidad, in 1943. **Contact:** Lt. Col. Robert W. Bliss, USAF (Ret.), Box 107, Orford, NH 03777.

Collector seeking **China-Burma-India theater patch**. Also seeking information on **Sgt. Richard "Dick" Hasen** from Wisconsin, who was with 14th Air Force during World War II and flew as a photographer with B-24s. **Contact:** Arthur F. Reihe, Jr., 2111 Metairie Heights Ave., Metairie, LA 70001.

If you need information on an individual, unit, or aircraft, or if you want to collect, donate, or trade USAF-related items, write to "Bulletin Board," Air Force Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Letters should be brief and typewritten; we reserve the right to condense them as necessary. We cannot acknowledge receipt of letters. Unsigned letters, items or services for sale or otherwise intended to bring in money, and photographs will not be used or returned.—THE EDITORS

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#A-4 **A2 Jacket.** Dark brown goatskin (as made in WWII) with durable twill lining and heavy duty knit cuffs and waist band. Sizes 34-44 (longs and larges up to size 54 available at slightly higher cost). **\$202.50**

#A-5 **AFA Necktie.** Silk and polyester Givenchy tie with embroidered AFA logo. Specify color—brown, green, tan. **\$18.50**

#A-6 **T-Shirt.** Durable T-shirt with "Air Power . . . For a Strong America" on back and AFA "wee-wings" on front. 100% preshrunk cotton. Unisex sizes—M, L, XL, XXL. **\$10.00**

#A-7 **Ft. McHenry Necktie.** Depicts the 15-stripe, 15-star flag that flew over Ft. McHenry and inspired Francis Scott Key to write the "Star Spangled Banner." Navy polyester with full-color 1812 U.S. flag. **\$15.75**

#A-8 **AFA Necktie.** Silk and polyester Schreter tie with full-color AFA logos. Specify color—navy or maroon. **\$15.75**

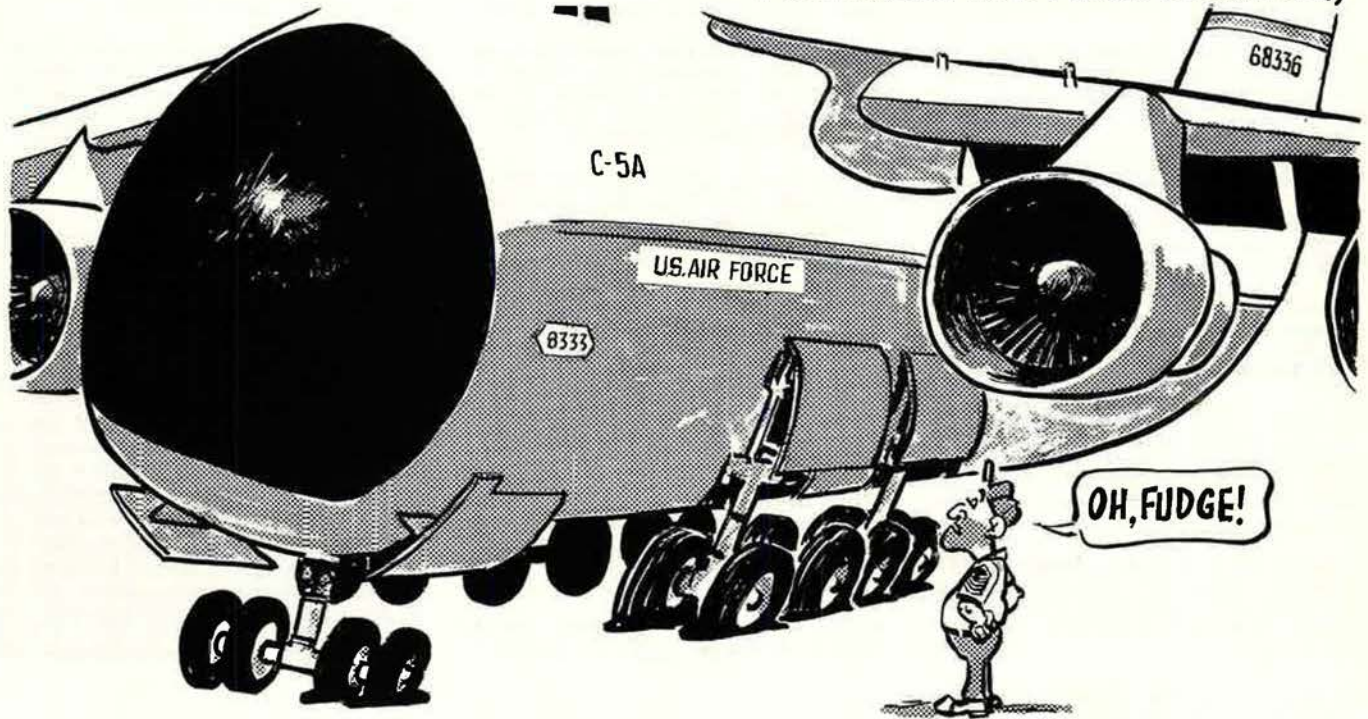
#A-9 **AFA Athletic Shoes.** Comfortable athletic shoes with Air Force seal in full color. Specify size—men's even and half sizes 7-11, plus 12 and 13; women's even and half sizes 5-10. **\$48.95**

