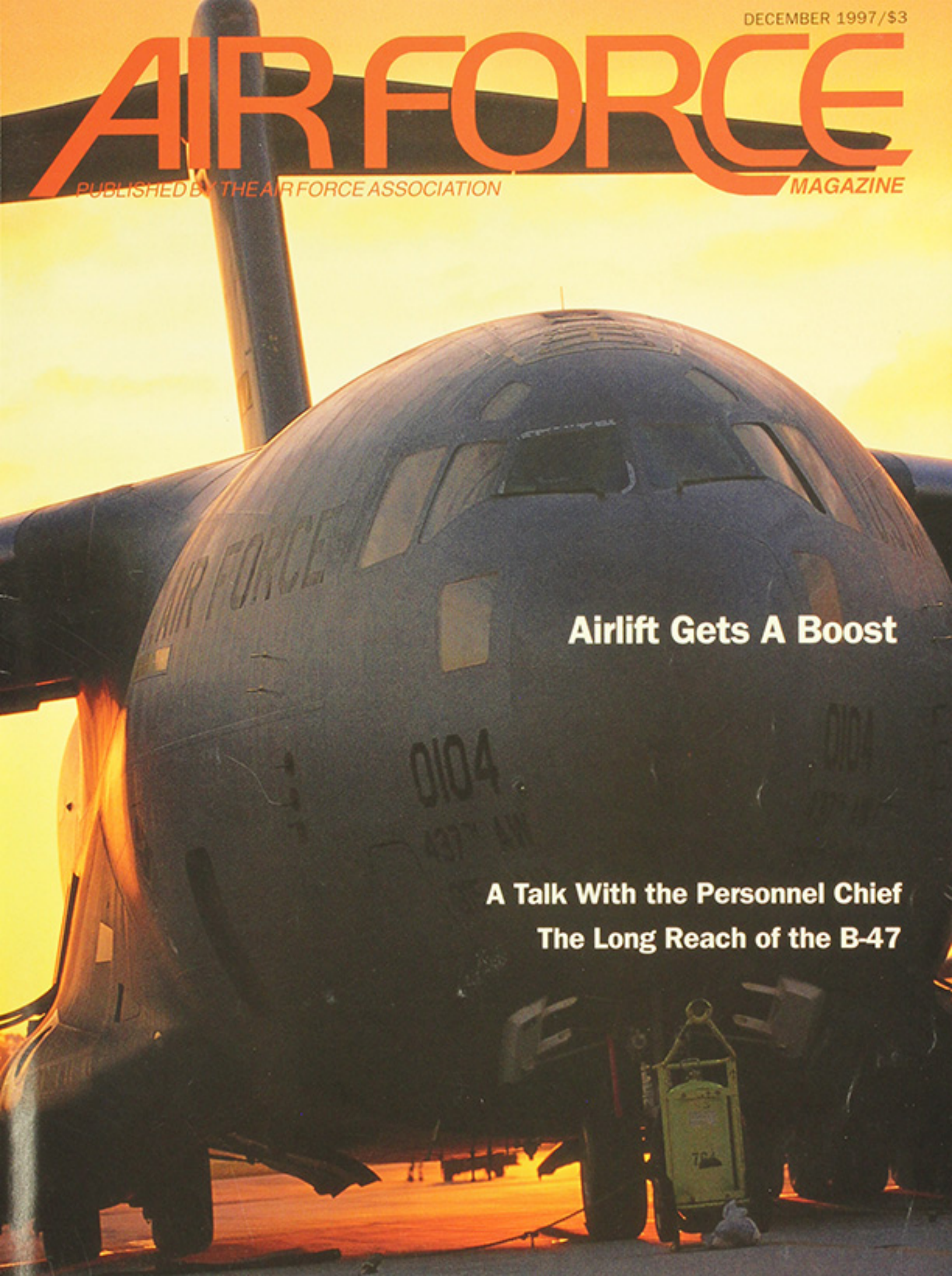


DECEMBER 1997/\$3

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE



Airlift Gets A Boost

**A Talk With the Personnel Chief
The Long Reach of the B-47**

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MAGAZINE

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About the cover: This C-17 and others from Charleston AFB, S.C., are key to the Pentagon's air mobility plans. See "Airlift Gets a Boost," p. 24. Photo by Erik Hildebrandt.

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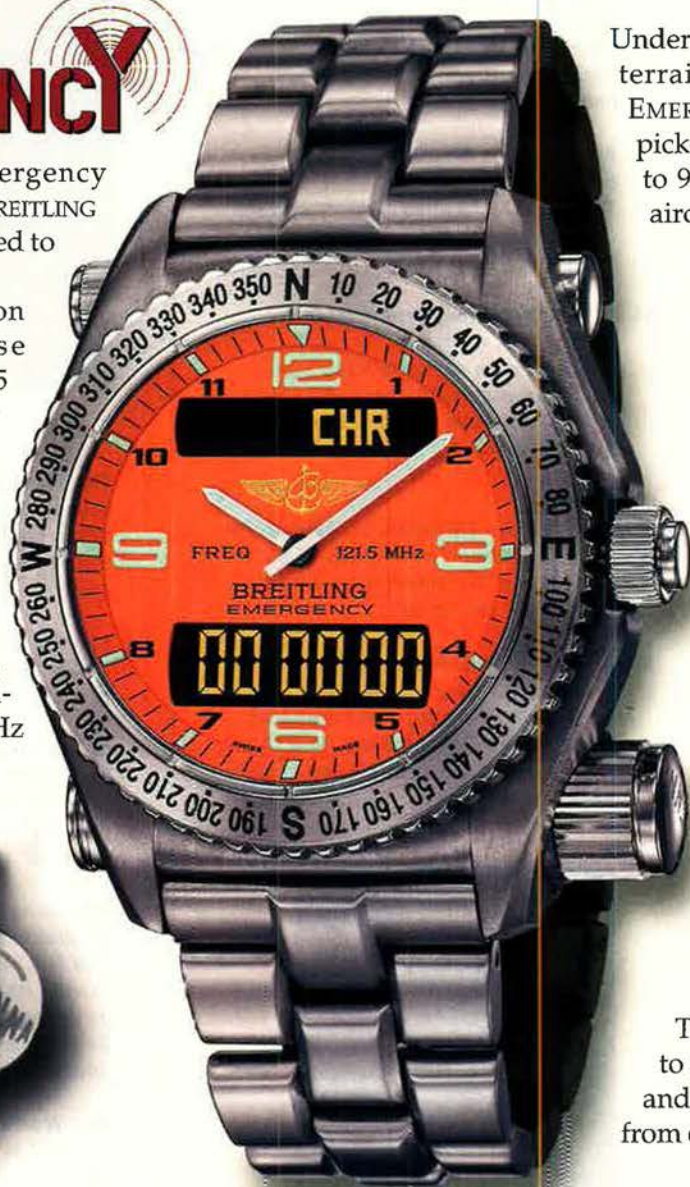


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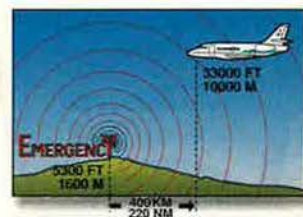
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INSTRUMENTS FOR PROFESSIONALS

By John T. Correll, Editor in Chief

Sending Signals and Projecting Power

ON Sept. 29, Iran bombed two camps occupied by Iranian rebel groups in southern Iraq. Iraqi fighters responded, although the Iranian aircraft had returned to base by then. It was the latest in a string of violations of the Southern Watch no-fly zone that the United States and its coalition partners have been enforcing since 1992.

The principal concern was that the Iraqi air force was getting restive and bolder. On Oct. 2, the Pentagon ordered the aircraft carrier *Nimitz*, then in the South China Sea, to skip a port call in Singapore and hurry, ahead of schedule, to its next station in the Persian Gulf.

The news media played the story as a cliff-hanger, following the progress of *Nimitz* daily. A front-page headline in the *New York Times* said, "Iran-Iraq Battles Lead US to Rush Carrier to Gulf," adding, "Pentagon Feels Urgency."

On Oct. 13, the day after *Nimitz* arrived in the Gulf, Newport News Shipbuilding bought large newspaper advertisements to proclaim the carrier was on station. The ads quoted President Clinton repeating the Navy's stock claim that in time of crisis, the question on everyone's lips in Washington is, "Where is the nearest carrier?"

Assuming the events of Sept. 29 qualified as a crisis, the answer was that the carrier was 7,000 miles and 10 days away. A better question to ask would have been: "Where is the nearest effective force?"

On Sept. 29, the US Air Force was already in the Gulf Theater with 120 combat aircraft—fighters, deep-strike aircraft, and two B-1B bombers—at bases in Saudi Arabia and Bahrain. That force was eminently capable of whatever military action was desired against Saddam Hussein and his recalcitrant regime in Iraq.

Announcing the dispatch of the carrier, Secretary of Defense William S. Cohen said, "I did this to send a signal to Iraq that the coalition is serious about enforcing the no-fly zone over southern Iraq." A National Security Council official said, "We

are trying to send the signal to all parties that we will enforce the no-fly zone. A senior defense official told CNN that "We are doing this to get Saddam's attention, to tell him to watch it, to be careful."

These officials carefully declined to say what actions they might take, other than sending signals. If all eyes remained on *Nimitz*, though, it was possible to adopt a tough-sounding position for 10 days without actually doing anything.

It is questionable how Saddam interpreted these signals. He certainly knew that Air Force and coalition air-



When *Nimitz* arrived in the Gulf, the Air Force was already there with 120 combat airplanes.

craft in the theater could strike then and there if ordered to do so. He probably remembered as well that during the Gulf War, the US Air Force shot down 41 of his aircraft, compared to three he lost to Navy fighters. What additional pressure he may have felt from the carrier's approach last October is unknown.

Upon arrival, the *Nimitz* air wing became part of the Joint Task Force/Southwest Asia, responding to the same air tasking order as coalition aircraft, the Air Force wing in Saudi Arabia, and an air expeditionary force that had been operating in Bahrain for the past month. The Navy keeps a carrier in the Gulf for approximately

270 days a year, but it is the Air Force that flies 68 percent of the Southern Watch sorties.

The way the *Nimitz* story was told perpetuated a misconception about the projection of power. The Navy argues that carriers are the force of choice, but their utility depends increasingly on being in the right place at the right time for limited operations. Compared to land-based airpower, carriers take longer to deploy, have less strike capability, and they cost more.

Intercontinental reach is well established as a characteristic of land-based airpower. In 1986, Air Force F-111s flew from Britain to take part in air strikes against Libya. In January 1991, seven B-52Gs took off from Barksdale AFB, La., struck in Iraq, and landed again at Barksdale.

For the past two years, the Air Force has been demonstrating its air expeditionary force concept. Air Combat Command says that, beginning from a cold start, it can have an air expeditionary force on location and operating in 72 hours. With strategic warning, the time drops to 48 hours. Air Force bombers from the United States can be over a regional target within 36 hours.

Furthermore, when the action is of any considerable scope or duration, the Air Force role is likely to be substantial and sustained. It flew 70 percent of the US air sorties in the Gulf War, just as it now carries most of the load in Southern Watch.

Perhaps in emphasizing the military power that would arrive with *Nimitz* in 10 days, the Administration was putting off a decision or trying to look—to the American press, anyway—more resolute than it really was. If so, that borders on bluffing, which is seldom a good policy. Alternatively, the Administration might not have fully realized the possibilities that were open with Air Force airpower.

The President may or may not have actually wondered where the carriers were in September, but if that's all he wondered, he needs a better briefing on his options. ■

Headwinds: Airpower

It is misleading to use the Gulf War as a typical example of what airpower can do [*The Headwinds of Tradition*, October, p. 3]. The fortuitous combination of conveniently located airfields with secure lines of supply and communication is unlikely to be found elsewhere on the globe.

Col. Peter E. Boyes,
USAF (Ret.)
Rancho Murieta, Calif.

Your October 1997 editorial offers many interesting comments on future force structure and doctrine. From the mid-1960s to the early 1990s most weapon designs and force structures were in response to known threats and their potential extensions. It is no longer clear that future challenges will be so well defined.

You correctly observe that our ability to use air, space, and sea resources gives us military leadership—but not necessarily military prevalence. In places such as Somalia we have found that our size, resources, or weapons had little meaningful value. Ditto Bosnia.

We need to contemplate an “arsenal” of clever schemes that do not need to replicate mass but will innovate low-cost security. Find the best low-cost solutions and let “Jointness” fall where it may.

Ernest C. Guerri
Melbourne, Fla.

[In] the letter “Joint Contributions” [October, p. 9] Robert E. Duchesneau takes exception to statements in the June “Airpower and the Other Forces” article [p. 34]. I suggest that the long-range, or strategic, aspects of war have been, and still are, best carried out by the aircraft designed to carry heavy weapons loads over the long distances needed to attack strategic targets deep in an adversary’s rear. Thus the Air Force has grown up with the strategic perspective.

To cite Desert Storm and Vietnam as examples of the other services’ air assets in relation to strategic operations is comparing apples to raisins. There was no true strategic long-

range operation required. The fact that tactical assets carried the war to the adversary’s homeland merely reflects the short distances involved. The involvement of truly strategic, long-range assets in Desert Storm and Vietnam were (and I was there in Vietnam on both tactical and strategic assets) an accommodation to involve these assets more for training than for truly strategic requirements.

[An] ongoing argument seems to be based on the premise that airpower can’t sink ships. I think this was disproved over and over in World War II. It seems that some are still smarting from that showdown. Let’s get on with being components of the US Defense Department, which can find appropriate uses for airpower, whichever component has the best position and capability.

Lt. Col. James E. Bradley,
USAF (Ret.)
Westmoreland, Kan.

Battle of Arlington Ridge

I was happy to read that Rep. Gerald Solomon (R-N.Y.) is trying to block the construction of the planned Air Force Memorial in Washington. I don’t know the facts of his argument about how it might encroach on the Marine Memorial, but I do question the design of the planned Air Force Memorial. As an Air Force member, I am all for a memorial, but I don’t see the connection between the big, tubular, open-roofed building planned and the men and women who have fought and died in the Air Force.

The Marine’s memorial of men

planting the US flag on Iwo Jima, and the [Korean War Veterans] Memorial of soldiers standing there showing incredible emotions of war—those are what I call memorials. They represent real people in war. Why shouldn’t the Air Force’s memorial represent what we do in the Air Force—Fly and Fight?

Where’s the pilot and maintenance people discussing a hard fought combat sortie? Where’s the bomber with its crew that just pinpoint bombed a target deep in enemy territory? It seems to me that statues like these would stir memories of pride, devotion to flag and country, and good feelings about loved ones who served in the Air Force more adequately than an abstract structure.

Maj. Keith Edwards,
USAF
Luke AFB, Ariz.

Deliberate Force

As a former fighter pilot who flew 230 missions in Vietnam and supported our involvement there, but not the political mismanagement of the war, I was very interested in John A. Tirpak’s article about the NATO air campaign in 1995 against the Bosnian Serbs [*Deliberate Force*, October, p. 36]. However, the article failed to address far more important ramifications of that operation as to the future use of our armed forces.

The most egregious shortcomings are that the author totally accepted the flawed justification for the bombing in the first place and completely ignored the historical and political background of this gross and shameful misuse of (mostly) US military power against people who had done us no harm. The Serbs had attacked no NATO nation.

By beginning his piece with a repetition of the charge that the Bosnian Serbs were responsible for the Aug. 28, 1995, attack on the marketplace in Sarajevo, he does not take into account a UN report, findings of a US Congressional committee, or numerous European newspaper articles which cite the role of the Bosnian Muslim government in staging attacks on its own people to gain Western

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

sympathy and support, a plan which was clearly successful.

In the past, *Air Force Magazine* has provided in-depth analyses of how our military is being used or misused. It is long past the time when AFA should be questioning what national interest is being served by spending billions of dollars, wasting military readiness resources, and putting our GIs' lives at risk in a "peace enforcement" operation whose only objective is to impose a Bosnian Muslim government on people who will never accept it.

Col. George Jatras,
USAF (Ret.)
Sterling, Va.

Speaking of China

Congratulations on your article on China's military modernization efforts [*"The Chinese Buildup Rolls On," September, p. 77*].

As our defense policy-makers look at potential adversaries like China with overconfident, post-Iraq attitudes, three critical points deserve attention:

- Any conflict we may have with the People's Republic of China will be in their neighborhood, not ours, and we will need enormous capabilities, like airlift, to get there.

- Even if our technology is unmatched, fighting an adversary like China that will be able to draw on huge reserves of manpower and equipment will be a daunting challenge.

- While China modernizes, America's weapons procurement budget is in the basement, with no relief in sight. Worse, our forward presence in East Asia is steadily dissipating, and regional powers like China are filling the vacuum.

If QDR-type cuts in critical weapons platforms like the F-22 are left unchallenged, our airmen will be left flying last generation, nonstealthy platforms in the next war, and we will look back on the current procurement holiday and ask, as your author did, "What about the SA-10s?"

Merrick Carey
Alexis de Tocqueville Institution,
Arlington, Va.

In browsing the "Gallery of Far East/Pacific Airpower" [*October, p. 63*], I noted a number of aircraft attributed to the "Taiwanese Air Force." It is disappointing to see one of my favorite information sources fall in with the political correctness crowd in using this label for the Republic of China. This nation has been a steadfast ally and was one of the few nations who volunteered to send troops to assist us in Vietnam. The offer was declined in order not to irritate the

People's Republic of China, for fear it might increase its already prodigious support to "North Vietnam." I realize that's not its name either, but that's what we called it at the time to more easily differentiate it from the South.

Our government currently believes that we are best served to placate mainland China, give it most favored nation trading advantages, and help it become a superpower. Its espionage agents steal our technology wholesale, and we turn a blind eye to our allies and others selling the PRC state-of-the-art military hardware. When it considers that it has the military clout to do so, it will attack our "friends" on Taiwan and defy us to do anything about it. The animosity between the two Chinas has been festering for too long to be salvaged by time.

Col. Lowell P. Little Jr.,
USAFR (Ret.)
Albuquerque, N.M.

SR-71 vs. UAVs

In the September issue [*"The Robotic Air Force," p. 70*], Maj. Gen. Kenneth R. Israel explained that [Unmanned Aerial Vehicle] work represents roughly 30 percent of [the Defense Advanced Research Office's] overall budget, which also funds operations of the SR-71, U-2, and RC-135 Rivet Joint aircraft. This statement gives the impression that the SR-71 program is funded by his office.

The SR-71 program is entirely funded each year by Congress. When Congress directed the SR-71's return to service in Fiscal 1995 the Air Force wanted nothing to do with it.

In the same article, the Senate Appropriations Committee was right on the mark when it stated that needed upgrades to manned reconnaissance systems have been consistently sacrificed for almost 20 years of UAV yet-to-be-realized potential. There have been several attempts in the past to modernize the SR-71's ability to provide real-time imagery, only to be denied because something "better" was on the horizon.

USAF politics prematurely retired the SR-71s in 1990. They were not outdated, nor were parts scarce, as had been reported. Fortunately, Congress became acutely aware of gaps in our intelligence-gathering capabilities around the world, saw there was nothing to replace the SR-71's unique abilities, funded the program, and provided the long-overdue near-real-time downlink on the aircraft. The Air Force did not want to use the SR-71s for fear they might prove too useful and jeopardize funding for other reconnaissance projects, like UAVs.

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Letters

Now the SR-71 is being retired a second time. On Oct. 14, President Clinton line item vetoed the SR-71 program. Although the President vetoed the program, make no mistake about it: USAF offered it up. They are now circling the wolves for the U-2 program—Check six!

Col. Richard H. Graham,
USAF (Ret.)
Plano, Texas

Thoughts on Pilot Shortage

I read with interest "Training Overload Hits the Force" [*October, p. 30*] since I spend my time in what was formerly ATC. With demands for [more] pilots in the very near future, and the lack of training facilities, it's even more amazing that the Air Force closed Reese AFB, Texas, one the most modernized bases in AETC. The results of closures and downsizing of AETC bases will not be realized for a while, but the lack of proper training and updated facilities to train new pilots will be realized much sooner with a higher accident rate. Reese [had] the newer facilities and the environment to produce the pilots the US needs in the future to gain and maintain air superiority.

Frank DeAngelo
Parma, Ohio

As a retired member of the Ohio ANG and USAF, I read with interest comments regarding a short-term pilot shortage in the Air Force (and Navy). I have every confidence this issue will be handled in the appropriate manner and that by the turn of the century or soon thereafter, the situation will be both stabilized and properly addressed.

[As] an interim solution, why not voluntarily recall former or retired personnel, already trained, for a specified period of time to fill specific vacancies? Only minimum time would be required to requalify these people who possess an enormous amount of experience and skill. If pilots are a national resource, perhaps one key segment of this resource could be tapped to fill a critical need.

Lt. Col. James H. Frederick,
USAF (Ret.)
Worthington, Ohio

By the By

I was prompted to write you about your "50 Years Ago in *Air Force Magazine*" [*October, p. 19*]. The cover that year showed the tail section of the second B-36 built, the so-called YB-36 [#570]. The ship was the second prototype with that designation, but

Convair later sent the ship back through retrofit and converted it into an RB-36, ultimately delivering it to SAC's 72d Strategic Reconnaissance Wing at Ramey AFB, Puerto Rico.

Following a conversion at Kelly AFB, Texas, in 1954–1955, it was clear to us that the main mission of the wing had shifted to offense and to a new mission profile: bombing, not passive intelligence gathering.

For a 10-year period, had the balloon gone up, it was in those behemoths that we would have—for better or worse—lighted up the sky, heading for the Soviet Union to deliver a nuclear weapon. Mercifully, the airplane never had to do that, and the Peacemakers quietly disappeared by the early 1960s, most of them ending their careers out at Davis-Monthan AFB, Ariz.

Not so, old #570. It was flown from Ramey to Wright-Patterson AFB, Ohio, and put on display outdoors. Several years later, I learned #570 had been sold to a man who planned to reassemble the airplane and put it on display in Hamilton, Ohio. Another B-36 was selected to be in the new USAF museum, one that was a newer model and that was better preserved than #570.

Col. Raymond Bottom Jr.,
USAF (Ret.)
Hampton, Va.

[In] "The First Five Years of the First 50," on p. 55, you discuss the bitter squabble between the Navy and the new Air Force over which would have the primary responsibility for the evolving strategic nuclear mission (along with the funding to do so, of course). USAF would use their huge, swift new B-36 bombers, while the Navy would use large, slower aircraft carriers with their necessarily smaller and shorter-range aircraft.

Your article does not mention that around 1949 the Navy, in pursuit of favorable propaganda, brought an aircraft carrier in close to the Eastern Shore near Washington—and ran firmly aground. After the Navy had writhed in horrible embarrassment for a couple of days, in full media glare and unable to shake the thing loose, someone declared sympathy for the Navy's plight and offered to pull the carrier off the sandbar—with a B-36. My memory is that this was the point at which the Navy heaved a quivering sigh and gave up the jurisdictional fight.

Lt. Col. James L. Brewer,
USAF (Ret.)
Grant, Ala.

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By Peter Grier

Change Out of the Top Four



Daryl L. Jones



F. Whitten Peters



Gen. Michael E. Ryan



Gen. Ralph E. Eberhart

On Oct. 21 President Clinton announced his intent to nominate Florida state legislator Daryl L. Jones to be the next Secretary of the Air Force, replacing Sheila E. Widnall.