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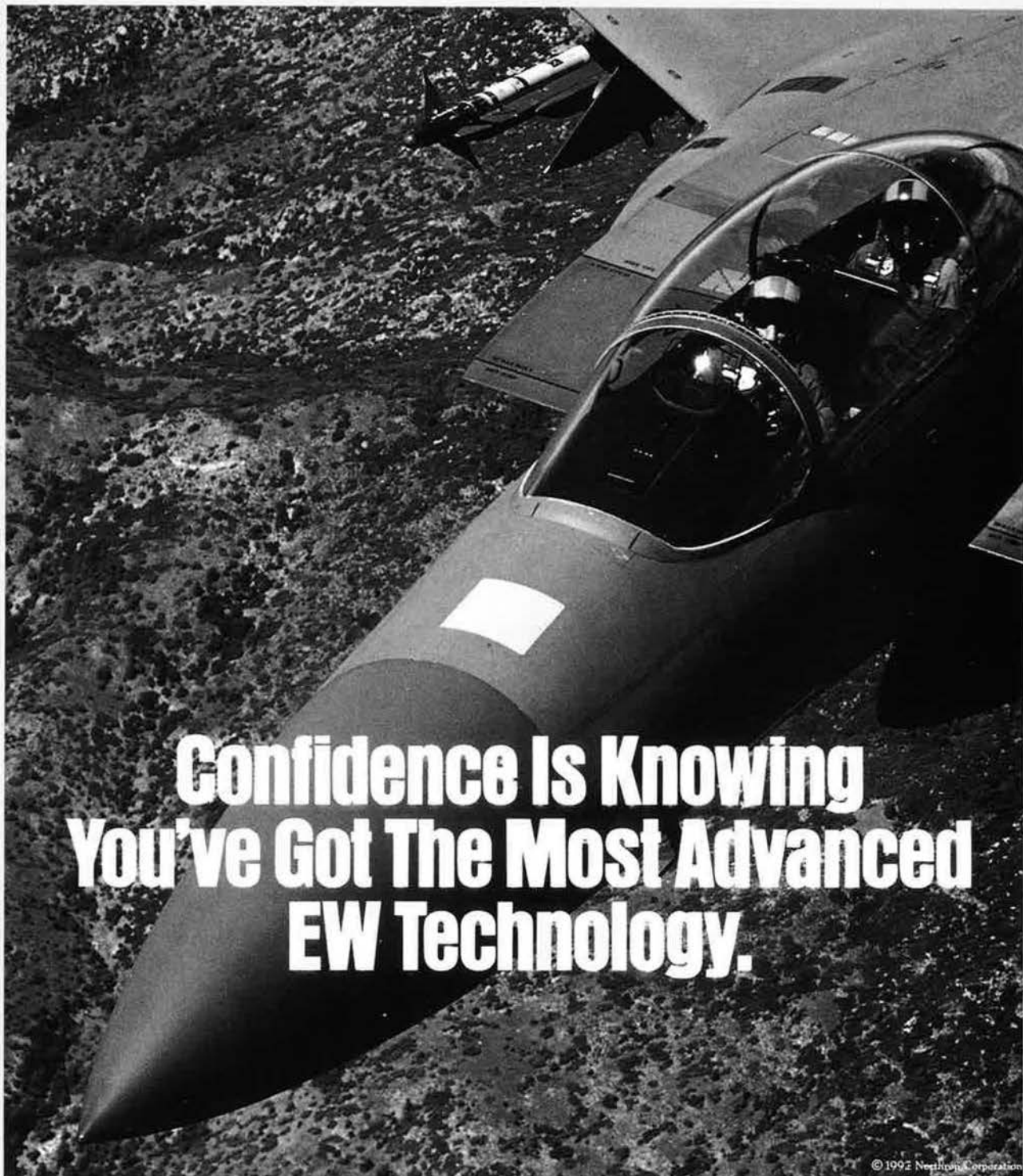