The selection of Jones is part of a rare, nearly simultaneous change out of the Air Force's top four leaders. Also moving into top positions are Gen. Michael E. Ryan, the new Chief of Staff; Gen. Ralph E. Eberhart, the new vice chief of staff; and F. Whitten Peters, the new undersecretary of the Air Force.

Born and raised in Mississippi, Jones graduated from the Air Force Academy in 1977. He subsequently spent seven years on active duty, flying F-4 Phantoms from Clark AB, Philippines, and other Air Force installations.

He moved to Florida in 1981 while still a member of the US military. He left the service to study law full time at the University of Miami and launched a political career which eventually made him the Florida state Senate's first African-American Democratic leader.

Ryan was sworn in as Air Force Chief of Staff on Oct. 6 and officially introduced as the service's new uniformed leader at an Oct. 10 ceremony at Bolling AFB, D.C.

"If my father were here today he'd be very proud," said Ryan. His father, Gen. John D. Ryan, was Air Force Chief from 1969 to 1973.

Today's service is far different from the one of his dad's era, Ryan said. The force is smaller—but more coherent and capable. Active duty, Guard, Reserve, and civilian Air Force components must work together to ensure continued success, he added. "The Air Force is also a family," he said, "and those families that succeed in the face of great challenges do so because of the great trust that develops."

In his most recent Washington assignment, Eberhart, a graduate of the US Air Force Academy, had been deputy chief of staff, plans and operations, at USAF headquarters. He then moved on to become commander, US Forces Japan, and commander, 5th Air Force, at Yokota AB, Japan. He is a combat pilot who flew more than 300 combat missions as a forward air controller during the Vietnam War.

Peters, formerly a Navy officer (1969–72), replaces Rudy de Leon as the Air Force's number two civilian official. A lawyer, Peters graduated from Harvard in 1968 and Harvard Law School in 1976 and subsequently worked as a law clerk to Supreme Court Justice William J. Brennan Jr. In the Clinton Administration, he has served as DoD's principal deputy general counsel.

Suicide Suspected in A-10 Crash

In a surprise twist to an unusual tale, the Air Force wrapped up its investigation into the crash of an A-10 aircraft last spring by concluding that the pilot probably caused the accident in an act of suicide.

Air Combat Command on Oct. 27 released the report of the accident investigation board that studied the April 2 crash of an A-10 near Eagle, Colo. The pilot, Capt. Craig Button, died in the aircraft.

The report concludes that "the pilot apparently committed suicide by

crashing his aircraft into the side of a mountain." It noted that the pilot did so "for undetermined reasons" and that one of the main supports for the conclusion was "a lack of credible evidence to the contrary."

The A-10, assigned to the 355th Wing at Davis-Monthan AFB, Ariz., was part of a three-ship formation that had embarked on a routine training mission to a bombing range. Button's A-10 carried four 500-pound bombs and 575 rounds of 30 mm training ammunition.

Just before the formation reached

the range, the flight leader directed a formation change. As the other aircraft got in position, Button's A-10 disappeared. Flight path information showed that Button flew his A-10 from central Arizona to central Colorado, approximately 495 miles from where he departed the training formation. His aircraft crashed 15 miles southeast of Eagle, Colo., just below the summit of 13,100-foot-high Gold Dust Peak.

Aircraft malfunction was ruled out as a potential cause of this incident. So was the possibility of pilot inca-

The Battle of Arlington Ridge

Air Force Memorial Site



Photo by Air Survey Corp., Sterling, Va.

ARLINGTON, VA., Nov. 7—In a dramatic statement at a Congressional hearing, Rep. Gerald B.H. Solomon (R-N.Y.) urged the Air Force Memorial Foundation to “remove the potential for a scar never forgiven” and abandon its plans to build a memorial on Arlington Ridge, overlooking the Potomac River.

Solomon is a former Marine and the powerful chairman of the House Rules Committee. He says that the Air Force Memorial would encroach on the “hallowed ground” of the nearby Iwo Jima Memorial. His testimony was to the House Subcommittee on National Parks, Forests, and Lands on Oct. 7.

Solomon had introduced a bill on July 30 “to make the grounds of the Iwo Jima Park off-limits to any future construction in perpetuity.” On Oct. 9, Sen. Pat Roberts (R-Kan.) introduced a companion Senate bill to Solomon’s House bill. Roberts is also a former Marine.

What Solomon calls “Iwo Jima Park” is actually the Nevius Tract, a 25-acre section of parkland adjacent to Arlington Cemetery. Eight acres were granted for the Marine Corps War Memorial in 1954. The Netherlands Carillon takes up three acres. The Air Force Memorial site is two acres. It is down a hill, more than 500 feet away from the Iwo Jima Memorial, and screened by mature trees.

In a letter to Rep. James V. Hansen (R-Utah), chairman of the National Parks, Forests, and Lands Subcommittee, J. Carter Brown, chairman of the Commission of Fine Arts, said that “When the Marine Corps Memorial was originally approved by the Fine Arts Commission, the applicants kept coming back for more land, and gradually, what had originally started

This aerial view of Arlington Ridge depicts the relative positions of the Marine Corps Memorial, which rests within eight acres, the Netherlands Carillon on three acres, and the planned two-acre area for the Air Force Memorial.

as two acres, and then four, was granted to eight, so there would be a large amount of open space to complete that precinct and provide the parade ground and gathering space around that great Memorial. Then out of the blue, 43 years later, comes an assertion that the Memorial had been given the balance of the 25-acre area.”

The Air Force Memorial project began in 1992. Since then, it has followed the elaborate process prescribed by Congress for proposed monuments. That has included satisfying the requirements of the National Park Service, the National Capital Planning Commission, and the Commission of Fine Arts. All three of those organizations testified at the Oct. 7 hearing and supported the Air Force Memorial.

At a hearing before the Senate subcommittee on Parks, Historic Pres-

ervation, and Recreation Sept. 11, Gen. Carl Mundy Jr., former commandant of the Marine Corps, confirmed that he had been informed in 1994 of plans for the Air Force Memorial and “did not impose any objection.”

Opposition began in April 1997 with the formation of “Friends of Iwo Jima,” a neighborhood group primarily concerned about an increase in cars and visitors to the Arlington Ridge area. Marine Corps objection built up rapidly over the summer and in August, the Marine Corps took an open position saying the Air Force Memorial should move to a different location.

Solomon joined the “Friends of Iwo Jima” in seeking a temporary restraining order that would have blocked the Air Force Memorial site dedication, which took place on Sept. 18. That action was denied in US District

Battle (cont.)

Court, but a legal battle lies ahead over an injunction to prevent construction.

Solomon acknowledges that the Air Force Memorial Foundation "didn't do the wrong thing," but rather was "misled by a flawed process and poor decision making by those charged with carrying out the laws and regulations." He proposes that the government reimburse the foundation for up to \$1.5 million of its expenses thus far. He says he will help find a suitable site to which the Air Force Memorial can move, perhaps somewhere on the Ft. Myer Army post.

John A. Shaud, executive director of the Air Force Association, presented the House Parks and Lands subcommittee the resolution adopted Sept. 15 by the AFA National Convention, declaring "strong and unqualified support for the establishment of the Air Force Memorial on its approved site on Arlington Ridge."

The Air Force Memorial Foundation has raised \$13 million (of a needed \$25 million) from individuals and groups who pledged their support with the understanding that it was for a specific memorial on Arlington Ridge. Foundation President Robert D. Springer told the subcommittee Oct. 7 that he did not know how much of the momentum could be recovered if the Air Force Memorial project had to start over again at a different location.

In an op-ed column in the *Washington Post* on Nov. 5, James H. Webb Jr., former secretary of the Navy, said that, "To put it simply, the proposed Air Force memorial would pollute Arlington Ridge, forever changing its context."

He said the two Jima Memorial is not taller than the Air Force Memorial unless the flagpole and flag—central elements to the Marine Corps monument, which depicts the raising of the flag on Mount Suribachi—are included in the measurement. He said the underground part of the Air Force Memorial would contain "enough floor space for 10 average-sized homes." (Fact: the memorial will sit on just 6,500 square feet within its two-acre site.)

Also, either unaware of Mundy's testimony to the Senate or choosing to ignore it, Webb accused the Air Force Memorial Foundation of "dissembling" in "erroneously" maintaining that the Marine Corps had posed no objection. ■

Aerospace World

pacitation. According to senior investigating officer Col. Philip J. Frazee, "Radar tracks and reports from numerous witnesses reveal the aircraft was maneuvering through high terrain along the route, changing altitude and heading on numerous occasions."

Frazee added, "Based on all available evidence, it is my opinion that, for unknown reasons, the mishap pilot spontaneously elected to leave his briefed formation, consciously flew the aircraft to Colorado, and committed suicide by impacting the terrain while in controlled flight."

Mountain Home AEF Returns

Units from the 366th Wing, located at Mountain Home AFB, Idaho, returned from Bahrain on Oct. 22, the Air Force announced. Personnel and aircraft from the wing had been supporting Operation Southern Watch, the policing of a no-fly zone over southern Iraq. Their return marks the end of the first Air Expeditionary Force made up of people and aircraft from a single wing.

More than 800 airmen and 22 fighter aircraft, including F-16 Falcons, F-15C Eagles, and F-15E Strike Eagles, deployed to Bahrain in early September.

Two Perish in Midair Crash

A T-38 Talon aircraft crashed at Edwards AFB, Calif., on Oct. 22 following a midair collision with an F-16 fighter. Two died in the crash.

Dead are Lt. Col. William R. Nusz,

assigned to the 419th Flight Test Squadron at Edwards, and Flight Leader Leigh Alexander Fox, of the Royal Air Force. Both were flying in the T-38.

The F-16 performed an emergency landing on a dry lake bed at Edwards. The aircraft was flown by Lt. Col. Richard Stevens, deputy commander of the 412th Operations Group, and Capt. Nicole Blatt of the 419th Test Wing, both assigned to Edwards. Neither crew member was injured.

Both aircraft were on a photographic support mission of a B-1B Lancer that was conducting a conventional weapons drop test of BDU-33s. The BDU-33 is a training bomb.

Russian Fighter Makes First Flight

A prototype of a Russian next-generation fighter, the Sukhoi S-32, made its first flight Sept. 25, according to the Russian news agency Tass.

The S-32's maiden hop occurred two weeks after the first flight of the next-generation US air dominance aircraft, the F-22.

Tass said that the S-32 is stealthy, having a radar absorbent airframe coating and conformal, under-fuselage weapons stowage, among other stealth features. It features an "integrated triplane" design that uses forward-swept composite wings, aft-swept canards, and twin vertical fins. This flight surface arrangement is meant to increase maneuverability in dogfights.

The S-32 has been under development for the past decade. The



SSgt. Dino Haynes plows snow at F.E. Warren AFB, Wyo., after an early season blizzard blanketed the Rocky Mountain region in October. The storm dumped about nine inches of snow on the base; high winds created five-foot drifts.

USAF photo by SSgt. Dean Miller

Sukhoi design bureau is believed to have paid for this R&D via commercial sales of its Su-27/30 to China, India, Vietnam, and Indonesia.

According to Japanese media, China will start making its own Su-27SK fighters, under Russian license, in 1998.

Aviano Teams Help Quake Victims

In the wake of a Sept. 26 earthquake in central Italy, Air Force civil engineers from Aviano AB and Camp Darby, Italy, deployed to assist with local disaster relief efforts.

Included in the effort were more than 30 members of the 31st Civil Engineer Squadron and 31st RED HORSE Flight. They arrived with heavy equipment Oct. 17 and established a five-tent area to serve as base camp.

Using everything from bulldozers to earthmovers, the civil engineers are clearing and grading land, and trucking in gravel to pave the way for Italian crews to set up temporary, prefabricated shelters for the nearly 4,000 displaced residents.

The earthquake was the most destructive to hit the region in more than 80 years. It killed 12 and injured hundreds.

Reserve Trims Training Requirements

Air Force Reserve Command is cutting Reservists' training requirements wherever possible in an effort to ease the burden of high personnel tempo. So far, AFRC officials have been able to do away with about 34 hours a year of noncombat readiness training requirements.

"And we've just hit the tip of the iceberg," said Brig. Gen. David S. Sibley, AFRC assistant vice commander. "We're still working on reducing ancillary training and are hoping to capture another 25 to 30 hours per year."

For years AFRC had been adding training without giving much thought to how much time people really had, say command officials. They estimate that there are now 50 to 75 annual ancillary training requirements.

Meanwhile, real-world contingency operations have been taking more and more of Reservists' limited duty time.

"It's safe to say that many functional areas experience more ancillary training requirements than they have hours to apply in meeting them," said Maj. Larry Lee, chief of the Training Support Branch in

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AFRC's Directorate of Personnel. "We have the same requirements as our active duty counterparts but have a much narrower window to satisfy them."

After they're done looking at ancillary training, AFRC plans to start scrutinizing Air Force Specialty Code training requirements for possible further time savings. A Reserve clearinghouse already ensures that no new requirements are added to the train-

ing list without another requirement being deleted.

Airlift/Tanker Hybrids Seen

Lockheed Martin officials say that future military tanker, transport, and airlift aircraft could be different versions of a single basic airframe.

A family of affordable, modular aircraft could become operational around 2007 to 2010, firm officials told reporters in Washington on Oct.

USAF photo by SSgt. Angela Stefford



USAF astronaut Lt. Col. Eileen Collins, the first female space shuttle pilot, addresses the 30,000-plus crowd at the dedication of the Women in Military Service for America Memorial Oct. 18 just outside Arlington National Cemetery.

16. The plane would have a 30 percent lower development cost than existing transporters, among other advantages, they said.

Lockheed Martin believes there is a future market for as many as 970 of these aircraft. Of this number, 450 would be tactical airlift models, 370 would be tankers, and 150 would be strategic airlift aircraft.

The upcoming decision on replacement of the C-5 could be the first opportunity to test this modular theory—though an upgrade of existing C-5s' reliability is also an option.

The concept could also be applicable to the KC-135 tanker replacement, due around 2013, and the proposed C-130 replacement, the Advanced Theater Transport, which is due around 2010.

NDP Seeks More Prototypes

The National Defense Panel recommends that the Pentagon focus its procurement strategy on the quick purchase and testing of small numbers of individual weapon systems, according to its chairman.

NDP chairman Philip A. Odeen told reporters on Oct. 2 that he supports efforts such as the Navy's purchase of a few missile-laden Arsenal Ships and the idea of buying relatively limited numbers of Unmanned Combat Aerial Vehicles.

"You don't have to buy 50 of these things, but you ought to buy one or two," said Odeen. They would then be field-tested in experiments and

exercises, as the Army now uses its exercise base at Ft. Irwin, Calif., to test new weapons and concepts.

The NDP was established by Congress to provide a critique of alternatives to the Pentagon's Quadrennial Defense Review. It was working against a Dec. 1 report deadline.

Odeen said the panel urges reform of the landmark National Security Act of 1947, which set up the current Department of Defense and established the Air Force as an independent military service.

There have been dramatic changes in the national security landscape in the last 50 years, yet the nation's institutional structure for providing defense remains relatively unchanged, said Odeen. "We need to better organize the national security apparatus," he said.

Servicemen's Memorial Dedicated

More than 30,000 people on Oct. 18 gathered outside the entrance to Arlington National Cemetery to witness the dedication of America's first major memorial honoring women who have served in the armed forces. Among the crowd were servicemen ranging from World War I vets to those currently serving.

The \$21.5 million Women in Military Service for America Memorial site takes up 4.2 acres and features a 30-foot-high neoclassical retaining wall. It hosts a 33,000-square foot education center with a Hall of Honor, 196-seat theater, and computer register of servicemen.

"This memorial is more than a remembrance, it's also a reminder that women in the military's service to America is not new and should never again be allowed to go unrecognized," said Secretary of Defense William S. Cohen.

More than 1.8 million women have served in the military from the Revolutionary War to the present.

Mail-Order Pharmacy Kicks Off

Many military health care enroll-



Chinese President Jiang Zemin walks with Adm. Joseph Prueher, commander in chief of US Pacific Command, through an honor guard at Hickam AFB, Hawaii, on the first visit of a People's Republic of China leader to US soil in 12 years.

Photo by PO2 Tina Ackerman

ees could mail away for prescriptions via a new mail-order pharmacy service that DoD initiated Oct. 6.

The Defense Personnel Support Center awarded an initial contract to run the service to Merck-Medco Managed Care, Inc., Maple Grove, Minn. This national plan will eventually replace regional mail-order plans now run by individual Tricare contractors.

"The goal of the program is to provide a uniform pharmacy benefit," said Air Force Capt. Debra Parrish, the program's director at DPSC. "Patients will have a convenient way of receiving prescription drugs and a greater variety of drugs are available."

As all regions are phased in, more than seven million people will benefit from the program, officials estimate. Among those who might find the service particularly useful are active duty personnel who are far from a military base, including those overseas and at embassies. Military retirees who live close to facilities that have been closed by downsizing are also likely to find mail-order prescriptions convenient.

The mail-order pharmacy is free to military members. Their families will pay a \$4 co-payment per item. Retirees and their family members will pay an \$8 co-payment.

Specific categories of those initially eligible are:

- All active duty military beneficiaries
- Tricare beneficiaries who live in Alaska and Puerto Rico
- Tricare Prime enrollees
- Uniformed Services Treatment Facility enrollees
- Base Realignment and Closure—Medicare-eligible beneficiaries in Tricare regions 1, 2, and 5 and newly established BRAC sites at NAS Adak, Alaska; NAS Treasure Island, Calif.; NAS Alameda, Calif.; Sierra Army Depot, Calif.; and Ft. Chaffee, Ark.
- Overseas Tricare beneficiaries listed in the Defense Enrollment/Eligibility Reporting System (with APO or FPO addresses)

The service will be up and running in some parts of the country in early fall. Local military treatment facility pharmacies and health benefits advisers should have full information.

CMSAF Calls for Service Before Self

After 12 months in his job, Chief Master Sergeant of the Air Force Eric W. Benken worries that too many of the enlisted personnel he meets are overly concerned about their pay checks and not worried enough about the responsibilities that go with being a military professional.

Benken spends some 20 to 25 days



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Those scores helped convince the U.S. Air Force Special Ops Command at Hurlbert Field that Bose was the communications solution for their special C-130s. And this headset's performance has led the U.S. Air Force to choose it for other aircraft as well, including the F-22 fighter.

In addition, the U.S. Navy is using it in P-3 patrol aircraft. The Belgian Air Force has chosen it for the C-130 cargo plane and Sea King Helicopter. The U.S. Army, Kuwait Army and Saudi Arabian National Guard are using it in armored vehicles.

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each month visiting troops at bases in the US and overseas, and he hears many complaints and comments about pay, retirement benefits, and health care.

"This job we're in ... is certainly not about pay and compensation," said Benken at a speech at Grand Forks AFB, N.D., on Oct. 20. "It's not about lucrative job offers from the private sector. Those things are secondary to what we are and what

we do for our nation."

Benken said he'd like to hear more questions about how individual effort can make individual units and the overall service better.

"We can't satisfy all of the material things that people want. That's not what we're about," he said.

Spaceplane Might be Transport

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Hughes Electronics' defense operations.

The transaction, which should be complete in mid-December, will result in a combined firm of 120,000 employees, with over \$20 billion in sales—\$13 billion from defense electronics. The new Raytheon will be part of a defense firm "Big Three" of top contractors, along with Lockheed Martin and Boeing.

To win the Justice Department nod, Raytheon agreed to sell two specific defense electronics businesses. Spun off will be Hughes' electro optics division, based in El Segundo, Calif., and portions of Raytheon TI Systems' focal plane array business, based in Dallas. Even after these sales the company will retain a significant presence in both EO and FPA technology.

as a rapid-response transport system, according to service space officials.

Such a concept means the spaceplane would be available for the highest priority missions. "We are looking at the possibility of military spaceplanes which would be able to react in minutes instead of the hours, the days it takes today," Lt. Gen. Roger G. DeKok, Space and Missile Systems Center commander, told reporters at a Pentagon briefing.

Such a system should be able to fly multiple missions and be more akin to an aircraft than a space launch system, said DeKok.

Such a use is far in the future, he admitted. Current plans call for a military spaceplane to reach operational status some time after 2010.

But "we believe that in the future we have the ability to perhaps reduce our air lift requirements" through such means, said the general.

Navy Bemoans JSF Cost

The Navy's top acquisition official vowed that the Joint Strike Fighter's program cost will not be permitted to grow, even if it takes scaling back program requirements.

"You have to draw a line in the sand and say, 'I will not go beyond this price,'" said John Douglas in a speech to the Marine Corps League.

The Pentagon plans to spend \$2.3 billion on JSF development. The Navy assumed control of program acquisition planning in August, as the Air Force takes its turn running program management. Though Douglas did not indicate which requirements are causing such affordability concerns,



The Confederate Air Force inducted the first six individuals and one combat unit, Doolittle's Raiders, into the newly created American Combat Airman Hall of Fame on Oct. 2. Pictured here (l-r) are Cmdr. Alexander Vraciu, USN (Ret.); Brandon Chin, accepting for his late grandfather, Maj. Shui-Tin Arthur Chin; Brig. Gen. Joseph J. Foss, USMC (Ret.); Col. Henry A. Potter, USAF (Ret.), accepting the unit award; Brig. Gen. Paul W. Tibbets Jr., USAF (Ret.); Col. David Lee Hill, USAF (Ret.). Col. Francis S. Gabreski, USAF (Ret.), was also inducted. Above left, Tibbets receives the CAF Freedom Award for his World War II combat record, as well as his activities with the National Air and Space Museum and the Enola Gay exhibit.

he did indicate that unique requirements are expensive.

A final JSF Joint Operational Requirements Document is due for release in 2000.

Raytheon-Hughes Merger OK'd

Raytheon on Oct. 2 announced that it has received Justice Department approval of its purchase of

Raytheon also agreed to take measures to preserve competition in missile production. It will set up "fire walls" to separate Raytheon and Hughes divisions that are the only bidders vying to produce a new generation of Army battlefield missile, the Follow-on to TOW. The firm will also provide the Air Force firm fixed pricing for the Advanced

Photos courtesy of the Confederate Air Force

Medium Range Air-to-Air Missile before it consummates the merger.

ASTOVL for Joint Strike Fighter?

The Air Force is considering buying the advanced short takeoff, vertical landing version of the Joint Strike Fighter, USAF officials said. "We're going to buy some of the ASTOVL variants," Lt. Gen. George K. Muellner, deputy Air Force acquisition chief, said Sept. 23. "I'm not sure how much yet but probably two wings' worth."

The Navy is weighing a similar purchase. Both services have studies under way that are addressing the issue—indicating a broadening interest in JSF that could indicate improved prospects for the program.

Originally, only the US Marines and the British Royal Navy were slated as JSF ASTOVL customers. The Air Force had simply planned on purchasing conventional takeoff and landing versions of the new light fighter. But ASTOVL versions could broaden service capability.

According to Muellner, the Air Force might use ASTOVL JSFs to help make Air Expeditionary Force packages more mobile and easier to deploy overseas. A year-long Air Force study of the issue began in June.

New Lab Organization Stands Up

The Air Force christened its new Air Force Research Laboratory organization with a simple military stand-up ceremony in Dayton, Ohio, on Oct. 22. Gen. George T. Babbitt Jr., head of Air Force Materiel Com-

Congressional News

No JCS Spot for Guard

After months of debate, Congress decided against creating a permanent spot on the Joint Chiefs of Staff for the head of the National Guard.

The compromise Fiscal 1998 defense authorization bill, crafted by House and Senate negotiators and announced on Oct. 23, failed to include such a provision. The compromise had to be voted on by both chambers and sent to the White House.

The Senate wanted to elevate the three-star Guard head to four-star status and install the position on the JCS. The House refused to do so, and this view prevailed.

The provision also was opposed by DoD, the White House, and the services.

The move stemmed from events earlier this year, when senior Guard officers complained to Congressional allies that they have been shut out of military decision making. However, the threat of a White House veto put the plan on ice for a year at least.

Fallback Position

Though the House prevailed on the Guard-JCS matter, defense negotiators agreed to create two new positions that get reserve components closer to JCS decisions.

The compromise authorization approves a pair of two-star assistants to the Chairman of the Joint Chiefs. The positions are to be on the Joint Staff and would be filled by senior officers of the National Guard and the Reserves.

The bill also requires the Pentagon to develop policies "to ensure that the level of reserve component officer representation on the Joint Staff is commensurate with the significant role of the reserve components in the total force."

The National Guard Association of the United States said that the step "falls short of our objective" but that it is "a good first step" in making sure Guard views aren't ignored.

Cut Sinks Arsenal Ship

After Congress slashed this year's funding for the Arsenal Ship, the Navy scuttled the whole program.

The Navy announced in late October that it had decided to scrap the controversial warship, which had long been touted as a revolutionary way to deliver mass firepower to a theater. The decision had been made by Navy Secretary John H. Dalton, said a Navy spokesperson.

Congress in September passed a defense appropriations bill giving the project only \$35 million. The Navy said it had to have at least \$85 million to keep the program on track. It was scheduled to let a contract in January.

Rear Adm. Daniel J. Murphy Jr., director of the surface warfare division, told reporters Oct. 15 that "Congress dealt us a very serious blow. I am enormously disappointed."

The Navy envisioned a fleet of six Arsenal Ships, each of which would carry 500 missiles that could be brought to bear quickly against land targets.

Line Item Veto Hits Aerospace

The Fiscal 1998 defense appropriations bill contained four aerospace-related projects that were among the 13 items struck out by President Clinton on Oct. 14.

The four were \$37.5 million for anti-satellite system research and development; \$30 million for Clementine 2 anti-asteroid interceptor R&D; \$39 million for SR-71 "Blackbird" spy plane procurement

and operations; and \$10 million in Air Force R&D for the military spaceplane.

Pentagon officials said that the ASAT was eliminated because the Administration does not believe the nation needs such a capability. Neither is the Clementine 2 needed, they said—and an anti-asteroid weapon isn't in the Future Years Defense Plan.

The SR-71 program had been resurrected by Congress in 1995 and supported ever since. The Air Force currently maintains two SR-71A models and shares a B model trainer with NASA. The planes are used primarily for research, as the Air Force has been reluctant to fly them much, due to their \$39,000 per hour operating cost. Service officials have long said the plane is too expensive to keep in service.

The Air Force has already awarded contracts to Lockheed Martin and Boeing to work on the military spaceplane. The line item funding cut means the start of this program will now slip to 1999—a "disappointing turn of events," according to the service.

These reductions in the \$248 billion Pentagon spending bill come on the heels of a more extensive use of the line item veto pen on the 1998 military construction bill.

President Clinton struck 38 projects from the milcon appropriations on Oct. 6, saving \$287 million off the legislation's total \$9.2 billion cost.

Among the items eliminated were a theater air simulation facility at Kirtland AFB, N.M.; a facility for combat search and rescue training at Moody AFB, Ga.; a civil engineering complex at Grissom ARB, Ind.; and a new operations facility for the B-1B squadrons at Dyess AFB, Texas.

mand, passed the newly designed AFRL flag to the organization's first commander, Maj. Gen. Richard R. Paul, while senior military and civilian leaders looked on.

AFRL will be responsible for research and technology development in support of future and existing Air Force aircraft and weapon systems. It was formed by realigning and consolidating the work of 22 directorates, formerly spread throughout four Air Force labs, into nine technology directorates and a single Air Force Office of Scientific Research.

Congress Causes JASSM Money Crunch

Because of actions taken in Congress, Air Force officials fear that the Joint Air To Surface Standoff Missile program does not have enough money to survive past April.

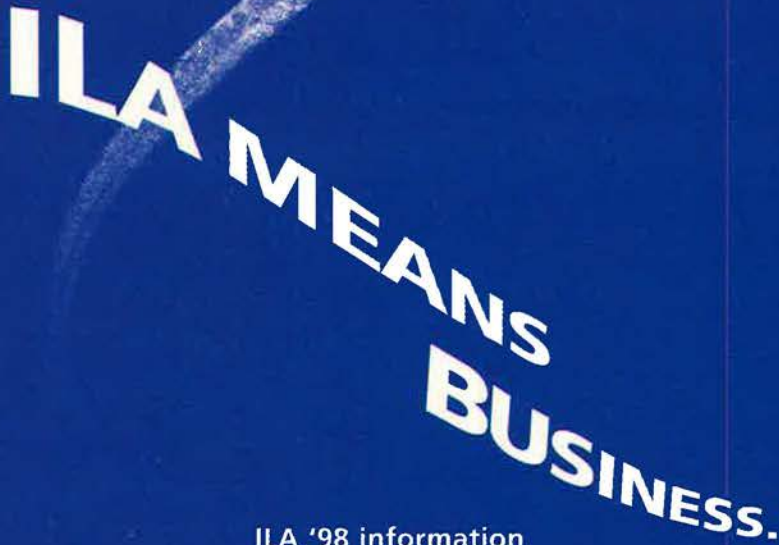
The problem: A Congressional conference did not restore JASSM budget cuts before they wrapped up work on the 1998 defense spending bill. Now the service's \$203 million request for the program has been pared to only \$128 million.

More money may be available after April, pending results of a study comparing JASSM and the Navy-led Standoff Land Attack Missile-Expanded Response. The program which comes out on top in this analysis will get an extra \$43 million, per the Congressional appropriations bill.

But the Air Force thinks JASSM money may be exhausted by then, and therefore service officials want the study's deadline moved up to February or March. And even if they win the study, JASSM may not have enough money for a robust testing schedule.


JASSM is meant to provide a long-range precision bombing capability for Air Force and Navy aircraft. Some Navy officials now say they do not need JASSM, however, as SLAM-ER meets their requirements and is already being produced.

In the meantime, Lockheed Martin's JASSM has arrived at Edwards AFB, Calif., for "captive carry" flight-testing. During such tests the missile will be carried aloft into its combat environment without being released. Analysts will be looking at vibration and acoustic profiles over a range of airspeeds and altitudes, among other things.



ILA '98 information is available from Messe Berlin.

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The command officially inactivated the four labs on Oct. 31. They were Rome Lab, Rome, N.Y.; Armstrong Lab, Brooks AFB, Texas; Phillips Lab, Kirtland AFB, N.M.; and Wright Lab at Wright-Patterson AFB, Ohio.

The push for the consolidation came from a Congressional mandate to reduce Defense Department laboratory overhead costs. The new lab will not require a major employee relocation, but it will help with a previously planned reduction of 450 positions by the end of the decade.



"No research is going away," said Paul, who had been director of science and technology at AFMC headquarters. "The primary goal is to reduce management overhead while improving the focus on technical activities." For example, each of the four old laboratories had its own directorate for plans and programs.

"We now have one central plans shop, and that will help us do a better job of investing our science and technology dollars," emphasized the general.

50 Years Ago in Air Force Magazine

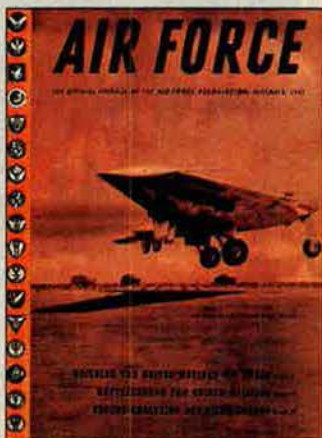
December 1947

■ Fifty-one models of aircraft were offered on the civilian market by 25 American manufacturers in 1947, according to the Aerospace Industries Association. (The year before, 29 companies offered 47 models.) The US outstrips other nations in the number of models offered.

■ A contract for more P-84 Thunderjets awarded to Republic Aviation Corp. brought the total order to 550 aircraft. (The contract was awarded after tests proved that the fully loaded Thunderjet could attain a level speed of 620 mph.)

■ A feature length article on pilot error analysis broke down 460 cases studied by Air Materiel Command and found that: 50 percent of the problems were "substitution" errors (confusing one control with another); 18 percent were "adjustment" errors (operating a control too slowly or too rapidly, moving a switch to the wrong position, or following the wrong sequence); 18 percent were "forgetting" errors (failing to check, unlock, or use a control); six percent were "reversal" errors (moving a control in the wrong direction); five percent were unintentional activation; and three percent were caused by inability to reach a control.

■ Then as now, *Air Force Magazine* is held to a high standard of accuracy. Chided by a reader, the editors concede that the approved abbreviation for squadron is "Sq" rather than "Sqdn."



On the cover: Northrop's jet-powered YB-49 flying wing flies 100 mph faster than the propeller-driven XB-35 flying wing, but has substantially less range.

The Headquarters USAF organization chart, as of Dec. 1, 1947, included the following:

Gen. Carl A. Spaatz, Chief of Staff

Gen. Hoyt S. Vandenberg, vice chief of staff

Brig. Gen. William F. McKee, assistant vice chief of staff

Lt. Gen. Edwin W. Rawlings, air controller

Lt. Gen. Idwal H. Edwards, deputy chief of staff/personnel and administration

Lt. Gen. Lauris Norstad, deputy chief of staff/operations (designate)

(Maj. Gen. Earle E. Partridge, acting DCS/Ops)

Lt. Gen. Howard A. Craig, deputy chief of staff/materiel

The nine new technology directorates cover air vehicles, space vehicles, information, materials and manufacturing, munitions, directed energy, sensors, human effectiveness, and propulsion. They will function as geographically separated units reporting to AFRL, which will have its headquarters at Wright-Patterson.

Cohen Downplays NATO Cost

Secretary of Defense William S. Cohen on Oct. 21 told a Senate panel that the cost of enlarging NATO will be less than even DoD thought, and it had the lowest estimate.

Last summer, NATO invited Poland, Hungary, and the Czech Republic to become part of the Western military Alliance. In its initial report on the subject, released last February, DoD said total costs to fully incorporate the new members would range from \$27 billion to \$35 billion through 2009. Cohen noted that NATO itself was planning to complete a cost study in December.

"Based on what we know now, I believe that the NATO cost estimates will be lower than those which you received from us in February."

This will be so, said the Secretary, for two reasons. First the initial US

cost was based on the predicted integration of four, not three, new members. Also, he said, experience has shown that the infrastructure in the new NATO nations is more robust and requires less work than had been anticipated.

Torrejón Set to Close

The US military will end its permanent presence at Torrejón AB, Spain, Secretary of Defense Cohen announced Oct. 21.

The base is vacated, and the remaining facilities will be returned to the Spanish government by the end of 1997. There are currently no US military or civilian personnel left at the base. It is one of some 900 European locations that have been closed, reduced, or placed on standby by US forces in recent years.

AMC Mounts Bulgarian Relief Effort

According to the Air Force, Air Mobility Command aircraft hauled more than half a million dollars' worth of much-needed supplies to Bulgaria in October to support an international humanitarian mission.

C-141 Starlifter crews from 6th Airlift Squadron, McGuire AFB, N.J., transported \$580,000 in medical supplies, pharmaceuticals, and equipment, provided by the Department of Defense, to the southeastern European country where citizens are experiencing financial difficulties and lacking necessary medical supplies.

The Oct. 3 shipment included respirators, blood transfusion equipment, needles, tracheotomy tubes, bandages, gauze, antibiotics, heart medication, local anesthetics, surgical gowns and gloves, wheelchairs, and hospital beds. The request for aid came from CARE, an international service agency.

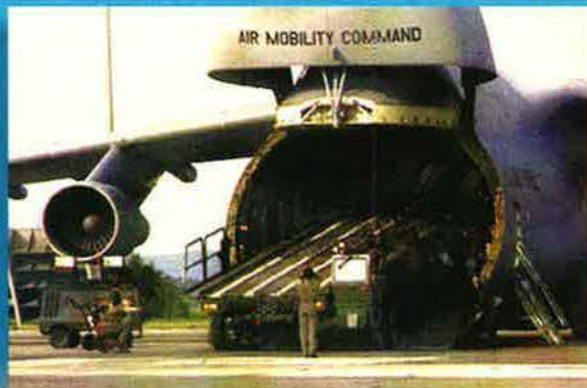
News Notes

■ Defense Secretary Cohen on Oct. 24 announced the President had nominated Lt. Gen. John P. Jumper to become commander of US Air Forces in Europe and commander of NATO's Air Forces Central Europe. Jumper, currently deputy chief of staff for air and space operations, would be promoted to general if confirmed.

■ Retired Air Force Brig. Gen. Charles "Chuck" Yeager reenacted his historic breaking of the sound barrier on its 50th anniversary, Oct. 14, 1997. This time, he surpassed Mach 1 flying an F-15 Eagle. The

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chase pilot from his long-ago feat, Bob Hoover, followed in an F-16.

- The United States has committed more aircraft to the defense of the no-fly zone over southern Iraq in response to zone violations by Saddam Hussein's regime, DoD spokesman Kenneth H. Bacon said Oct. 9. Operation Southern Watch flights are now flying farther north, closer to the 33d parallel, said defense officials.

- The US Air Force took delivery of its 34th C-17 Globemaster airlifter during a ceremony in Long Beach, Calif., on Oct. 2. The plane was named *The Spirit of the Air Force* in honor of the Air Force's 50th anniversary as a separate service.

- The Air Force announced its plans to name the nation's newest B-2 stealth bomber *Spirit of Louisiana* at a ceremony at Barksdale AFB, La., held Nov. 10. It would be the 17th model of the new heavy bomber to be named.

- The first C-5 Galaxy to arrive at

Robins AFB, Ga., for depot maintenance touched down Oct. 8. Warner Robins Air Logistics Center won a public/private competition for the C-5 workload in September. Base officials said that they believe the C-5 will be worked and delivered in less than 35 days—well before its Dec. 16 due date.

- The Air Force won the Environmental Protection Agency's "Best of the Best" Stratospheric Ozone Protection Award for steps it took to substantially reduce the amount of ozone depleting substances used in the production of Titan IV solid fuel rocket boosters. EPA chief Carol Browner presented the award to Defense Secretary Cohen on Sept. 25.

- Dover AFB, Del., opened the doors on its new \$5.5 million Air Mobility Command passenger terminal Oct. 10. The new terminal will provide 35,000 square feet of space and consolidate all passenger functions into one building.

- A fatal March accident of an

A-10 attack plane at Willow Grove ARS, Pa., was caused by pilot error, according to an Air Force accident investigation board. With 25-knot winds blowing across the landing strip, Air National Guard pilot Lt. Col. Joost VanBastelaar turned too close before his final approach, losing speed and possibly stalling, ruled investigators.

- To replace a current tent city, Saudi Arabia is building a 4,257-person housing area for US and coalition personnel outside of Prince Sultan AB that will have the comforts of home—and then some. The two-story buildings have quarry tile floors and sport a gym, swimming pool, and roller hockey area, among other amenities. The project is scheduled for completion in February.

- Air Force Chief of Staff Gen. Michael E. Ryan announced the five winners of the 1997 Chief of Staff Team Excellence Award during an awards banquet Oct. 16. The awardees were a Dyess AFB, Texas, team that reduced cargo processing time by 40 percent; a Patrick AFB, Fla., team that streamlined the 45th Space Wing's cost estimating system; a team from the Denver-based Air Reserve Personnel Center that improved individual mobilization augmentee contract handling; a Sheppard AFB, Texas, team that shaved 16 man-hours from operations support training; and a McConnell AFB, Kan., team that cut parts movement time in half.

- Air Combat Command assumed management responsibility for the airspace of the Utah Test and Training Range on Oct. 1. The 1995 Base Realignment and Closure commission directed the range to transfer from Air Force Materiel Command to ACC, since ACC aircraft are the primary users of the airspace.

- The Airman Leadership School at Scott AFB, Ill., was dedicated to former CMSAF Arthur L. "Bud" Andrews in a Sept. 25 ceremony. Andrews, who died in October 1996, was the seventh Chief Master Sergeant of the Air Force, serving in the Air Force's top enlisted position from 1981 to 1983.

- Air Force officials want to hear from the field about any C-130 incidents where the aircraft experienced an engine rollback or power loss. A team conducting a broad review of the C-130 is especially interested in information regarding fuel flow, torque, and RPM instrumentation readings during these incidents. Anonymous accounts can be left by calling (800) 343-0280. ■

Senior Staff Changes

CHANGES: Brig. Gen. Ralph S. Clem, from Mobilization Asst. to the Cmdr., AIA, Kelly AFB, Texas, to Dep. to Chief of AFRC, Pentagon, replacing Brig. Gen. John A. Bradley ... Brig. Gen. (sel.) Carol C. Elliott, from Dep. Dir. Intel., Surv., and Recon., DCS/Air and Space Ops., USAF, Pentagon, to Vice Dir. for Intel., Jt. Staff, DIA, Pentagon ... Maj. Gen. David R. Smith, from Cmdr., 10th AF, NAS Fort Worth JRB, Carswell Field, Texas, to Vice Cmdr., AFRC, Robins AFB, Ga., replacing Maj. Gen. James E. Sherrard III.

SENIOR EXECUTIVE SERVICE CHANGES: John J. Batbie Jr., to Dir., Plans (Air Reserve Technician), AFRC, Robins AFB, Ga. ... Harry C. Disbrow Jr., to Dep. Dir. Operational Rqmts., USAF, Pentagon ... David S. Sibley, to Asst. Vice Cmdr. (Air Reserve Technician), AFRC, Robins AFB, Ga. ■

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By John A. Tirpak, Senior Editor

Working the Optempo Problem

Air Combat Command is moving on a broad front to reduce the pressures of unprecedented operating requirements in peacetime.



The Air Force hopes that by next spring it will see results from a series of measures it has taken to blunt the impact of chronically high operating tempo on the troops, who by all measures

are working harder than ever before in peacetime. If the "fixes" don't show some positive effect on retention and morale by next summer, the Air Force may have to take more drastic action, in the form of requesting additional troops or force structure, or asking to be excused from performing some lower-priority missions for which it lacks resources.

The new Chief of Staff, Gen. Michael E. Ryan, alluded to these fixes in his confirmation hearings this fall, insisting to a skeptical Congress that the optempo issue is one that is "under control," despite declining pilot and enlisted retention. Ryan's remarks were in sharp contrast, however, to those of Gen. Richard E. Hawley, head of Air Combat Command, who has for the last two years been highly vocal about optempo, repeatedly warning that the troops will start "voting with their feet" if the workload isn't better managed.

Asked about the seeming difference of opinion between himself and Ryan, Hawley, in an interview with *Air Force Magazine*, answered, "I was right, and he's right."

"We had a serious optempo problem a couple of years ago," Hawley explained. "We've worked hard on it, and in my view, we have largely got it under control. The fixes that we've put in place leave me pretty optimistic about the optempo issue in all but about three of our major weapon systems."

Hawley first set out to develop a

series of "metrics," to determine just who was working too hard, and why.

"There is what I call 'good' ops tempo and 'bad' ops tempo," Hawley asserted. "Nobody complains about going to Red Flag or Cope Thunder. It's things like Southwest Asia, where you ... live in a tent in 120-degree temperatures and don't get any training while you're there. That's bad ops tempo. So the content of the ops tempo is important."

The metrics included factors such as the duration of an individual deployment, as well as the frequency of inspector general visits; the unit's equipment status; the level of effort needed just to maintain the day-to-day pace; the availability of adequate spares; the adequacy of training and experience of the unit's maintenance force—"All those things are part of ops tempo," he said.

Hawley also discussed the future shortage of air superiority airplanes and the likelihood of an expanded F-22 fighter buy and also made a pitch to "rebalance" the allocation of US defense dollars.

Instructing his staff to think creatively—as well as not to ignore the obvious—Hawley's main fixes for overly high optempo included the following:

Spread the Work Around. Each winter, ACC hosts a planning conference with the USAF major commands, Guard, and Reserve to look over the "known" missions—such as Bosnia, Northern and Southern Watch in Iraq, Red Flag, competitions, and such—and spreads the workload out among the units available. This approach makes the burden more equitable, since some units were being tasked up to six months a year while some similarly equipped units were deploying hardly at all.

The load is not distributed in a "perfectly even way across the Air Force, because everybody's got a unique situation," Hawley said. For example, due to continuing uncertainty about the Korean situation, units on the peninsula do not deploy. "But everybody contributes to the max of their capability to those

tasks to make sure we don't pile it all up on one small part of the Air Force," he added. What used to be considered major command responsibilities "are now Air Force responsibilities."

Use Air Expeditionary Forces. USAF is trying to convince regional commanders in chief that a unit deployed in the United States, on alert, is almost as good as one forward deployed in the theater. The AEF concept calls for a task force to pack up, deploy to theater, refuel, and put bombs on target—all within 48 hours. The troops benefit from being at their home station, and the CINC benefits from having more airpower almost at his fingertips. Hawley said he briefed Marine Corps Gen. Anthony C. Zinni, the chief of US Central Command, and his staff on the concept, "and he bought it all." Additionally, bombers may sit "conventional alert" to substitute for tacair units in the tank-killing role, given the arrival of new, mass anti-armor munitions like the Sensor Fuzed Weapon.

Reduce Inspections and Combine Tasks. IG visits will be less frequent. Particularly in bomber units, "we found ORIs [operational readiness inspections] to be a significant part of their workload," Hawley noted. In addition, IG visits will more often be timed to coincide with deployments—"killing two birds with one stone," he said. The IG gets to see a real-world test, and, since many deployments will be no-notice, "the wing commander doesn't feel compelled to give them all the practice that he would otherwise have felt compelled to give them in preparation for an IG."

Cut Back on Exercises. Both the USAF leadership and the Joint Chiefs of Staff have mandated a reduction in exercises as a way to lighten the workload. Also, competitions like William Tell and Gunsmoke will shift to a triennial schedule.

Eliminate Some Lesser Taskings. Regional commanders in chief have been asked to scrub their requirements and ask only for those capabilities they absolutely must have, rather than asking for units

that merely raise their level of comfort. New requirements must be cleared through the JCS.

Become More Efficient. Success in working smarter—such as using one spare tanker for Northern and Southern Watch, instead of one each—may help reduce the workload, although “there is a degree of risk” in having such reduced depth, Hawley admitted.

Increase the Crew Ratios. On the E-3 AWACS, in particular, an increase in crew ratios has eased a backbreaking deployment schedule which had been driving many AWACS specialists out of the service. Creation of Reserve associate wings in some weapon systems has also lessened the individual burden.

Buy Some More Assets. If there aren't enough of some kinds of aircraft, a few more might be bought. A prime case in point is the RC-135 electronic reconnaissance aircraft. Two more Rivet Joints are on their way to the force to ease the shortage. Also in store are a few more H-60 helicopters for combat search and rescue. Any system routinely busting a JCS-set “sustainability” optempo ceiling is a candidate for additional procurement.

Shorten the Deployments. Units will now deploy overseas for 45 days rather than 90, reducing the stresses of being away from home and family—as well as training—too long. Units deployed for 90 days tended to need “long work ups” when they returned, to get back to full mission readiness, since in-theater training is usually limited and poor in quality. Regional CINCs get fresher, more recently trained and combat-ready troops, and the troops get a less disruptive deployment.

Increase the Pay, Benefits, and Quality-of-Life Funding and Bonuses. Such has been requested from Congress.