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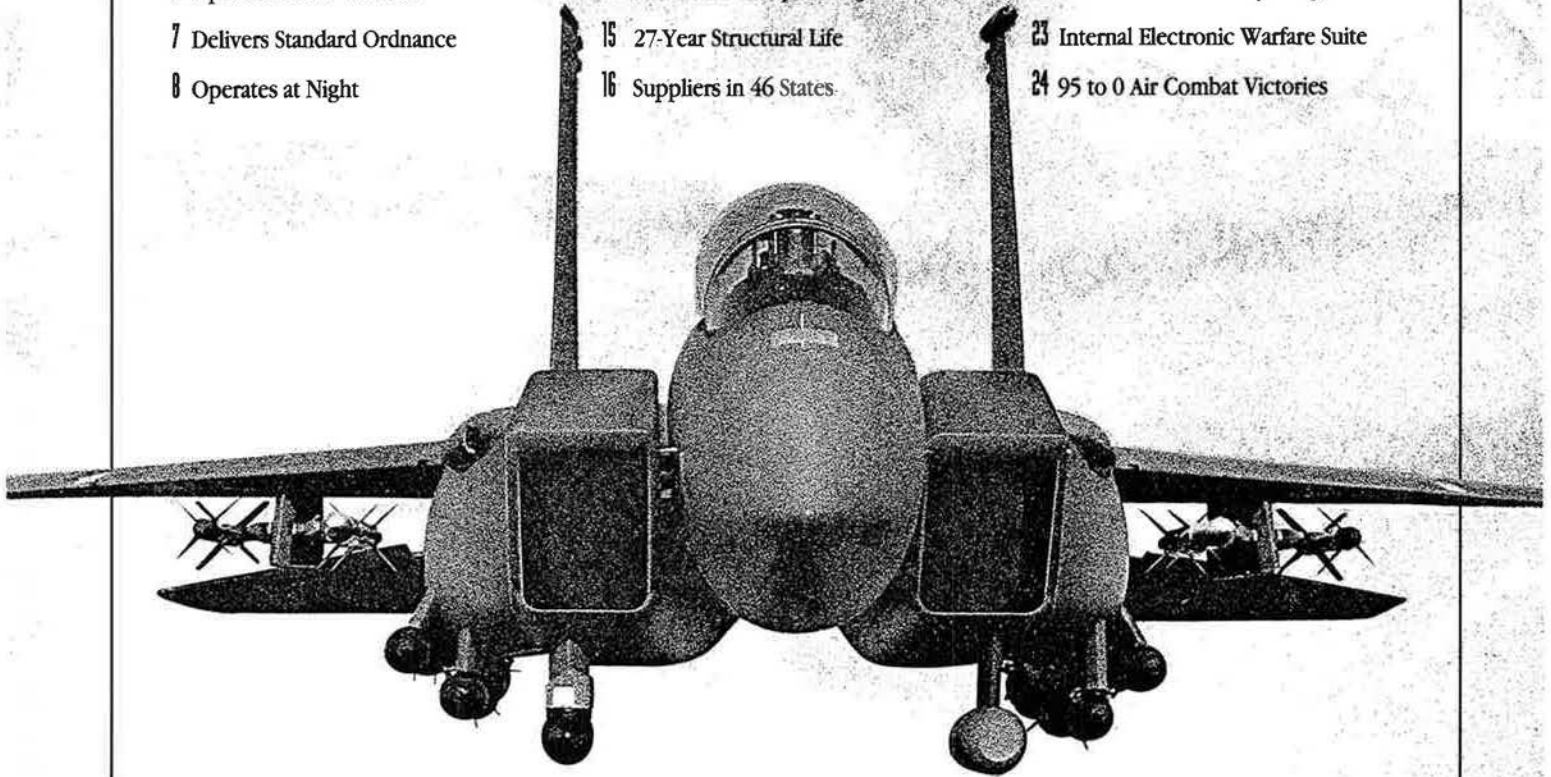
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