Hawley acknowledged that many of the solutions—such as the 45-day deployments—have only recently been put into effect, and there hasn't been time yet to see if these efforts will boost morale and reduce the stress on the troops. “I think we'll have a good picture of how successful we've been by next spring,” he forecast. “By that time, it will be clear whether our initiatives to enhance some of the compensation issues”—the most recent pay and bonus requests to Congress—“are going to bear fruit.”

Nevertheless, Hawley is acutely aware of warning signs that some of

the troops are fast losing their commitment to “service above self.”

“About 36 percent of the people who are eligible to establish a date of separation have established one,” Hawley said, adding, “a year ago, it was about 28 percent.”

The ACC chief sees that increase as troublesome but not cause to panic. More telling, to him, is the number of troops who are declining to accept bonuses and who are eligible to declare a separation date but have held off.

“The number of people who have not declared is way up,” he noted, and the number of personnel saying, “I'm not going to take the bonus, but I'm not going to establish a date of separation, either,” is very high.”

Hawley continued, “And so I sense from that, that a lot of people are kind of marking time, they're going to see how well we do controlling ops tempo. And they're going to see how well we do delivering on our promise in many other areas”—principally in quality-of-life initiatives such as better housing and family support at home and during overseas deployments.

“They're waiting to see,” he summed up. “We've got to prove to them that we're going to deliver. And I think they'll have made that judgment by spring.”

But if the fixes don't have the desired effect by then, what then?

“We won't be out of ideas,” Hawley asserted. “We'll go to Congress and say we need to pay these people more. We'll go to JCS and say we need to task them less. We need to rely more on forces on alert in the United States and less on forces camped out in the theater. We'll say we need to increase pilot production. We'll take all those measures, if we have to, ... and more.”

He added, “We'll keep working this until we fix it, and we'll eventually fix it.” By next summer, “we'll know whether or not we have to circle back and try something new.”

Nonetheless, Hawley has few ready answers for the people who work on some “low-density, high-demand” systems, who are routinely tasked to deploy more often—and longer—than those in most other systems.

With respect to the U-2, RC-135, A-10, EC-130, and H-60 forces, said Hawley, “I do not have confidence that I've solved the ops tempo problem.”

In the case of the RC-135 and

H-60, more aircraft may lessen the load, higher crew ratios can help the U-2 pilot force, and sometimes F-16s with anti-armor capability can substitute for one of the tank-killing A-10s. However, said Hawley, these systems are the “five or six ... I still have a problem with and I gotta continue to work.”

Pilot retention has been a particularly sensitive subject this fall, drawing the attention of Congress and even of the national news media. Hawley agrees that the dropping pilot retention rate is a significant concern but not a force-breaker.

“I wouldn't call it a crisis,” he said, but rather “another cyclical downturn in our retention of pilots. We go through this about every 10 years, it seems,” and each episode seems to coincide with an airline hiring surge.

Given a requirement for 10,000 new airline pilots a year (all requirements, not just the major airlines) for as many as 10 years to come—far outstripping military pilot production—Hawley doesn't see the problem solving itself anytime soon.

“I can't compete with the airlines” on pay, Hawley said. Rather, he said, he's trying to “highlight what we do well,” which is to offer “a great mission.”

“Our pilots like to fly Air Force airplanes,” he went on. “They're good equipment. It's ... exciting, ... it's challenging, very demanding.” And, he added, “They get to work with Air Force people, and maybe I'm being a little prideful here, but I think Air Force people are more fun to go to work with and have as neighbors. We offer a chance to serve your country. And there's still a lot of people around who like serving their country.”

Hawley couldn't say whether he is able to hang on to the best pilots, but “I think we're hanging on to the ones that I want”—who are happy with the service and driven by the mission and the opportunity to serve. “And they're doing a great job for us.”

He added, though, that pilots are getting undue attention and that retention problems—what he called “symptoms” of the excessive optempo problem—afflict a number of specialties.

Security Forces, he noted, have been working 12-hour shifts for months. The heightened workload has been caused by two factors: increased force protection requirements caused by the June 1996 bombing of Khobar Towers in Saudi

Arabia and the fact that the specialty is only 79 percent manned. It's a pace that is grinding down those in the field, said Hawley, "but you don't hear about that" in the media.

Yet while the Air Force is addressing the immediate optempo problem, it may have sown the seeds of future problems in some of the changes it recommended in the Quadrennial Defense Review.

For example, going down to 339 F-22s from 442—that is, from four wings to three—means more risk, Hawley said.

In the future, "some CINC is going to have to get by with less air superiority than he's getting by with today," he said. "Our F-15 force is fully tasked today. They can't handle any more ... ops tempo, and we've got four wings of them. So somebody's going to have to make do with less."

He readily admitted that this situation "may well make it more difficult" to carry out the national strategy of winning two Major Theater Wars in close succession. The F-22s in the planned numbers are deemed adequate for the two MTWs because it is expected to be "so dominant ... that we will still be able to achieve air superiority quickly."

In terms of optempo, though, the F-22 plan has a built-in deficiency.

"The problem that we will have is not with the two MTW scenario," said Hawley. "It is with the day-to-day ... peacetime contingency commitments around the world." Hawley thinks 339 will not be enough F-22s to police the now-typical high number of contingencies and still have enough left over for training and depot work.

Like the F-15, "we'll have to keep about half of the force in the United States and about half deployed overseas. That's as thin as we can get. We have to maintain that rotation balance. You can't sustain a weapon system when it's all overseas, because the people never come home."

However, Hawley doesn't think the 339 figure is the final word on the F-22.

"I don't think we'll end up with just three" wings, he predicted. Because the F-117 and F-15E will need to be replaced about the time the end of the F-22 run is reached, "my guess is ... we'll turn to the F-22" to replace them.

"We may modify it a little bit, but a variant of the F-22 will wind up being delivered, to the tune of at least a couple more wings, in order to fill in the rest of that force structure requirement for that deep penetrating, interdiction fighter," Hawley asserted.

He maintained that the F-22 will

be a better choice than, say, the Joint Strike Fighter because "the characteristics that produce a dominant air superiority fighter also turn out to be the basic airframe characteristics that make a good interdiction platform. And that's why the F-15E serves us so well today; it derived from that very capable F-15C air superiority fighter."

The JSF, meanwhile, "if it comes in at the price tag we're looking for, which is under \$30 million a copy, in 1996 dollars, I don't think it will deliver an airplane that can fulfill the F-15E mission or the F-117 mission."

Hawley doesn't believe that the advent of high-precision weapons, capable of fulfilling the "one target, one bomb" goal, will pose much threat to the force structure as it stands today. The force is already down to a size decided on because the precision weapons were coming, and it was decided that USAF could live with a "period of risk" in capability until they arrived.

"It'll probably never be 'one target, one bomb,' just because the planners will always want high [probability of kill] and they'll probably put two bombs on it anyway," he said. But the driver of force size is not wartime capability but the "requirement to be present all over the world."

He asserted that "I could not sustain our current requirement for overseas presence with a smaller force structure than we've got today," especially given that more than one of every four USAF people is deployed outside the country at any one time.

Hawley said that even though the Quadrennial Defense Review put great emphasis on bombers in the "halt phase" of a conflict, and that bombers offer the range and speed to help offset high optempo, he agrees that buying new bombers is not feasible.

The Air Force is hard-pressed to afford the airplanes it has requested, let alone those it hasn't, he said. And, "I don't think that the Army is prepared to offer up divisions in order to buy B-2s, and I know the Navy's not going to give up carriers to buy more B-2s. So it's very difficult for me to find space in the budget for more B-2s."

However, he offered that "the mix of B-2s, B-1s, and B-52s works pretty well for us. You've got the B-2 for the high-end target ... that's deep, well defended, that you need to penetrate early in the war in order to do that halt phase, take down that command and control structure, help beat up the defenses—those kinds

of things that you need a stealthy, long-range platform to work on in the early days."

The B-1, meanwhile, will serve well as a platform to attack enemy armor "out in the field, ... on the march" where it won't be protected by the "high-end" air defense threat, and the B-52, with its standoff weapons, can stay away from danger until after air supremacy has been achieved.

"We think that's a pretty good mix," he asserted, "particularly when combined with the other systems that are coming along," such as the F-22 and JSF, precision munitions, and GPS targeting on almost all weapons.

Since the Administration seems unwilling to cut back on commitments much further, and the Pentagon seems unwilling to cut back on readiness, and modernization and force structure can't stand to be reduced any more, where can resources be found to give the troops the additional relief they need?

"You're going to have to ... find some areas where you're willing to make some trades, willing to incur some risk, in order to restore balance to the force," Hawley said.

"I don't think we have an appropriate balance today" between land- and sea-based tactical aviation, he added.

"We need some carrier-based air," said Hawley. "It is very expensive. It costs a lot to field a carrier and its associated air wings, but you can't do without it. They provide a great capability. So I would never advocate that airpower—land-based airpower—is going to obviate the requirement for carrier-based aviation, no more than I would say that it obviates the requirement for adequate ground forces."

"What we need is a balance."

While he declined to say what he thought was an appropriate level of carrier aviation funding and force structure, Hawley said flatly that USAF and ACC "can't do with any less land-based tacair. My forces are stretched to the limit right now."

He further feels that some of the things that led to the "hollow force" of the late 1970s are creeping back into the picture now.

"The sustainability and readiness of the forces that we've got today [are] declining," Hawley asserted. "I think we need to increase our investments in ... the fundamentals of sustainment: depot, spare parts, well-trained support crews who know how to maintain airplanes and keep 'em flying." ■



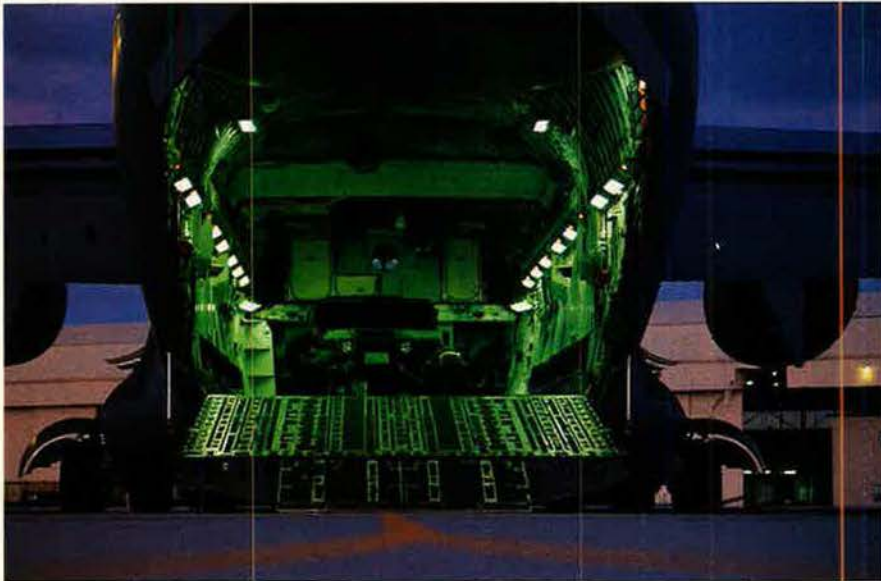
By **John A. Tirpak**, Senior Editor

Air mobility forces are among the oldest Air Force assets. USAF plans call for 120 of these new C-17s to replace 256 C-141s as the backbone of the air mobility force.

The new C-17s have helped, and the QDR confirmed the critical importance of air mobility.

Airlift Gets a Boost





The C-17, such as this one being loaded at Charleston AFB, S.C., has helped revitalize the air mobility force—now recognized as vital to the US strategic goal of being able to fight two Major Theater Wars nearly simultaneously.

THE delivery of more than two dozen C-17 transports in the last three years has given military airlift a much-needed shot in the arm, but even so, air mobility forces are among the oldest and most neglected of the Air Force's assets. Thanks to a recent comprehensive strategy review and some enlightened leadership, however, the situation may, finally, be turning around.

The Pentagon's Quadrennial Defense Review, completed last spring, was a cutting machine that lopped off personnel and force structure in many mission areas. However, it spared airlift and aerial refueling forces. QDR officials recognized that smaller forces might be adequate to their missions if, and only if, they could be transported swiftly and over great distances.

In the final QDR report, defense officials reaffirmed that the US must be able to fight two Major Theater Wars at more or less the same time. They further concluded that, without a healthy and up-to-date air mobility force, hopes of achieving that strategic goal would be little more than wishful thinking.

The QDR results gratified Gen. Walter Kross, commander in chief of US Transportation Command and commander of the Air Force's Air Mobility Command. He said he was pleased to see new emphasis being put on airlift and even more pleased at the reshuffling of scarce defense dollars that resulted.

The Office of the Secretary of Defense is "putting their money where their mouths are," Kross said in an interview with *Air Force Magazine*. In funds allocated, he explained, "we've edged up a little." The general added that the QDR evinced, more than any previous study, "a clear recognition of how important air mobility is going to be in support of our national military strategy" and that in the future, "it might be even more important than it is today."

The QDR concluded that USAF should make no reduction in the size

of its airlift or tanker fleets. Indeed, it noted, the loss of overseas bases and the spread of "Smaller-scale Contingencies" will cause the Pentagon to reevaluate and give "increased emphasis" to lift in future budgets.

Kross said that, without a sustained injection of funds during the next few years, airlift forces would not be up to the task given them and would struggle to meet even basic requirements. He pointed to the QDR view that airlift has a role not only in fighting two theater wars but also in supporting the many Smaller-scale Contingencies, such as humanitarian missions, that have cropped up more frequently in the last decade.

"Tremendous Support"

"We have seen a tremendous amount of support ... from the Air Force ... and OSD" in putting resources toward long-deferred modernization and renewal projects, Kross reported. Air mobility projects were preserved in the current five-year defense plan "while a lot of other things were cut."

The QDR effectively laid to rest the idea that the United States can meet its military obligations with fewer than 120 C-17s, blessing the multiyear buy of the airplane and endorsing the idea of direct-to-the-front strategic lift. Plans call for the 120-aircraft C-17 fleet to replace 256 Air Force C-141 long-range airlifters as the backbone of the air mobility force.



AMC is replacing old loading equipment, such as this 40K loader at Dover AFB, Del., with the new 60K loader, christened the Tunner. It will load more and heavier pallets than the 40K and doesn't need disassembly prior to airlift.

After the C-17, however, priorities for air mobility shift to the less glamorous but equally vital task of updating the rest of the airlift fleet with new international-standard avionics. In short order, the Global Air Traffic Management, or GATM, project went from being virtually a budgetary non-entity to a recognized priority.

"Last year ... there wasn't even a name 'GATM,' let alone the amount of monies we're going to see," Kross noted, adding that, after the QDR, it "got immediate attention."

The GATM project will provide AMC airplanes with the avionics they need to be certified to operate out of major airports and fly at preferred altitudes under new flight control

Strategic Airlift Aircraft



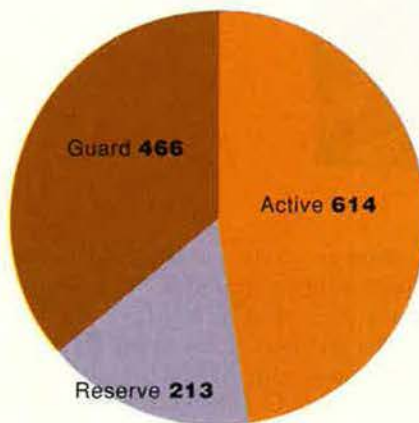
regimes adopted worldwide. Without the upgrades—some of which must be installed in less than a year—AMC airplanes would not be able to fly the most efficient routes.

After GATM, Kross said the next priority is rather down-to-earth: repairing and renewing the fuel handling infrastructure at US bases at home and abroad.

"We have ... a very large—almost \$1 billion—backlog of deteriorating fuel infrastructure around the world," at places like Andersen AFB, Guam, Yokota AB, Japan, and Hickam AFB, Hawaii, Kross explained. "Pipelines, hydrants, storage tanks—all the things we need in our en route locations in order to support both Major Theater Wars."

This infrastructure has languished for five years because, in 1992, the Defense Logistics Agency was given

Theater Airlift Aircraft



the maintenance responsibility but no money.

Show the Money

The DLA was "never given the resourcing to handle it, so it went chronically underfunded," Kross said. After the situation was explained to Deputy Defense Secretary John J. Hamre—the former DoD comptroller—DoD scavenged money from other parts of the budget to fund GATM and the fuel infrastructure accounts. GATM will get between \$70 million and \$100 million a year, Kross said, while the preferred approach to the fuel infrastructure project is to carry out a \$100 million per year effort that can wipe out most of the maintenance backlog in five years.

"The warfighting CINCs," said Kross, "have been unanimous in their strong support and partnership in

The Mobility Force Selected Airlift/Tanker Aircraft Types

Aircraft Type	Active	AFRC	ANG	Total
C-5 Galaxy	81	32	13	126
C-10 (KC-10) Extender	59	0	0	59
C-17 Globemaster III	27	0	0	27
C-141 Starlifter	156	46	18	220
C-130 Hercules	311	141	242	694
C-135 (KC-135) Stratolifter	303	72	224	599
Total	937	291	497	1,725

Note: Figures current at beginning of Fiscal 1997. C-130 and C-135 lines include a few special purpose aircraft. Figures denote total aircraft inventories.

helping me justify these requirements." He added that support also has come from the Joint Requirements Oversight Council and Defense Resources Board, which weigh funding priorities among the services.

"We had to justify our requirements, but the requirements are there, they're solid, and getting support," Kross said. These add-on projects are "over and above the TOA [Total Obligational Authority]" in the Air Force budget.

Kross also reported a huge turnaround on another seemingly mundane but still critical program: loading equipment. The vast majority of AMC's cargo handling gear is failure-prone and antiquated, but relief is arriving in the form of a new 60,000-pound loader that is exceeding all expectations.

"Remember—last year we had zero in the 60K [loader] line," Kross noted. "This year we've got ... [about] \$80 million to buy 60" of the new loaders.

"They're coming off the production line; they're doing very well," he noted.

The loader has been named the "Tunner" after the late Lt. Gen. William H. Tunner, the airlifter famed for his roles in World War II operations over "the Hump" into China, the Berlin Airlift, and airlift in the Korean War. The choice of name was not a whim, Kross said. "For the first time, we've given the name of somebody who's really a central figure in our heritage ... to a piece of materiel handling equipment. ... It calls attention to how important strong, workable, reliable, materiel handling equipment is to our entire



The C-17, which is larger than the C-141, can carry virtually all of the Army's air transportable outsize combat equipment. Here, with an AH-64 Apache Longbow helicopter in its cargo bay, a C-17 still has room for troops or other cargo.

process. This thing replaces three pieces of equipment and a lot of people."

He described ceremonies marking the delivery of the first Tunner at Ramstein AB, Germany, in which a single technician was able to drive the loader off a C-5 transport, raise it to full height, and "plug it right into the side of a KC-10" sharing the ramp. This one airman then loaded a KC-10 pallet onto the Tunner, lowered it, drove it to a waiting C-130, and loaded it on the smaller airplane.

Seven-Minute Shift

"That took seven minutes," Kross said. "That is the seamless transition between strategic and theater lift."

With current gear, the same transfer would have required three pieces of equipment and nearly an hour, assuming that none of the old equipment broke down in the process. The Tunner has a mean time between failure of 350 hours.

"This is phenomenal," Kross enthused. He noted that Dover AFB, Del., and Travis AFB, Calif., will be the first bases to get the new loader.

While it is hard to argue against upgrading equipment and facilities, Kross noted one area where modern-

ization is posing a political rather than technical problem. The area in question is theater airlift.

The Air Force, Air Force Reserve Command, and Air National Guard all maintain C-130s in their inventories. Last year, a theater airlift study determined that about 50 C-130s could be withdrawn from service because they were excess to USAF's requirements. Kross observed that Congress has forced the withdrawal of the C-130s from the Active force, where they can't be spared, rather than Guard and Reserve units, where they can.

Moreover, he pointed out, Congress has been adding funds to buy brand-new C-130J airplanes for the Air Force for the last few years, though USAF has asked only for a few to test and evaluate. The new airplanes are earmarked to go to Reserve and Guard units rather than the Active force.

Such Congressional tinkering with the size and composition of the theater airlift force poses potential hazards in the not-too-distant future, Kross said.

The situation is "upside down, inside out," he warned, when the Reserve and Guard have the newest air-

planes and the Active forces—especially those overseas that are working harder—have the oldest and least-reliable airplanes. The situation has occurred gradually "over the last 20 years by interests that were not based on centralized planning but rather on constituent interests," Kross said. "We have to tackle that."

While he's not complaining about Congress adding money for new airplanes, Kross is concerned that if the modernization mix between Active and Guard/Reserve gets too out of balance, it could pose problems.

He noted that the C-130 schoolhouse at Little Rock AFB, Ark., is flying airplanes far older than those found in operational squadrons. He also warned that putting the newest airplanes in the Guard and Reserve means that a "sense of ownership" isn't developing in the Active force, suggesting there may not be the incentive to lay in the depot support and spare parts needed to operate the new J models.

"The J is 80 percent a new airplane," Kross said. The change looks "incremental," but "it is, indeed, a new airplane," and he worries that while Congress is adding aircraft, it is neglecting to add the monies needed to support them.

Something Wrong

"There's something wrong with this picture," Kross said.

"The Guard and Reserve [are] built on Active forces operating the same kind of equipment," he asserted, adding that there should at least be a "one for one" side-by-side equipage of the Active and Reserve component airlift structure. He said, "If all the airplanes were going into the Active force, and none were going into the Guard and Reserve, I'd be the first person to tell you that was wrong, too, because that's not 'Total Force.'"

To illustrate the problem, he pointed out that the Active forces will retire their last C-141s in 2003, but the last Reserve units won't release theirs until 2006.

"You will find that they are nervous ... about that three-year period and us not having a proper sense of ownership in the interim," Kross reported. "Well, if they're worried about it for the -141, they ought to be seriously concerned about it for the -130J."

To keep like airplanes together, USAF has earmarked most of the C-130Js to update the hurricane-chaser squadron, which is getting 11 C-130Js, and its jamming squadrons, which are getting three. The remaining, currently funded C-130Js—16 airplanes—are going to Reserve and Guard cargo squadrons.

The Air Force is looking at the problem of bedding down, fielding, and supporting the C-130J, and Kross said a “tiger team” is studying the best solutions. Part of the solution may be to task some Reserve or Guard units to overseas assignments on a semipermanent basis, so the most modern airplanes are located where they’ll be most in demand.

Though there’s no deadline for a plan, it will likely be made final by May 1998, when the services must submit their five-year Program Objective Memorandum for DoD reviews.

“The C-130J is a wake-up call that the way we are procuring airplanes for our tactical airlift forces ... is not pertinent as it relates to our wartime and peacetime requirements,” Kross asserted. “We ought to modernize the Active [force], Guard, and Reserve at the same time.”

The 1996 theater airlift study also found that the C-17 could serve a very important role within a theater—as it did in Bosnia in late 1995 and early 1996—and not just as a strategic airlifter. It suggested that, for this purpose, the Air Force should

What the QDR Said

The final report of the Quadrennial Defense Review, released in May 1997, said the following about air mobility forces:

“A robust and effective strategic lift capability is critical. ... The QDR reaffirmed DoD’s baseline requirements for intertheater mobility, as outlined in the 1995 Mobility Requirements Study Bottom-Up Review Update. To meet our force deployment objectives, the mobility update recommended an airlift capability of approximately 50 million ton-miles per day. ... The review reaffirmed these requirements which, in turn, will guide DoD’s long-range planning for strategic mobility forces. ...

“The burdens placed on US strategic mobility forces will not become less demanding in the future. To the contrary, the potential demands of peacetime engagement, reduced infrastructure at overseas bases needed to support airlift en route to a crisis, the likelihood of smaller-scale contingencies worldwide, and the increased possibility of confronting nuclear, biological, and chemical threats all pose challenges for mobility forces that were not accounted for in the mobility update.

“These and other key issues will be evaluated and will receive increased emphasis as DoD formulates upcoming budget requests for strategic mobility programs.”

buy two additional squadrons—a total of 32 airplanes. However, Kross said that this particular requirement is “very fuzzy” yet.

What has been more sharply defined is a requirement to replace retiring special operations C-141s that have no designated successor, yet.

“No one ever swept up those special operations requirements ... in support of several critical plans” in the C-17 requirement of 120 airplanes, Kross said.

Because the C-17 is a larger airplane than the C-141, and already has a night vision goggles-compatible cockpit, it’s unlikely that they would be bought as one-for-one re-

placements for the 13 C-141s now doing the special ops job.

“And so, we believe that we need at least another squadron of C-17s, over and above the [currently planned] 120, in order to handle those special operations requirements, which are simultaneous with Major Theater War requirements,” Kross revealed.

“At Least” 120 C-17s

He also noted that the Defense Planning Guidance—which lays out the ground rules for all procurement—was changed this year to read “that the Air Force should buy at least 120” C-17s. While he’s not pushing now for more C-17s—“This is not something we need to do this year or next year”—Kross said, “We are building the justification.”

There had been 33 C-17s delivered by early fall, of which about 24 were in squadron service and the rest in test or modification. The schedule calls for nine to be built in Fiscal 1998, 13 in Fiscal 1999, and 15 a year from 2000–02, with a close-out build of five in 2003, under the multiyear procurement contract.

However, before the Air Force buys “the 121st or 141st” model of the C-17, it must step up to the task of upgrading the giant C-5 transport, Kross asserted.

AMC has commissioned the Institute for Defense Analyses, located in the Washington area, to provide “an unimpeachable third source” opinion on whether, indeed, upgrading the C-5 makes more sense than

Staff photo by Guy Aceto



The latest update to the venerable C-130, the C-130J, is more than an incremental change. Congress has added funds to purchase the C-130J, but USAF officials worry about their deployment primarily to the Guard and Reserve.



Gen. Walter Kross believes that, for overall benefit, few steps can match an upgrade for the C-5 (foreground above). He maintains DoD needs both the C-17 and the C-5.

some other alternative to maintaining the outsize-load airlift force, Kross noted.

The Air Force bought two distinctly different C-5 models at widely separated times. USAF took delivery of 81 C-5As between December 1969 and May 1973. Under a subsequent major modification program, USAF extended the service life of C-5A wings by 30,000 flight hours. Modification of all aircraft in the inventory took place between 1982 and 1987.

The first C-5B, incorporating major improvements in the wings and avionics, arrived in January 1986. Fifty were delivered by April 1989.

At present, the Air Force has 126 C-5s of all types in Active, Reserve, and Guard units.

Due to engine and avionics problems, the C-5 is only achieving a departure rate of about 80 percent, causing vexing problems in "flow management." Culprits are unreliable engines and an outdated avionics suite and cockpit. Lockheed Martin has made an unofficial proposal to upgrade the C-5 with, among other things, new CF6 engines—which would be leased—and a glass cockpit for around \$30 million–\$40 million per airplane.

Kross thinks there are few alternatives that could match a C-5 upgrade in capability delivered for the cost.

Noting that the C-5s generally have about 60,000 hours remaining—80 percent of their structural life span—

Kross concluded "it would be very foolish" to discard the airplane and buy something new. This is especially true, he said, in light of the fact that infrastructure, simulators, and spare parts for the airplane "all exist already," and flight and ground maintenance crews are "already trained."

It Takes Two

Kross believes it would be a mistake to assemble a fleet made exclusively of C-17s to do the airlift mission. "What the CINCTRANS needs is [about] 250 strategic airlift airplanes ... to do its work: That's 120 C-17s and 126 C-5s," he said. "You wouldn't ever want to have 250 of the same kind of airplanes ... because you have to hedge against having your entire fleet grounded for some common cause."

If the C-5 could be brought up to a departure rate of 94 percent, then "I'm able to do a really tremendous flow," said the general. "It's an exponential thing."

While no formal negotiations on a C-5 upgrade have taken place, Air Staff planners are already struggling with how to handle the leasing arrangement. A proposal to lease new engines for the B-52 fleet last year was abandoned because of indemnification issues. The question of termination liability—who has responsibility for the airplanes and who takes the loss in the event of accident or program termination—has

proved so thorny that the replacement of a handful of VIP airplanes had to be changed from a leasing arrangement to an outright purchase.

At present, seven obsolete and deteriorating VC-137 airplanes are being replaced with four C-32s—a special variant of the Boeing 757—and two small "VC-X" airplanes, which will be Gulfstream 5 aircraft.

Unless the parties can resolve the indemnification issue, the C-5 upgrade with new engines could become unaffordable. Next year, the Pentagon will launch a formal study to consider alternatives to a C-5 upgrade, in case the legal problem proves intractable.

Kross is keen on the upgrade idea, however, especially since the engines would come with a 10-year warranty. According to the general, "If anything goes wrong, they fix it for free, because the engines are that reliable."

One of the long-awaited upgrades that will go forward is Pacer CRAG, a program to update the Air Force's KC-135s with new avionics that improve their reliability and capability while eliminating the need for a navigator.

The program was set to go forward last winter, but Kross halted the project because "in the form that it was in last year, [it] actually yielded less combat capability." The new color radar planned for the upgrade had a narrower beam than the old radar, making formation flying more difficult, "so we had to add another piece of equipment so we could do formation right," Kross reported. The new equipment is a collision avoidance system, and operational testing has shown the new suite to be a winner.

The update was delayed nine months, "and in that I've had to keep the navigators in the force longer," said Kross. He added, "Now, the light is at the end of the tunnel, we've got an even better Pacer CRAG capability than we would have had before, and it will be entering the force in earnest in Fiscal Years '98 and '99." Kross explained that all 590 KC-135s are set to receive the upgrade, which also includes inertial navigation systems, Global Positioning System capability, assorted air traffic control improvements, and extensive software improvements. ■

The Air Force works to ease the optempo-perstempo pressures and moves to handle the latest drawdown by contracting out support jobs.

THE Air Force is not going to have a 'going out of business' sale," said Lt. Gen. Michael D. McGinty, USAF's deputy chief of staff for personnel. "As far as I can see into the future, we're going to be a military force. We're bottoming out on the downsizing. We're moving ... from an air and space force toward a space and air force. It should be pretty exciting."

That said, McGinty conceded that USAF will continue to shrink through the early years of the new century, that frequent deployments are taking a toll on the troops, and that the Air Force will need new measures—some of them costly—to hold on to members, particularly in critical rated specialties.

In a wide-ranging interview, McGinty frequently invoked the term "quality of life," long a favorite phrase of service leaders and, more recently, the watchword of the Clinton Administration and many members of Congress.

McGinty also spoke at length about operations tempo and personnel tempo, noting the stresses created by meeting increased requirements with smaller forces. He ticked off a laundry list of improvements the Air Force is making to ease the strain of heavy work schedules and frequent family separations.

McGinty maintained that, while the worst of the drawdown is over, USAF's end strength will continue to drift downward for another few years.

Under the defense plan in place at the start of this year, explained the general, USAF was programmed to lose, in the period 1998–2003, an

A Talk

With the
Personnel

Chief

By Bruce D. Callander

additional 29,000 members, both military (Active, Reserve, and Guard) and civilian. That reduction, he said, was to flow from long-anticipated factors such as the retirement of the EF-111 Raven electronic warfare aircraft and most of the C-141 transport fleet.

Now looming, however, is an additional drawdown over the same period of up to 45,900 members (26,900 Active, 700 Reserve and Guard, and 18,300 civilian). The new reduction stems from the outcome of DoD's Quadrennial Defense Review, made public in May. These cuts would come largely from outsourcing Air Force jobs to contractors.

McGinty said that outsourcing makes economic sense, particularly in support areas. "When I do the budget," explained the general, "I have to budget \$55,000 or so for each enlisted person and \$80,000 for an officer—when I factor in all the base operating support, retirement benefits, and all that.

"So, in effect, out of the Air Force budget, we're paying \$55,000 for a billeting clerk or for an airman to hand out towels and schedule racquetball courts in the gym. ... We're looking for those kinds of things that could be done by a contractor and save us some money."

Mild by Comparison

The Air Force already has weathered the enormous 1990s drawdown of 206,600 Active, Reserve, and Guard military members and 77,400 civilians, representing the elimination of 284,000 spaces. Compared to that, the loss of up to 74,900 more over a six-year period is relatively modest, McGinty said.

However, he conceded that the Air Force already is feeling the effects of carrying a heavier operational load

with a reduced force. These effects are showing up as retention problems in some key specialties. The most visible problem concerns pilots.

The Air Force has no trouble recruiting pilots. Officer Training School, Air Force ROTC, and the Air Force Academy have more applicants for flight training than they have slots to fill, the general said. In fact, the Air Force hopes soon to boost its pilot training rate from a low of 500 a year during the drawdown to a robust 1,100 per year after the turn of the century.

The real problem concerns holding on to enough pilots once they are trained and experienced. McGinty said the Air Force lost about 630 pilots in Fiscal 1997 and already has heard from 279 applying for separation in 1998. "It costs about \$5.9 million to train and experience a pilot up to the nine-year point," said McGinty. "Replacing 630 pilots at almost six million bucks a copy costs a lot of money, but it's also a loss of a lot of combat capability because

"When you look at any kind of retention problem," he said,

"whether it be pilots or crew chiefs,

it's a push-pull thing.

Part of it is that we do things in the service that tend to upset people, that push them

out the door."

you're losing a nine-year captain."

Such officers are those with enough experience to be a flight leader, a flight commander, or an instructor pilot. They are being replaced with new lieutenants with scant experience in an airplane.

"We're in a period where the airlines are hiring," said McGinty. "An airline pilot can only fly until age 60, and they have a lot of people approaching 60 whom they have to replace. That's going to go on for four or five years. I would put the numbers in the range of 3,000 to 4,000 in the 12 major airlines, and if you add in all the feeder lines as they get more sophisticated, then the number gets bigger."

According to McGinty, the lure of civilian flying jobs is only one factor. Dissatisfaction with the situation in the force also plays a role. "When you look at any kind of retention problem," he said, "whether it be pilots or crew chiefs, it's a push-pull thing. Part of it is that we do things in the service that tend to upset people, that push them out the door."

Top "Dissatisfiers"

For enlisted troops no less than pilots, according to the personnel chief, the No. 1 "dissatisfier" was high optempo. Also high on everyone's list is what is viewed as the persistent undermining of quality of life.

The Air Force already has taken a number of steps to deal with reducing the size and frequency of deployments, the general said. Other improvements deal with giving members more time off after they have been away for prolonged periods.

According to McGinty, "All the commands have implemented a policy—not just for pilots but for everybody—that if they've been away from their families for 45 days or more, we're going to give them a seven-day stand-down period when [they] get home to get reacquainted. They can take leave or the commander can give them up to a four-day pass. If they want to stay home and be present for duty in an emergency, that's fine, too, but their duty location will be home."

Moreover, said McGinty, "If they are gone 90 days or more, we're going to give them two weeks off. That should help this optempo business."

In past periods of turbulence, the

Air Force has worried that frequent separations were raising divorce rates and causing other family difficulties, but McGinty said that the problem appears to be different now—though no less serious.

"I have not seen high increases in divorces or domestic problems," McGinty said. "I think what's happening is that people are voting with their feet and separating from the Air Force."

The Air Force is attacking the problem on a broad front, the general said. In addition to changes in tempo, frequency of inspections, and the provision of down time, USAF is working all the little angles it can in the quality-of-life area for the families back home.

"For example, if you walked into the tent city at Incirlik [AB], Turkey, right now, you'd see a family-support tent there for the troops," said McGinty. "Inside, there are three computers that are busy almost all day because those troops are sending e-mail back and forth to their families. We're testing video phone links, too, to see if we can't hook together a guy in a deployed location and his family back in the States so they can see each other while they talk."

Pay and benefits, as always, are an important part of the dissatisfaction equation, the general admits. Congress has voted military pay raises in three out of the last six years and that has helped, he said, but some pays have not kept pace.

Pay Erosion

Again, the most glaring example concerns pilots. McGinty cited problems with the pilot bonus as an example of problems in the entire force. In 1989, when the bonus came into existence, young pilots could get seven years of bonus payments of \$12,000 a year, or \$84,000, said the general. Since then, the service commitment for pilot training has been extended two years, so a pilot today loses two years of bonus—down from \$84,000 to \$60,000.

The effects of inflation also must be considered. The \$84,000 of a decade ago equates to \$110,000 in today's dollars, said the general, but the payments have not been adjusted. McGinty said the Air Force is asking for authority to raise the bonus from \$12,000 to \$25,000 a year. The general also pointed out that flight pay

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overseas.”**

has not been increased since 1991; the true value of this compensation has eroded by 27 percent.

"What we are paying aviators ... has decreased significantly, and that's the part we're asking Congress to help us with," said McGinty. "Nobody joins the Air Force to get rich, but they all expect to get a reasonable wage to live on."

In other compensation areas, Congress this year moved to reform the Basic Allowance for Subsistence to tie it to a food index, he said. "Everybody would end up getting it after a phase-in period," according to McGinty. "I think that's a pretty reasonable approach."

There also is provision for combining the Variable Housing Allowance and the Basic Allowance for Quarters and indexing them to a housing allowance. That will cause some shift in pay that people get for housing, but it has a save-pay provision so it won't hurt anybody right away. McGinty called that "a more realistic approach to housing allowances."

The general maintained that USAF has seen "great progress" with respect to permanent change of station reimbursements.

"Only about six or seven years ago, we were only reimbursing people about 50 cents on the dollar," said McGinty. "When I came here [Pentagon] four years ago, it was about 65 cents on the dollar, and with the increase in the dislocation allowance in January, it went up to 74 cents."

While the service is hoping for improvements in several compensation areas, it continues to battle for the status quo in some fringe benefits. Case in point: the commissary benefit.

"Our position on the commissaries has been that we need to preserve the benefits," McGinty said. "They save the average staff sergeant with two kids more than \$200 per month. Every now and then, people talk about doing this or that with the commissaries, changing the pricing scheme and all that, but we feel that it is very important to maintain commissaries as the benefit we've all grown up with. In actuality, it's part of our pay and particularly important to people overseas."

He went on, "The base exchange system draws more and more competition from the discount houses, but it still provides reasonably priced goods on our bases. More importantly, it generates a lot of money in morale, recreation, and welfare funds that can be spent for the good of the community and the good of the troops. So, I would not want to see anything changed on either the BX or the commissary."

Housing is another area getting lots of USAF attention, McGinty said.

They Want Privacy

"If you talk to the young, single troops on the base," the general reported, "they will tell you they want to get out of the central latrine dor-

“As we get more into **Tricare** and [the number of] military medical treatment facilities gets smaller and we have

f e w e r b a s e s ,

there is going to
be less
space-available
care for **people
over 65** as
they go under
Medicare.”

mitories. We're listening and the last of those dorms will go away in 1999.

“The second thing they want is privacy. They'd like to have a room to themselves instead of sharing. I don't think that's too much to ask. So, by the year 2002, most of our enlisted troops will be in single rooms with a shared bathroom.”

The first dorm built from scratch on this “one plus one” formula opened in August at McChord AFB, Wash. It provides a 118-square foot sleeping room per occupant, with a shared bathroom and kitchen. It also features air-conditioning, walk-in closets, 20-inch ranges and ovens, 12-cubic foot refrigerators, microwave ovens, and garbage disposals. Other older dorms are being renovated to the one plus one standard.

Improved family housing also is on the drawing board, but McGinty said the Air Force may have to take some unconventional approaches to make it happen.

“There is always somebody who says, ‘Let's just get out of that business,’” said the general. “Well, we have 41,000 people on the waiting list, so people must want to live in military housing, and I think it's desirable in many places. We just have a lot of it that's getting long in the tooth and needs some renovation. There are all kinds of schemes afloat not only for fixing up housing, which we have done over the last couple of years, but for having contractors build housing to lease back to us.”

One showcase project can be seen at Bolling AFB, D.C., where the Air Force has put up the first set of three-story, three-bedroom town houses with different color schemes in each unit and what officials describe as a “Washingtonian, community atmosphere.”

An even more radical departure from the traditional Air Force housing approach is taking shape at Lackland AFB, Texas, where 420 housing units will be leased from a private owner to Air Force members. The Air Force will pay the utilities, and members will pay rents capped at the level of their BAQ and VHA entitlements.

Officials estimate it would take 26 years to bring the Air Force's existing housing units up to standards, but this type of privatization may accomplish essentially the same purpose in a mere 10 to 15 years.

In the health care area, McGinty acknowledged that the Tricare health care program is experiencing some problems and drawing some criticism. He said, “I think after we get through the growing pains, we'll know whether Tricare is going to be good for us or not, but the [USAF] Surgeon General will tell you that in

Washington and Oregon, where Tricare first came on, nine out of 10 people said they would sign up for Tricare Prime, which is the best of the options. So, I think the jury is still out on Tricare.”

He said that the service needs particularly to keep focused on health care for retirees over age 65, who are not currently eligible to take part in Tricare.

“As we get more into Tricare and [the number of] military medical treatment facilities gets smaller and we have fewer bases, there is going to be less space-available care for people over 65 as they go under Medicare,” said McGinty. “There are various ideas around now about Medicare Subvention, where we can treat them in military facilities and get reimbursed for that.”

Now, Tricare Senior

One such approach, called Tricare Senior, is being tested at several DoD facilities, including Sheppard AFB, Texas. Under this approach, Medicare patients otherwise eligible for care in military facilities can choose to receive the bulk of their health care from the Sheppard hospital. They are not expected to pay any enrollment fee beyond Medicare Part B. The Sheppard hospital is to provide all routine health care and most specialty care and bill Medicare for the costs.

While the Air Force is working a number of problem areas in personnel, McGinty said, the overall outlook is good. Promotion rates, which slowed in some grades during the heaviest part of the drawdown, are picking up. Despite retention problems in some rated and technical specialties, overall airmen retention rates are at or above USAF goals. And in a quality-of-life survey last year, 62 percent of enlisted members, 72 percent of officers, and 84 percent of civilians said they planned to make the Air Force a career.

Knowing what he does of the Air Force's problems and future prospects, McGinty was asked, would he himself join as he did in 1965? “In a heartbeat,” he said. ■

Bruce D. Callander, a regular contributor to Air Force Magazine, served tours of active duty during World War II and the Korean War. In 1952, he joined Air Force Times, serving as editor from 1972 to 1986. His most recent story for Air Force Magazine, “Air Force Training on the Move,” appeared in the August 1997 issue.

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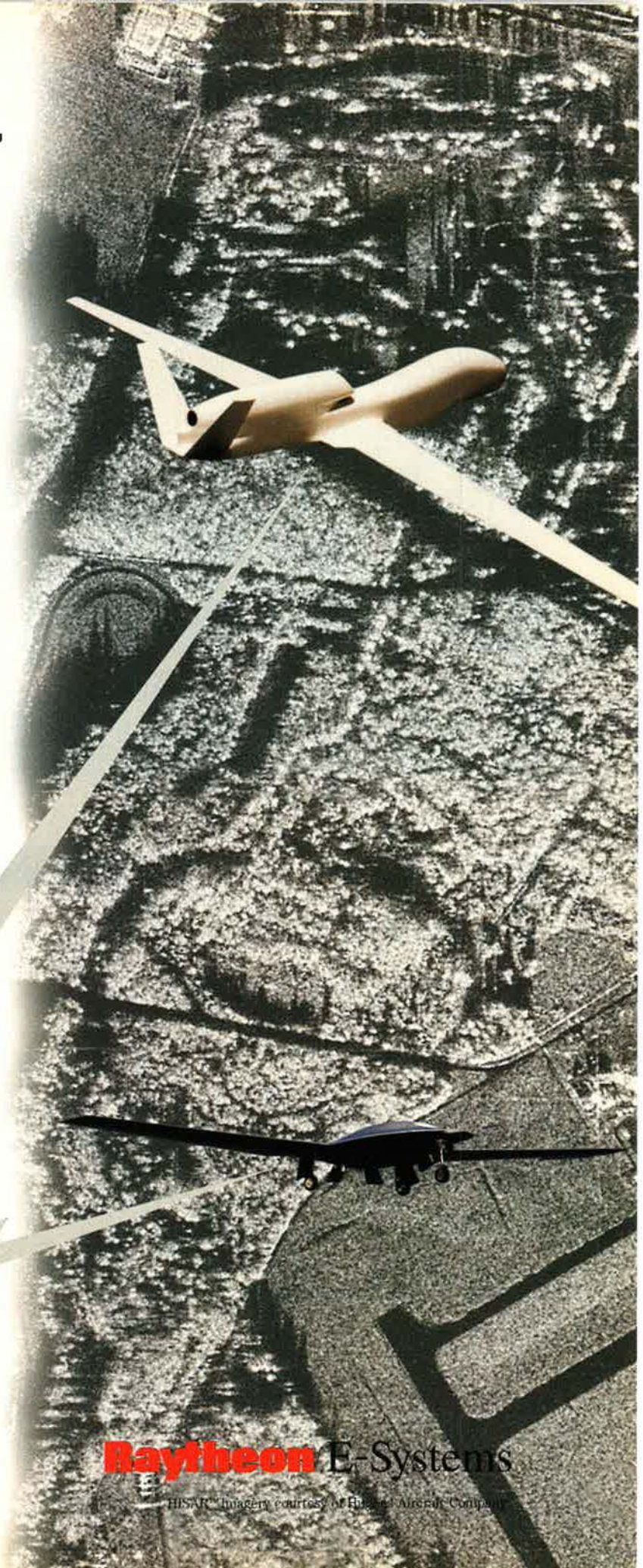
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Here are the statistical profiles of the men and women who fly USAF's aircraft and the unfavorable trends USAF now confronts.

Pilots

The Air Force's pilot force is key to the strength and effectiveness of the service, but today it is somewhat beleaguered. Officials said that their numbers and capability are adequate to the mission at this time. However, USAF is tracking unfavorable trends that portend future readiness problems.

Figure 1: Pilots in USAF Officer Corps

Category	FY 92	FY 93	FY 94	FY 95	FY 96
Pilot	17,808	16,950	15,963	15,362	14,774
Total USAF Officer	90,376	84,073	81,003	78,444	76,388
Percent of Total	19.7	20.2	19.7	19.6	19.3

The pilot force usually comprises about a fifth of all USAF officers, as seen in Fig. 1. However, pilots form the largest single occupational group in the Air Force, rivaled only by the medical corps (Fig. 2).



Figure 3: Where They Are

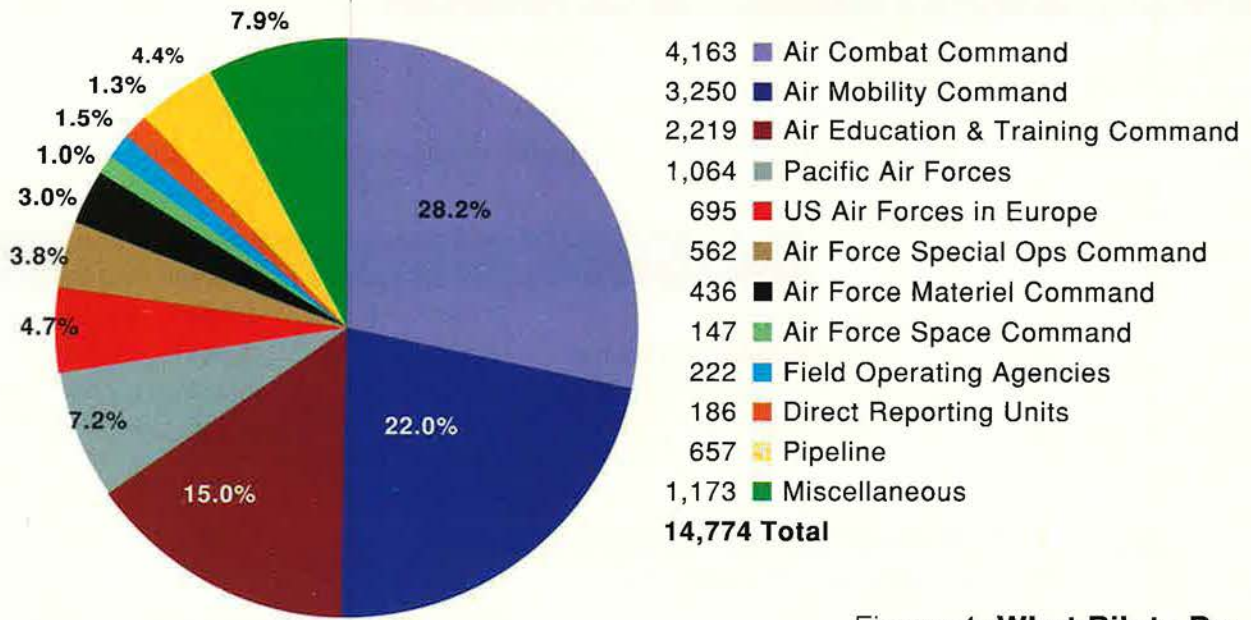


Fig. 3 shows that the pilot force is concentrated in Air Combat Command and Air Mobility Command. Taken together, they account for some 50 percent of all pilots. More than 40 percent are deployed in operational forces (Fig. 4). As seen in Figs. 5 and 6, a high proportion is actually engaged in flying, and a large number of officer/pilots receive incentive pay.

Figure 4: What Pilots Do



Figure 2: Share of Occupations

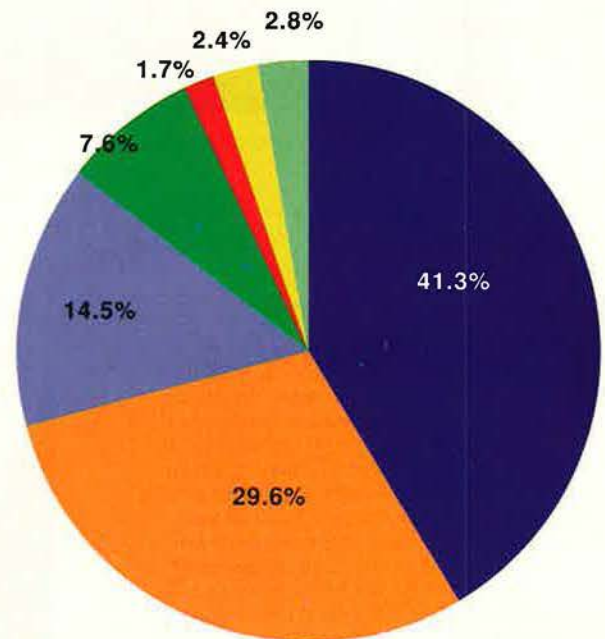
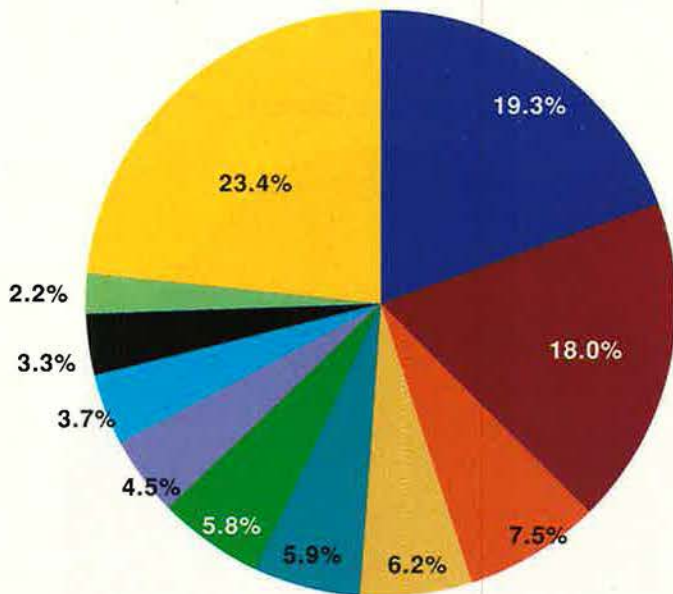


Figure 5: Air Force Pilots Actually Flying

Grade	FY 92	FY 93	FY 94	FY 95	FY 96
General and Colonel	581	523	479	481	435
Lt. Colonel and Below	12,948	12,020	11,574	11,605	11,040
Total	13,529	12,543	12,053	12,086	11,475

Figure 6: Air Force Pilots Receiving Incentive Pay

Grade	FY 92	FY 93	FY 94	FY 95	FY 96
General and Colonel	1,179	1,082	1,062	1,023	888
Lt. Colonel and Below	17,620	16,610	15,953	15,398	14,778
Total	18,799	17,692	17,015	16,421	15,666

Figure 7: Pilot Retention Ups and Downs

6-11 Year Cumulative Continuation Rate

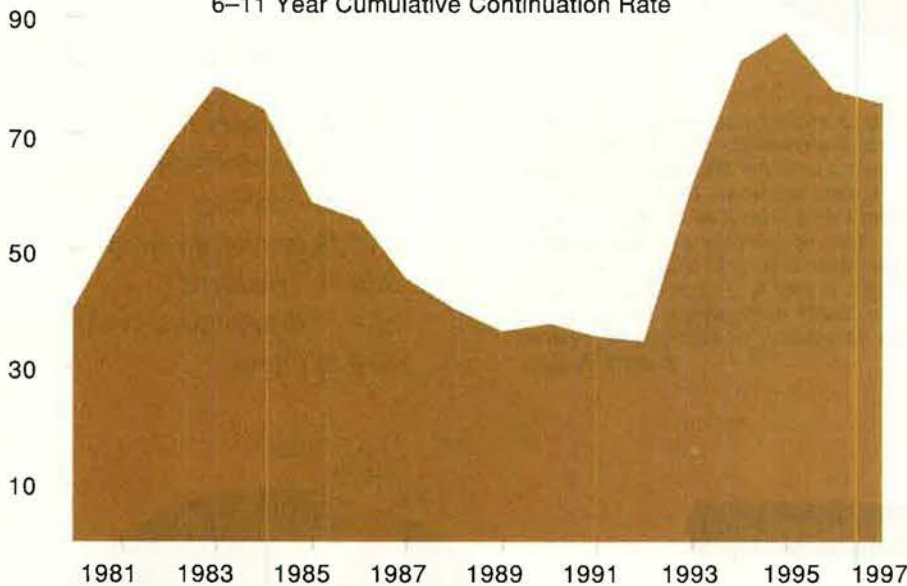
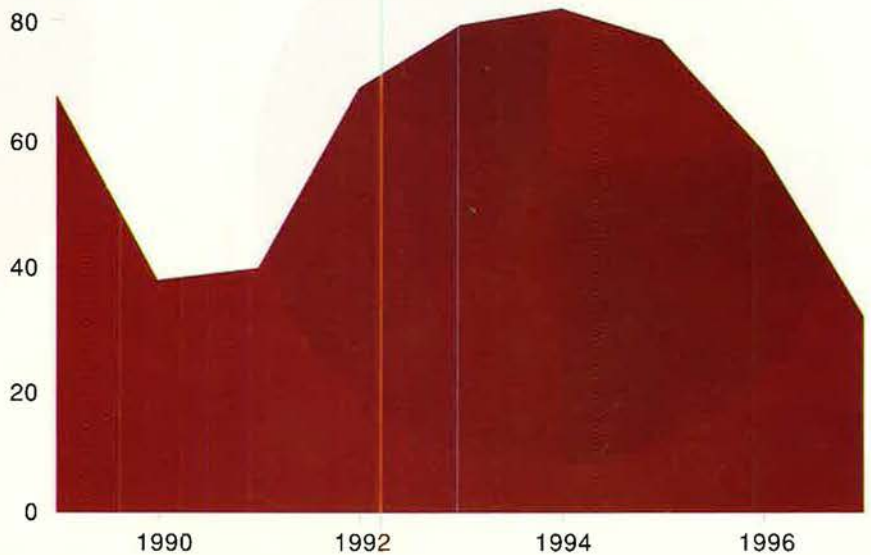


Fig. 7 shows cumulative continuation rates, a key indicator of pilot retention. It expresses—as a percentage—how many pilots on active duty with six years of service decide to stay in the Air Force and are still on duty at their 11th year. The CCR hit a peak of 87 percent in 1995. In 1996 the rate turned down to 77 percent and to 75 percent this year.

Figure 8: Fewer Take the Bonus



Related to the CCR trend is a drop in the "take rate" for Aviator Continuation Pay, a bonus offered to pilots completing service commitments from initial pilot training. As Fig. 8 shows, the take rate hit a high in 1994 (81 percent accepted and stayed in the Air Force). By last year, the rate had fallen to 59 percent and this year was down to 32 percent. Traditionally, 90 percent of those who decline ACP leave within two years. Fig. 9 indicates the problem exists in all weapon systems and commands.

Figure 10: Exodus of Experienced Pilots

As Fig. 10 shows, pilot separations are on the rise. After the big draw-down, the proportion of eligible pilots leaving USAF went down as the force stabilized. Since 1994, though, the share has climbed steeply. In surveys, pilots cite high optempo, poor quality of life, and eroding pay and benefits.

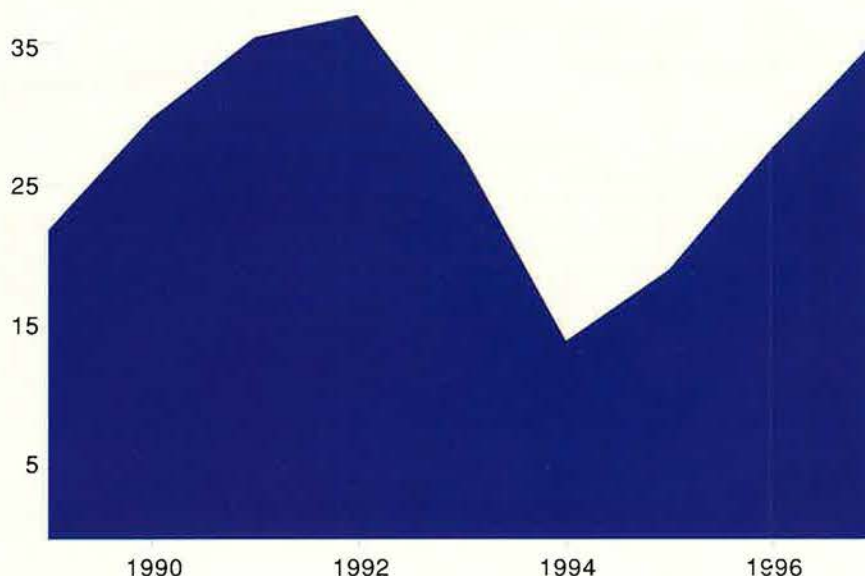


Figure 9: Snapshots of the Take Rate, 1997

By Weapon System	Eligibles	Decline	Accept	Percent
Fighter	152	103	49	32.2
Bomber	37	23	14	37.8
Strategic Airlift	158	117	41	25.9
Theater Airlift	76	49	27	35.5
Tanker	96	74	22	22.9
Helicopter	15	8	7	46.7
Trainer	7	7	0	0.0
Total	541	381	160	29.6

By Major Command	Eligibles	Decline	Accept	Percent
ACC	119	82	37	31.1
AETC	151	116	35	23.2
AMC	169	126	43	25.4
PACAF	22	16	6	27.3
AFSOC	16	9	7	43.8
USAFE	17	6	11	64.7
USAF Academy	12	5	7	58.3
AFMC	20	14	6	30.0
Undistributed	15	7	8	53.3
Total	541	381	160	29.60

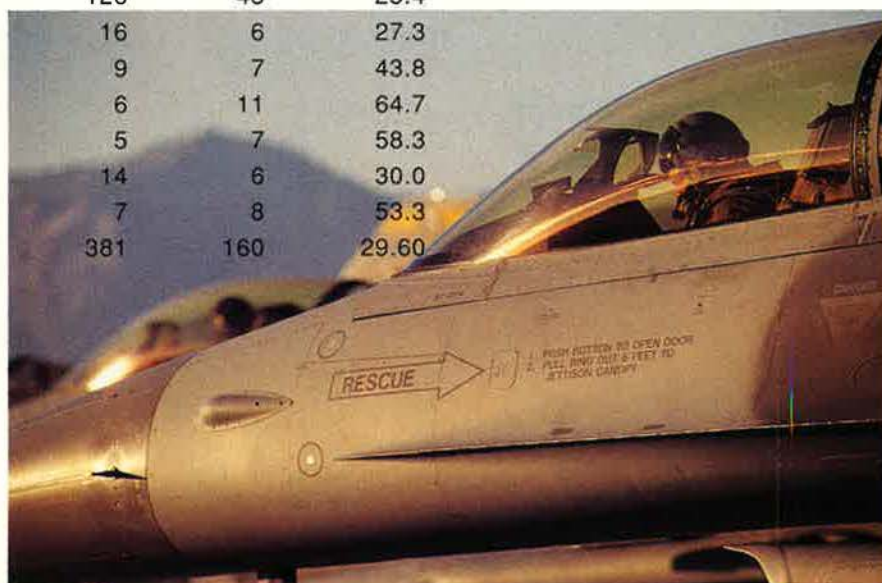


Figure 11: The "Pull" of Airline Hiring

Aggravating such problems is the lure of the airlines. Airline hiring spiked in 1997 and is expected to taper off some, but it will stay strong for years. As Fig. 11 shows, the majors could absorb all military pilots who will become eligible to separate in the next few years, with room to spare.

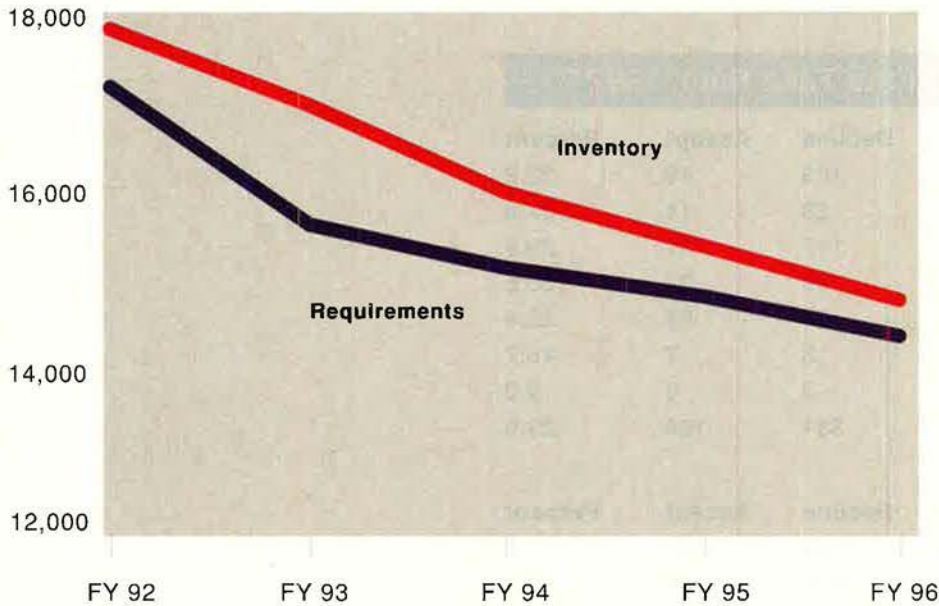
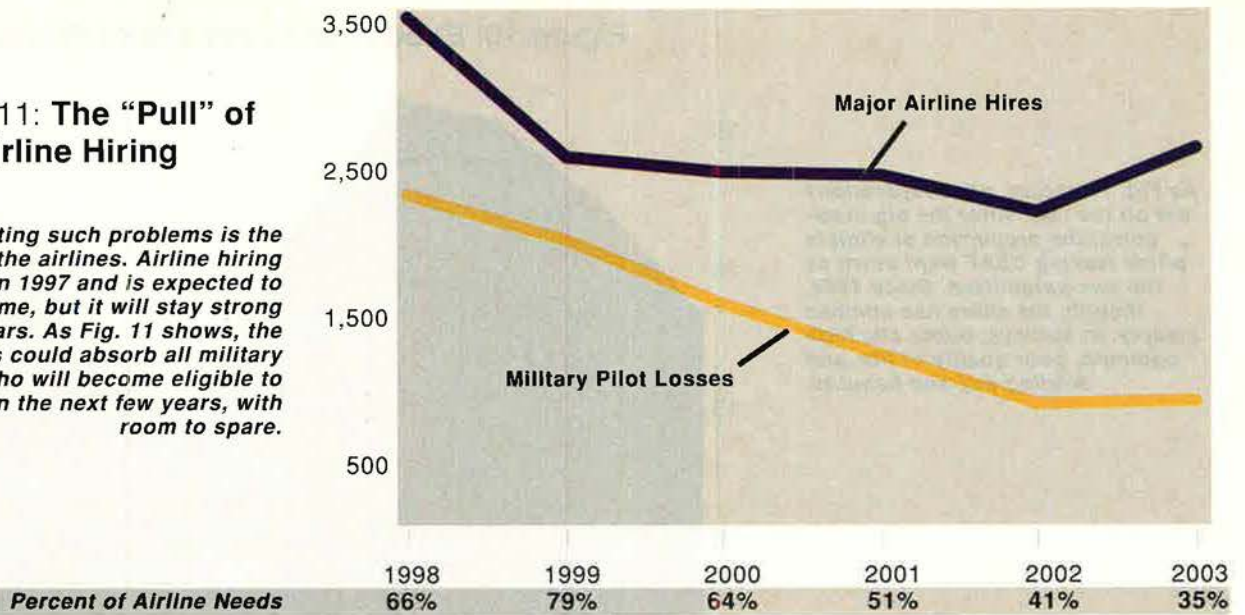
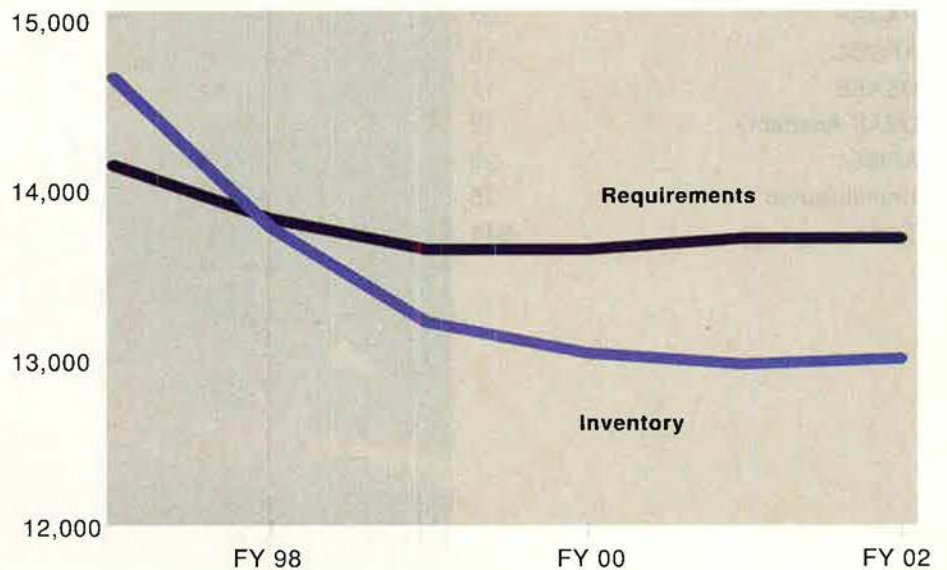


Figure 12: Requirements and Inventory, Recent Past

Fig. 12 shows that a "surplus" of pilots has been shrinking since 1993. Today, the total pilot number still exceeds requirements, but USAF is experiencing spot shortages of fighter and C-130 pilots. USAF says it will run a deficit of 350 pilots next year and that, by 1999, all combat and mobility systems will be undermanned as the gap widens (Fig. 13). The service has launched a major get-well effort to reduce requirements and increase pilot production and retention, with no assurance of success.

Figure 13: Requirements and Inventory, Future



Empty Tanks

"Most people know the story of the F-111s adapting to the Iraqi tank patterns, being able to find them buried in the sand because of the differentials in heat as the night cooled and the tanks stayed warm. ... The Iraqi tankers became accustomed to this idea that, if they slept in their tank, they might die.

"Well, just the other day I came across a briefing done by an independent analysis agency ... for the Army, trying to explain why it was so easy for the American Army to beat the Iraqi army. One of the conclusions ... is that there was a difference in training. The difference in training was exemplified by the fact that, when American tankers came across the horizon to face the Iraqi tankers, those stupid Iraqi tankers weren't even sleeping in their tanks like a well-trained American tanker would.

"These different interpretations of the same event tend to confuse the issue, don't they?"

Retired Air Force Maj. Gen. Charles D. Link in Oct. 31, 1997, remarks at an Eaker Institute Colloquy held in Washington.

Course Correction

"An American general asked a Polish major familiar with the details of a particular rail complex [in Poland] whether we could reasonably expect to transport a NATO armored division through it in one week's time. The amused major replied by asking the general how many Soviet heavy divisions he thought they planned on moving through the same location when the trains were going the other way."

Secretary of Defense William S. Cohen in Oct. 21 testimony on NATO expansion before the Senate Appropriations Committee.

Where Honor Is Found

"There's been no end to the controversy surrounding the purpose and conduct of the Vietnam War.

But, whatever history's ultimate verdict about that war, one truth remains unassailable: Those who were called to duty there found their honor in their answer, if not in their summons. By that standard, our friends who did not come home with us are ranked among the most honorable Americans to have ever worn the uniform of this country."

Sen. John McCain (R-Ariz.), who spent nearly six years as a POW in North Vietnamese prisons, in a Sept. 19, 1997, Washington speech honoring POWs and MIAs from all wars.

The Navy and the JSF

"It [the Joint Strike Fighter] is a very expensive plane to develop. We are going to have to come up with a cheaper way to develop this aircraft. ... There are so many unique requirements being put on it by the services that the program could have trouble."

Vice Adm. Donald L. Pilling, deputy chief of naval operations, quoted by Thomas E. Ricks in the Sept. 9, 1997, Wall Street Journal.

Shadowy Presence

"If every carrier battle group in the Navy's fleet were posted off the Korean peninsula, the entire armada would fail to provide as much 'preventive' influence as the single Army division and Air Force units deployed there now."

Lt. Gen. William E. Odom, USA (Ret.), former director of the National Security Agency, in an article published in the July/August 1997 issue of Foreign Affairs.

Sounds Like "Quagmire"

"In June 1998, [Stabilization Force's] mission will end, as President Clinton has said, but the international community's engagement will continue. Whether an international security presence is part of that engagement, and what role the United States might play,

remains to be decided. ... The United States has an important interest in the establishment of a lasting peace in Bosnia. The best way to advance that interest is through the framework agreed upon in those [Dayton] negotiations. That's why America has a significant and continuing stake in Dayton's success."

National Security Adviser Samuel Berger in a Sept. 23, 1997, speech at Georgetown University, Washington.

Still Sounds Like "Quagmire"

"Let me just say, again, very simply, that we have said that there will be an international presence in the [Balkan] region, politically and economically, because we have interests in the region for strategic as well as humanitarian reasons. No decisions have been made as far as the presence of US forces or NATO forces, following the termination of the SFOR mission in June 1998."

Secretary of State Madeleine Albright at a Sept. 24, 1997, press briefing in New York following a meeting of foreign ministers on Bosnia.

Uncle Schwarzenegger

"Never before in modern history has a country dominated the Earth so totally as the United States does today. American idols and icons are shaping the world from Katmandu to Kinshasa, from Cairo to Caracas. ... The Americans are acting, in the absence of limits put to them by anybody or anything, as if they own a blank check in their 'McWorld.' Strengthened by the end of Communism and an economic boom, Washington seems to have abandoned its self-doubts from the Vietnam trauma. America is now the [Arnold] Schwarzenegger of international politics: showing off muscles, obtrusive, intimidating."

From Der Spiegel, the German newsmagazine, as quoted in the Nov. 4, 1997, Washington Post.

Local volunteers carefully preserve pieces of Air Force history near the shores of the Great Salt Lake at Hill AFB, Utah.

Aerospace History at Hill

Photography by Paul Kennedy

Take Interstate 15 north toward Ogden, Utah. Over a gentle rise and to the right, you'll see them—rows of neatly arranged aircraft glinting in the sun. Spanning more than 36 acres, the Hill Aerospace Museum, located at Hill AFB, Utah, features an outdoor "Air Park" as well as indoor displays of aircraft, missiles, uniforms, flight gear, artwork, and aircraft engines. The Air Force Heritage Foundation of Utah began raising funds in 1983 to create the museum, which opened in 1987. Today, the museum houses nearly 60 aircraft, including a one-of-a-kind SR-71C "Blackbird."

Most of the larger aircraft in the collection can be seen in the Air Park. Visitors stroll through the grounds at their own pace, following well-placed signs, or take advantage of volunteer guides, who offer detailed, knowledgeable answers to questions about the museum's displays and the base.



This B-29 bomber (near left), known as Hagarty's Hag, was transported to the museum in pieces in 1983. Delivered to USAAF in August 1945, it was turned over to the Army in 1953 at Dugway Proving Ground, Utah, where it fell prey to weather and vandals. Museum volunteers restored it over an eight-month period. In the background is a newer acquisition, a C-124 that served with the Utah Air National Guard during the late 1960s. Volunteers found the aircraft at Aberdeen Proving Ground, Md., and arranged to have it disassembled and moved to Hill in 1992.



At the center of the museum's acreage is a 52,000-square foot building, donated by the state of Utah in 1991, in which 20 aircraft, ranging from a PT-17 trainer to the SR-71C, are on display.

The SR-71C, which was built from the rear section of the first YF-12A and an engineering mock-up forward fuselage, first flew in 1969 and served as a trainer. One of the collection's gems is a professionally restored P-38J, rescued from a site on Buldir island, Alaska, where it had been used as a ground target for other P-38s after it crashed in February 1945.

This 1943-era chapel—used as the base chapel until 1984—was saved from destruction, moved to its present site, and restored by the museum's foundation and through local contributions. It features a re-creation of a stained glass window commemorating the efforts of the 384th Bomb Group, assigned to Wendover Field, Utah, in World War II. The original window was placed in the Parish Church of St. James the Apostle, Grafton Underwood, UK, on May 21, 1983.



The museum's collection is not limited to aircraft. Fragile documents and memorabilia, many belonging to Maj. Ployer Peter Hill, after whom Hill AFB is named, are carefully maintained in a climate controlled environment (right). Curator Carol Nash wears gloves when handling these pieces, since dust, humidity, or even oils from the hands can speed the deterioration of paper and photographs.



Col. William L. Evans, USAF (Ret.), contributed flight gear and uniforms spanning his 32-year career. Together with more recent donations, this display illustrates the many changes in USAF uniforms and gear, from World War II to the present.

At left is the flight suit Evans wore when he flew B-47s with the 43d Bomb Wing in the 1950s. Note the eye patch, which was issued to nuclear-capable bomber pilots. Theoretically the patch would keep one eye safe from being blinded by a nuclear flash, giving the pilot a chance to return with his aircraft.

Museum volunteers give many reasons for their dedication and hard work. For some, it's a chance to work on "an old friend"—for others, an opportunity to pass on their experiences to a younger generation of aviators and aviation fans. At right, E. Don Peterson readies a rivet gun in preparation for maintenance work on one of the Air Park aircraft, which require constant vigilance. Peterson also brings his firsthand knowledge and unique perspectives on aviation to audiences in the museum's education seminars.





Above, emphasizing the dedication of the museum's restoration workers and volunteers, is an accurately restored B-17G cockpit. At right, Robert Cosgrove continues work inside the cramped bomber. Flying Fortresses were heavily used in every World War II theater, but by 1945, when this aircraft was delivered, the B-17 was virtually obsolete. After a stint with the Brazilian Air Force, this bomber was returned to USAF in 1968 and then loaned to various aviation museums until the Air Force Heritage Foundation of Utah acquired the airplane in 1987. Foundation member and local businessman John Lindquist, who was a navigator in the 493d Bomb Squadron, sponsored the aircraft, and the plane was given 493d markings and the name Short Bier (after an aircraft on which Lindquist served) in his honor. It symbolizes the hundreds of B-17s that came through Ogden Air Depot during the war.



Inside and out. A walk through the Air Park will often reveal one of the volunteers—aviation buffs who make up the majority of the Hill Aerospace Museum workforce—hard at work performing one of the countless tasks necessary to safeguard aircraft exposed to the elements. Here, one volunteer undertakes the daunting task of polishing the exterior of a C-124.



To ensure its displays are accurate in their history as well as restoration, the museum includes a well-stocked research library—home to computer databases and hundreds of volumes ranging from the most elementary books on military flight to detailed technical manuals. The technical manuals on the various weapon systems provide an invaluable resource for the museum's preservation crews. At right, librarian Sandee Whitson, one of many persons working behind the scenes at the Hill museum, checks on some information in the library's computer.



Photos by Paul Kennedy



The collection includes many examples of helicopters as well as fixed-wing aircraft. Here, a mannequin sports fire-fighting garb while posed at the rear of an HH-43 helicopter. The Huskie, sporting a unique rotor system that made the helicopter a very stable platform from which to work, was used as a fire-fighting and rescue aircraft in the Vietnam War.

Ogden Air Logistics Center, located at Hill, through the years has played an important part in maintaining a number of weapon systems, including providing depot-level maintenance for F-84, F-89, F-102, B-47, and B-57 aircraft. Ogden also assumed prime responsibilities for early missile systems such as the SM-62 Snark and IM-99 Bomarc, as well as Atlas and Minuteman ICBMs. At right, the Minuteman I and Bomarc A- and B-model missiles displayed outdoors help present a complete picture of the Air Force, past and present. ■



By John L. Frisbee, Contributing Editor

Odyssey Extraordinary

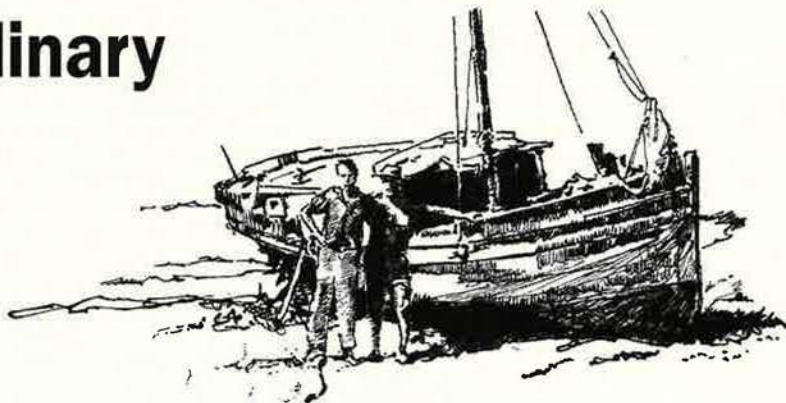
Lt. Damon J. Gause was the central figure in one of the most dramatic events of World War II.

Lt. Damon J. Gause, a member of the 27th Bombardment Group (Light), arrived in the Philippines in November 1941. The group's A-24s were diverted to Australia and never reached the Philippines. Along with other Americans, he fell back to Bataan when our forces no longer were able to hold positions in the Manila area. The group fought with the infantry until the Japanese overran Bataan and killed or captured all but a few of the US and Philippine defenders.

Gause escaped from his captors by attacking one of the guards, whom he killed with the man's own knife, then swam the three miles to Corregidor, where he led a machine gun squad. When Corregidor fell on May 6, Gause again escaped, found a small boat, and set out for Luzon. An enemy fighter sank the boat, leaving him to swim for many hours to the island. He then made his way through enemy-held territory to the island of Mindoro. There he met an Army captain, William Osborne. Their plan—ambitious to say the least—was to reach Australia and rejoin the fighting.

With the help of friendly natives, they located a dilapidated 22-foot sailboat with a diesel engine that ran only when it chose to do so. When the engine was out, they relied on tattered sails. The two men had no charts or navigation equipment and little fuel for the engine. The latter problem was solved by eliminating the Japanese guard at a lighthouse, taking on a load of fuel, and replenishing their meager larder. They also took a Japanese flag that was to save their lives on the long voyage through unfriendly waters.

Gause and Osborne made frequent stops at small islands to gather food and, with luck, water, and to work on the engine, which ran for a few hours between recurrent rest peri-



ods. One stop was at the small island of Bugsanga, a leper colony. One of the inmates was an American, who had been a marine engineer before his illness, and he helped them repair the engine. At another island, they were greeted by a lady missionary who provided food and gave them her camera and all the film she had so they could document their escape.

Sailing south in the boat, which they named *Ruth-Lee* after their wives, the two Americans survived several tropical storms, one lasting for five days, that left the boat leaking in many places. The leaks were stuffed with rags. Then came a typhoon with violent winds that snapped the mast and broke the rudder. The mast was replaced with a small tree and a rudder was carved with knives provided by friendly natives. Off the coast of enemy-occupied Palawan, they ran up the Japanese flag, which saved them more than once from enemy ships and aircraft that came down to look them over.

Drinking water was a constant problem. There were no containers on the boat that could store rainwater. Several small islands proved to be devoid of streams or springs. Coconuts became a prime source of water. A shark that followed them for several days helped out on that score as well. It was caught on a hook made from steel wire and provided both food and some moisture. As their coconut supply ran low, they moistened their mouths by chewing raw fish.

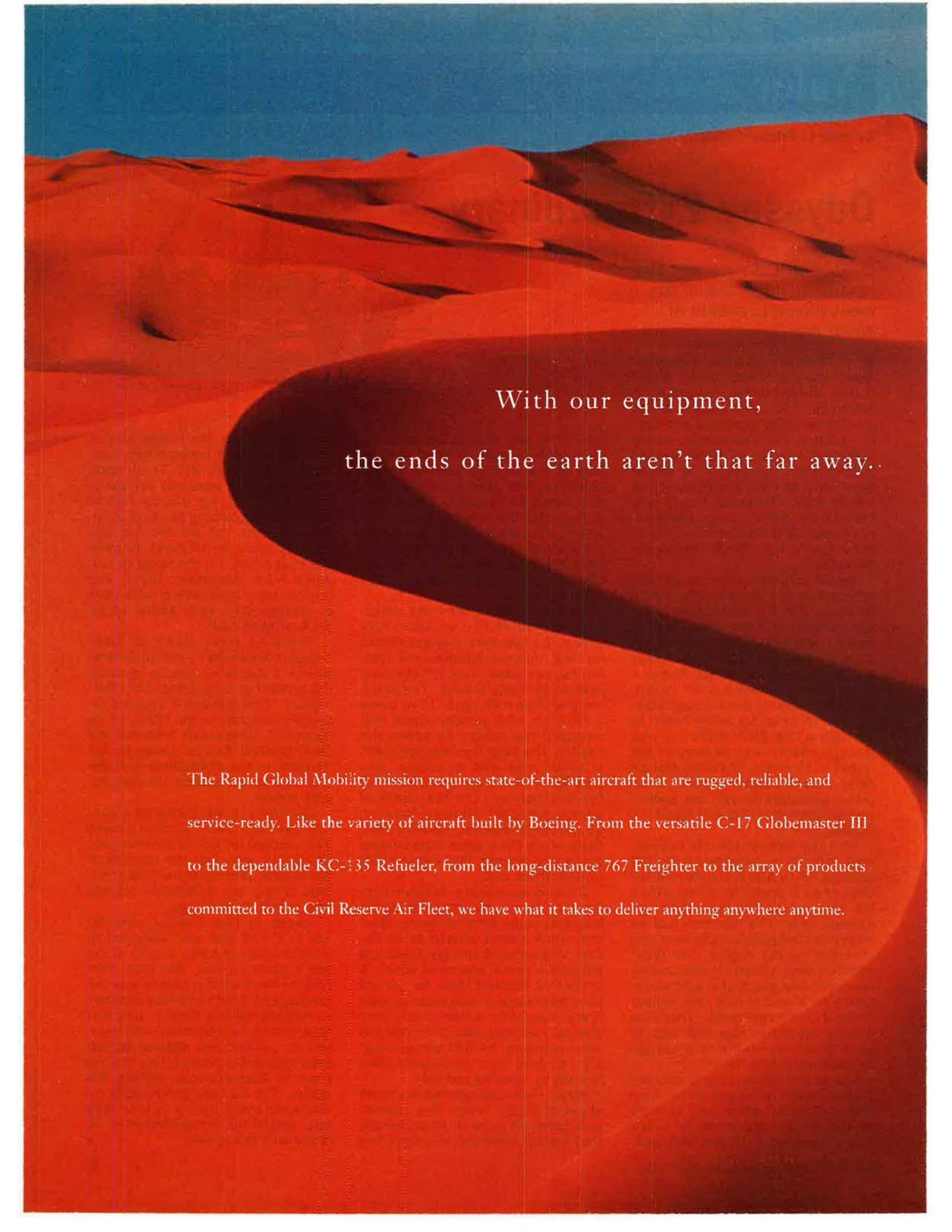
When *Ruth-Lee* reached the south shore of Timor, which they mistakenly believed to be in Allied hands, they hauled down the Japanese flag

and hoisted the Stars and Stripes that Gause had taken when Corregidor surrendered. They soon found out they were not yet out of the war zone. An enemy fighter strafed them, setting the boat afire. The two men put out the fire and plugged many bullet holes to keep the boat afloat. On the verge of collapse from starvation, thirst, and tropical sun—after several more days of sailing—they were picked up by an Australian boat.

The men were flown to Gen. Douglas MacArthur's headquarters, where a barefoot Gause saluted the general as he "reported from Corregidor." The general's amazed response was said to be, "Well, I'll be damned." Gause was awarded the Distinguished Service Cross for his heroism in the Philippines and the unprecedented escape through enemy waters.

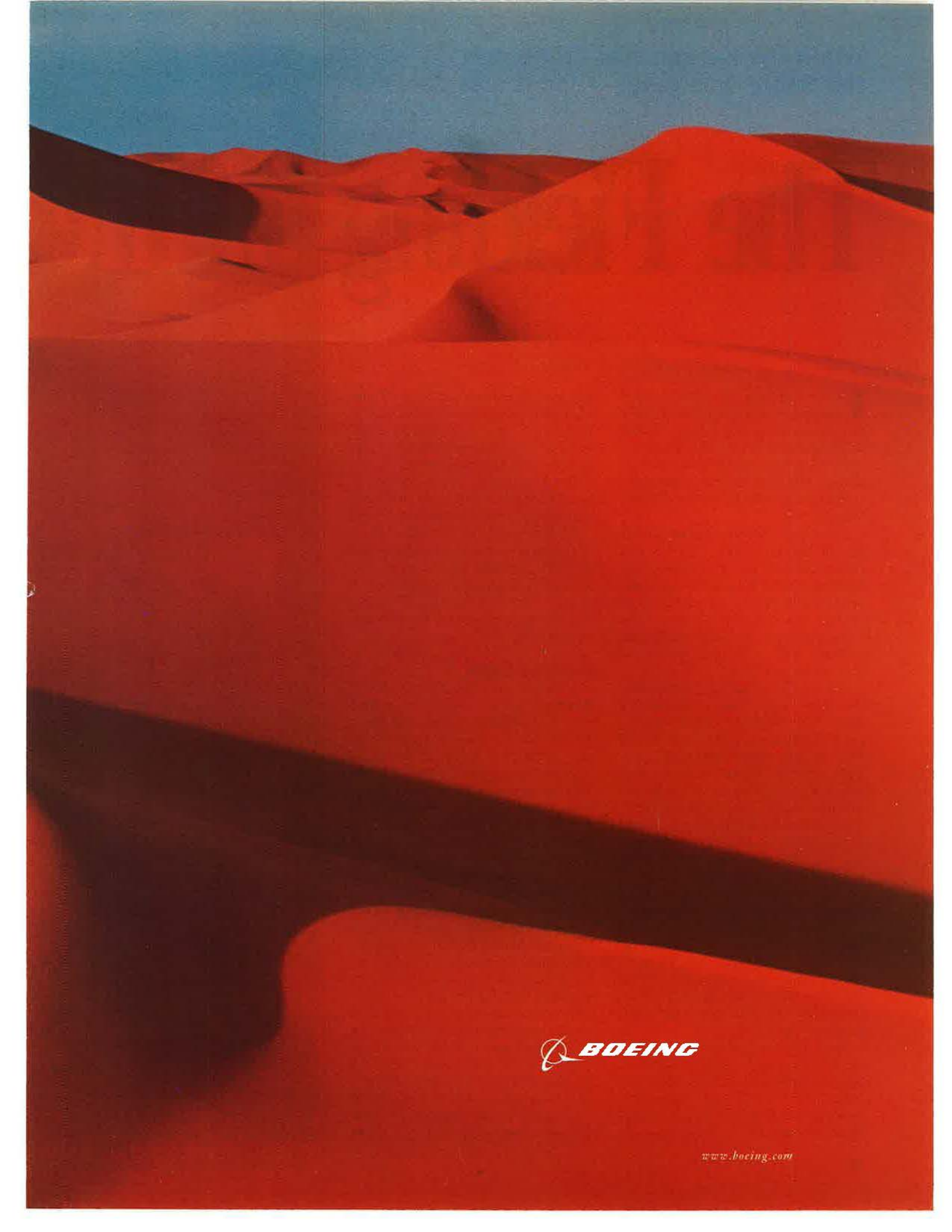
Returning to the States as a captain and war hero, Damon Gause was present for the birth of his son, Damon L., who has the account of the escape that his father had scribbled during the 3,000-mile voyage that lasted for 159 days.

Gause, by then a major, checked out in P-47s and was assigned to the European theater. In one of the war's great ironies, this man, who had survived what probably was the longest and most harrowing escapes in modern military history, was lost on a mission over Germany. His heroism in combat and against almost insurmountable odds during the escape to Australia must not be forgotten. The courage and tenacity he displayed more than a half-century ago should be an inspiration to all those who follow him. ■



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**When the Korean War broke out,
the Sabre was ready—and it was decisive.**

The Fielding of the

IN the summer of 1944, Allied bomber crews returned from their missions to Germany asking, "What was that thing? And where is ours?" The "thing" was the German Messerschmitt Me-262, the first jet-powered fighter to see actual combat in World War II.

The Allies did indeed have similar aircraft in the works. The US had flown several jet prototypes, and Britain had built an RAF squadron around its turbine-powered Gloster Meteor, but none of these unconventional fighter aircraft arrived in time to make much of a mark before the war ended in 1945.

Barely five years later, however, the story would be dramatically different. What the North American P-51 Mustang had been to World War II, the same firm's new jet-powered F-86 Sabre would become to the Korean War. In the battle for air superiority, it would be decisive.

It is remarkable that the F-86 appeared when it did, given the fact that it was being developed in a climate of postwar demobilization. In the aftermath of the defeat of Germany and Japan in 1945, the Army Air Forces were scrapping aircraft, canceling contracts, and operating on budgets that were, for the most part, inadequate. Getting the F-86 in the force took ingenuity, determination, and more than a little luck, but its time had come.

That the jet era did not arrive sooner was not for lack of technology. As early as the 1930s, Britain's Frank A. Whittle and Germany's Hans P. von Ohain both had developed gas aircraft turbine engines,

and manufacturers had begun to design airframes around them. Later, Italy, the United States, and the Soviet Union began experimenting with their own turbine-powered airplanes.

For a variety of reasons, however, none of these efforts had produced significant results by the mid-1940s.

In Germany, for example, much of the early work on unconventional aircraft centered on rocket power. Despite their impressive speed, rocket ships could fly for no more than a few minutes and often exploded during takeoff.

Fumbling Führer

Germany's more promising turbine-powered fighter project took a back seat when Hitler, thinking that airpower would give him a quick victory, ordered a massive buildup of conventional aircraft. When the Me-262 did begin to show promise, the dictator ordered it converted for bombing, a mission for which it had neither the range nor lifting power. The fighter version finally did reach combat but was too late to change Germany's fate.

Britain was more willing to explore new possibilities, but London could not afford to wait for long development programs to produce results. Early on, its main effort went to replacing the RAF's massive losses of Spitfires and Hurricanes, and work on jets was little more than a sideline.

Through much of the war in Europe, the US also played catch-up. In 1940, President Franklin D. Roosevelt called on US manufacturers to turn out 50,000 airplanes per year. Most development work concentrated



F-86

*North American test pilot George Welch
flies the XP-86 over Edwards AFB,
Calif., on its first flight Oct. 1, 1947.*

By Bruce D. Callander





USAF turned down the original XP-86 since it did not achieve 600 mph. It already had contracted for Lockheed's P-80, shown here at Furstenfeldbruck, Germany, in 1948, and Republic's P-84.

on improving existing aircraft and designing new ones along conventional lines. Like Britain, the United States had little time to exploit exotic technologies. What it needed in a fighter was enough range to escort bombers on missions deep into Germany. Jets were not the answer.

In the wide-ranging Pacific war, the situation was much the same until 1944. Then, the Allies began planning to invade Japan in late 1945, and the Navy invited manufacturers to provide jet-powered, carrier-based fighters for the purpose. North American's contender was the NA-134. The Navy ordered three prototypes in January 1945 and 100 production models in May. The same month, the AAF ordered three prototypes of a day-fighter/dive-bomber version to be known as the XP-86.

As the European war turned in their favor, the Allies took more interest in such jets, but, by then, their conventional fighters were more than holding their own, even against Me-262s. The German jets were about 100 mph faster but difficult to handle, and few German pilots had the experience needed to fly them. British and American airmen in prop-driven aircraft shot down more than 200 German jets.

The Navy still might have pressed for jets in the Pacific, but, after US B-29 bombers dropped two atomic weapons on Hiroshima and Nagasaki, the Japanese surrendered and plans for an invasion were scrapped.

While the World War II jets were too few and arrived too late to affect the outcome of the war, the next generation of jet fighters would have a lasting impact. However, it would take major aeronautical improvements, particularly in wing design, to make it happen.

The seeds had been planted during the war when not only North American, but Bell, Lockheed, Republic, and McDonnell all had developed jet fighters.

Except for their fuselages, however, all had been designed along the lines of the firm's conventional fighters. North American's XP-86, for example, had the wings and squared tail of the company's famed P-51 Mustang. Though impressive, it could not achieve the 600 mph speed that AAF wanted and was turned down. By then, the AAF already had contracted for Lockheed's P-80 and Republic's P-84, both of which could fly as fast as the proposed XP-86.

The Crossroads

Already lagging the competition, North American had the options of scrapping the project or risking the further delay of a long redesign project that might lead to something better. The firm had faced a similar decision in the early 1940s, when it was invited to produce Curtiss P-40s for the British. At that time, company president James H. "Dutch" Kindelberger and vice president/en-

gineer John Leland Atwood opted instead to design a better fighter. The result was the P-51, one of the all-time classic fighters.

Now, North American decided to take a similar risk. To improve the design of the XP-86, North American technicians pored over German studies that led to development of the unconventional Me-262. They were especially interested in identifying what had given the little German jet its remarkable speed, and they eventually fastened onto a single factor: its sweptback wings.

The war already was over when North American's aerodynamicist L.P. Green proposed to chief engineer Raymond Rice that a swept wing be incorporated in the XP-86 design. Atwood, who headed the design team, and Kindelberger bought the idea. NAA quickly built and tested, in September 1945, a 35-degree swept wing and submitted the concept to the services.

The Navy was not interested. However, Lt. Gen. Laurence C. "Bill" Craigie, the head of Air Force research and development at Wright Field, Ohio, said yes, deciding that the new aircraft would have a 35-degree swept wing, even though it would slow down the project by several months. His approval was made official on Nov. 1, 1945. Some aviation historians note this as the critical decision, one that transformed what had been a mediocre fighter into a truly dominating combat aircraft. By the following January, NAA had more than 500 engineers laboring at the F-86 project.

In one sense, it was an improbable time to launch an ambitious new aircraft project. The AAF was scrapping not only obsolete airplanes but many still in production. It was cutting forces and canceling weapons orders. The government now used its money to help defense plants convert to consumer products and veterans rebuild lives and careers. After more than four years of war, there was little support for large peacetime military programs.

In another sense, however, the climate was favorable for bold new ideas, particularly in the field of aviation. By their sheer numbers, conventional aircraft had given the Allies air superiority in World War II, but even in its primitive state the Me-262 had convinced air leaders

that prop-driven airplanes soon would be obsolete.

Earlier Work

Moreover, much of the ground-work for a jet-powered force already had been laid during the war years, when funding was no problem. Interest was not confined to fighters. In the fall of 1943, Boeing had begun to design a jet bomber similar to its B-29 and, late in the war, had drawn on the German studies and adopted the swept wing. By then, North American also was working on a tactical jet bomber design that would lead to the B-45.

As the war ended, AAF Chief of Staff Gen. H.H. "Hap" Arnold and his successors, Gens. Carl A. "Tooe" Spaatz and Hoyt S. Vandenberg, pressed for modernization of the inventory. Barely three months after the war's end, Arnold created the office of Deputy Chief of Staff for Research and Development and made Maj. Gen. Curtis E. LeMay its head. If the Air Force could have only a few airplanes, argued the airmen, they should be state-of-the-art machines, not wartime leftovers.

W. Stuart Symington, assistant secretary of war for air (later the first Air Force Secretary), asking Congress to fund the new weapons quickly, reminded the lawmakers that "not one airplane whose development started after Pearl Harbor was ever used in combat."

The leaders also cited another prob-



USAF via Warren Thompson

Work continued on a revamped XP-86, shown here during early flight tests with a North American B-45 jet bomber as chase plane. On April 26, 1948, the XP-86 broke the sound barrier—traveling at Mach 1 in a shallow dive.

lem. The aircraft industry that had mushroomed during the war had not yet found a peacetime market to serve. The expected boom in commercial travel and private flying did not materialize, and, without military orders, this production base could wither away.

President Harry S. Truman also was concerned about the aircraft manufacturers for another reason. With some 12 million discharged servicemen looking for work, he was not eager to see thousands of aircraft workers suddenly unemployed as well.

Truman appointed a commission

headed by Thomas K. Finletter (later the second Air Force Secretary) to study the matter. Its report, titled "Survival in the Air Age," recommended a 70-group Air Force with 8,000 modern airplanes. At about the same time, a Joint Congressional Aviation Policy Board advised a similar course, and Congress eventually approved funding for the 70-group force. Meanwhile, the Soviet Union was not only pursuing an aggressive course in Europe but developing new weapons, including jet aircraft. Western intelligence learned that, less than a year after V-E Day, Stalin had called for production of a high-speed, lightweight fighter. Russian designers, like North American's officials, had drawn on the German swept wing design (and British engine technology) to sketch out what would become the MiG-15. Several American champions of a strong air arm were quick to sense the threat.

Such events, though they did not guarantee production of large numbers of aircraft in the postwar era, did help keep alive the development of the F-86. On Aug. 8, 1947, barely two years after North American had won the prototype contract, the company completed the first XP-86 at the company's Inglewood, Calif., plant. From there, contractor personnel trucked the aircraft to a remote desert test facility, Muroc AFB, Calif.

The first flight of the XP-86 came on Oct. 1, 1947, at Muroc, with the



John Henderson via Warren Thompson

The Sabre began to enter the operational force in 1949. Here F-86s clog the deck of USS Cape Esperance on their way to Japan and Korea in November 1950. Once there, the revolutionary design would dominate.



USAF pilots flying the Sabre in Korea claimed victory over 792 MiGs. Here Capt. James Jabara talks with the media after his fifth and sixth kill in May 1951. Jabara became history's first jet-to-jet ace.

aircraft piloted by George S. "Wheaties" Welch, a North American test pilot and World War II ace. Government officials were impressed with its flying capabilities and rushed to order it. By the end of the year, contracts had been signed and work had begun on the first batch of 33 production models, which were called F-86As.

A series of flight tests of the prototype continued into 1948, with a high degree of success. That spring the XP-86 prototype became the first US fighter to break the sound barrier when, on April 26, 1948, it exceeded Mach 1 in a shallow dive.

Less than a month later, on May 20, the first production model F-86A was test flown. The first two production models were accepted on May 28. On Sept. 15, 1948, Maj. Richard L. Johnson recaptured the world speed record for the US, flying an F-86 over a three-kilometer course at Muroc AFB, at 670.981 mph.

By 1949, after more months of testing, the new fighter began to enter the operational force. The 1st Fighter Group, located at March Field, Calif., was the first unit in USAF to receive the new aircraft, with the 94th Fighter Squadron taking delivery of its first model in February 1949. The Group's 71st Fighter Squadron soon followed, and in March 1949, the airplane officially got its name, "Sabre."

Fortunately, the swept wing F-36 was now catching up with the other

jets and starting to mature. The Air Force initiated full-scale production and, by the end of the decade, had enough of the new fighters to equip three stateside fighter groups, the 1st, 4th, and 81st. The F-86As were purchased in three big batches during 1947, 1948, and 1949. All told, USAF procured 554 production models, with delivery of the last coming in December 1950. By that time, however, the Sabre was fully engaged in combat.

In June 1950, the forces of North Korea attacked south of the 38th Parallel, and the US joined other United Nations members in a "police action" that soon escalated into a full-blown war. USAF's Far East Air Forces supplied F-80s, P-51s (officially designated F-51 in 1948), and F-82s mainly as fighter bombers.

Enter the Sabre

In November, P-51s attacking an airfield just south of the Yalu River were jumped by Chinese pilots flying new jet-powered MiG-15s. Even the USAF F-80 jet fighter was 100 mph slower than the MiG and inferior to the Russian fighter in direct combat. To counter the new threat in Korea, the Air Force moved the

F-86s of the 4th Fighter Group from the US to Kimpo AB near Seoul. Within days, the Sabre pilots had downed their first MiGs. Other Sabre units followed, and before long, USAF was claiming a 14-to-1 kill ratio and crediting the F-86 for most of the victories.

That estimate may have been overstated, but there's no question that the Sabre's work in Korea was extraordinary. USAF pilots flying the F-86 claimed a total of 792 MiGs, while only 78 Sabres were reported lost throughout the war. This victory ratio established the Sabre as one of history's best fighters, ranking with the Sopwith Camel, the Spitfire, and North American's own P-51 Mustang.

To this day, aviation buffs debate whether it was the airplane that made the difference in Korea or the superior skill of its pilots. It's true that many Sabre pilots came to Korea with World War II victories to their credit and that, at least early in the war, most of the MiGs destroyed were flown by inexperienced North Koreans. It is also true, however, that many US pilots fresh out of flight school faced veteran airmen from China and the Soviet Union. The relative merits of the two aircraft are equally debatable, but, for whatever reason, the Sabre emerged as the undisputed champion of that war.

Through the 1950s, the installation of bigger engines boosted the Sabre's speed, and air refueling gear extended its range. It served as a workhorse for Tactical Air Command and Air Defense Command, flew with the Reserve and the Air National Guard, and entered the inventories of numerous foreign air forces. In all, North American produced 6,231 Sabres for the Air Force.

It was the Sabre's record in Korea, however, that established it as the premier fighter of its generation and its pilots as a match for any pilots flying in first-line Soviet aircraft. The Cold War would continue, but the Korean experience caused the Soviets to think twice before again testing the Air Force. ■

Bruce D. Callander, a regular contributor to Air Force Magazine, served tours of active duty during World War II and the Korean War. In 1952, he joined Air Force Times, serving as editor from 1972 to 1986. His most recent story for Air Force Magazine, "Air Force Training on the Move," appeared in the August 1997 issue.

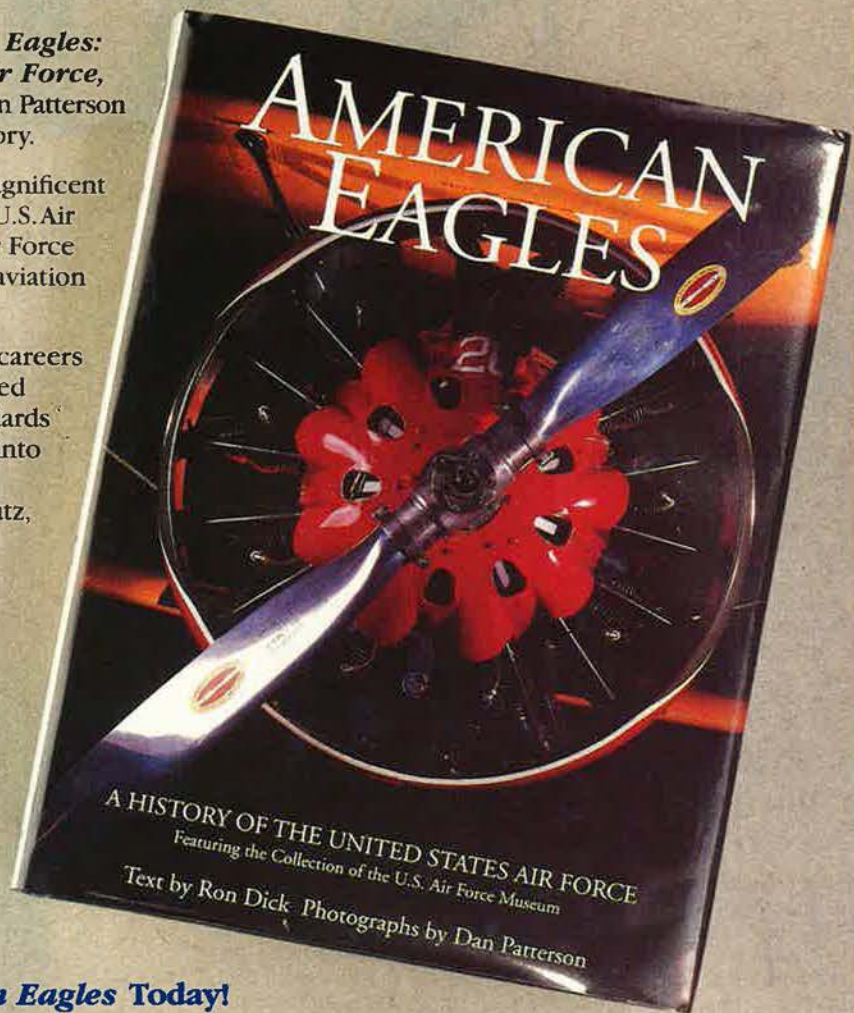
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Here are the estimates of what the Allies will pay.

The Cost of NATO Expansion

How much will it cost to incorporate Poland, Hungary, and the Czech Republic into NATO's defense structure? That shapes up as one of the more heated US security issues of 1999.

In July, NATO's 16 members, backed by the Clinton Administration, invited those three nations to join the Alliance. However, Sen. Jesse Helms (R-N.C.), head of the Senate Foreign Relations Committee, warned that Congress may balk unless Europe agrees to foot most of the bill for expansion. Europeans aren't happy about that, to put it mildly.

No one really knows what the cost will be. In the US, the debate focuses on three principal estimates produced by the Defense Department, Congressional Budget Office, and RAND Corp. Each developed an estimate for enfoldng new members in a "strengthen and reinforce" security setup.

A comparison of the results, in terms of total NATO costs, can be expressed as follows:

DoD: \$31 billion through 2009.

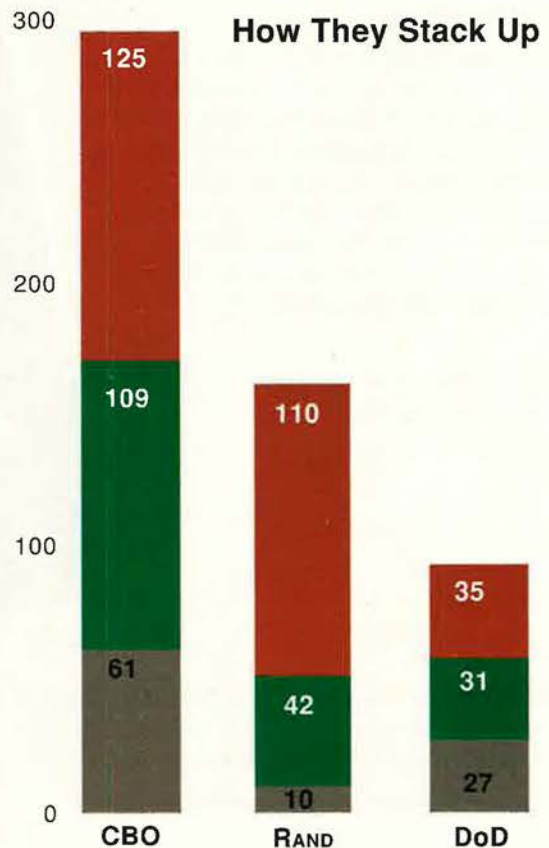
RAND: \$42 billion through 2010.

CBO: \$109 billion through 2010.

Such wide variations in estimates among reputable analysts concern many lawmakers. NATO this month will complete a new cost study of its own, one that may help clarify the issue.

Proponents of expansion make this point: Collectively, the countries that make up NATO spend \$440 billion a year on defense, meaning that even robust expansion would raise military budgets by only one to two percent.

Even so, the issue of cost and cost-sharing figures to be politically explosive. Adding new members to NATO requires Senate ratification, and both chambers of Congress will have to approve resources to carry out any US portion of expansion costs.

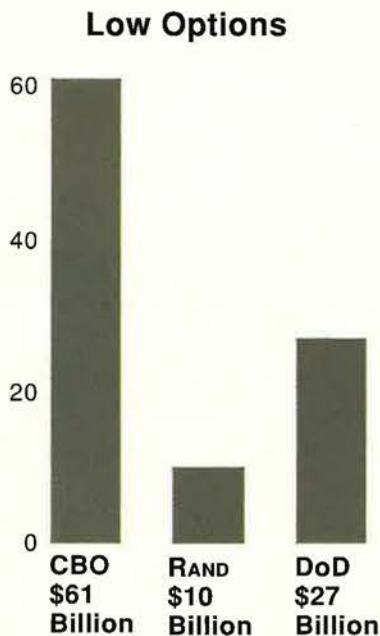
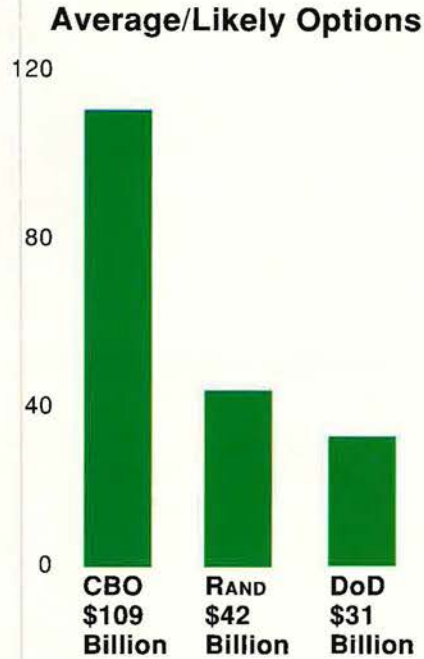
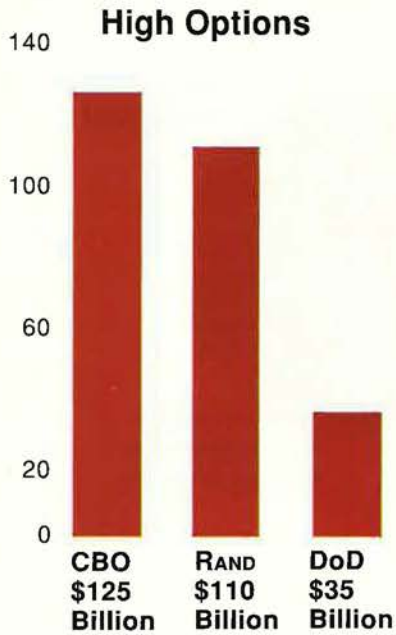


Key Assumptions

Study	New Members	End Year	Planning Threat	Eastern Reinforcement Force
CBO	Poland, Hungary, Czech Rep., Slovakia	2010	resurgent Russia	11.5 tactical fighter wings 11.7 heavy/mechanized divisions
RAND	Poland, Hungary, Czech Rep., Slovakia	2010	low overall threat	10 tactical fighter wings 5 heavy/mechanized divisions
DoD	Four unspecified	2009	low overall threat	6 tactical fighter wings 4 heavy/mechanized divisions

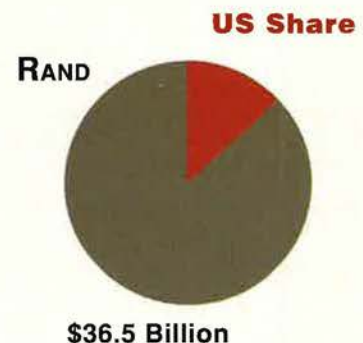
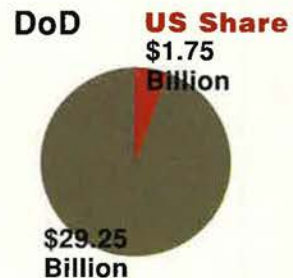
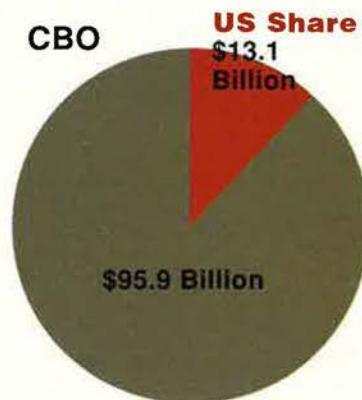
The Three Estimates

Each study gave a range of cost estimates, which can be expressed as low, high, and "average" or "likely." This article focuses on the midrange options. (DoD's midrange option is expressed as an average of the low and high ends of its range.) RAND and CBO midrange estimates correspond to DoD's postulated defense strategy, which envisions reinforcement of new nations in a crisis with air and ground forces. Each study's assumptions are as stated in the chart. As can be seen, the CBO midrange estimate exceeds the other two by a wide margin, mostly because it assumes a larger Russian threat. Overall, the three studies show little agreement, though the DoD and RAND studies are the most similar.



The American Share

According to DoD, the US would pay a total of only about \$1.5 billion to \$2 billion over 10 years. Both RAND and CBO believe that figure is understated. CBO foresees higher US costs stemming from the need for a much larger and more robust infrastructure, particularly air bases, in the new NATO nations to the east.

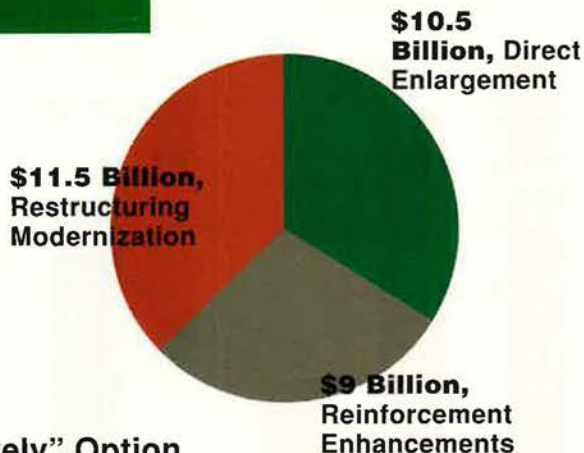


US Costs, in Constant 1997 Dollars

Study	Low Option	Average/Likely Option	High Option
CBO	13.1 billion	13.1 billion	13.1 billion
RAND	5 billion	5.5 billion	6 billion
DoD	1.5 billion	1.75 billion	2 billion

What It Pays For

All three studies divided costs into three basic categories, shown here. Substantial US funding would come into play only for "direct enlargement" costs, which would be financed with increased member contributions to NATO common funds. The financing of virtually all of the other two categories would fall almost exclusively to Allies in Europe and Canada, according to the Pentagon cost study. Specific cost elements are listed in the box below.



Cost Shares, DoD's "Average/Likely" Option

Billions of Constant 1997 Dollars

Category	New Members	Non-US Members	US	Total Cost
Direct enlargement	\$3.75	\$5.0	\$1.75	\$10.5
Current member reinforcement enhancements	\$0.0	\$9.0	\$0.0	\$9.0
New member restructuring, modernization	\$11.5	\$0.0	\$0.0	\$11.5
Total	\$15.25	\$14.0	\$1.75	\$31.0

DoD Plan's Specific Cost Elements

New Members: Military Modernization and Restructuring

- Increased proficiency in individual and unit training
- Modernization of 25 percent of planned ground force divisions
- Procurement of refurbished I-HAWK type, wide area SAM systems
- Procurement of refurbished Western combat aircraft
- Modernized ammunition for air and ground forces
- Modernized ammunition storage for air and ground forces

Current European Members: Reinforcement Enhancements

Deployable logistics sustainment that includes engineering, transport, test and repair equipment, mobile logistics, special operations units gear, medical unit equipment, liquid oxygen equipment generators, and specialized fire-fighting equipment, sufficient for:

- three allied land divisions
- five allied fighter wings

Collective NATO: Direct Enlargement Activities

- Refurbishment and renovation of headquarters facilities
- Communications and intelligence links to forces
- Military education
- Air sovereignty operations centers
- Air command and control for initial capability, such as radar
- Air C² costs for mature capability, such as weapons engagement
- Logistics equipment, such as common fuel nozzles
- Staff-level planning for host nation support
- Compliance with NATO standards, interoperability in logistics
- Collocated operating bases to host reinforcing wings
- Compatible/interoperable fueling facilities
- Road and rail upgrades
- Staging areas for ground reinforcements
- Fuel storage/distribution infrastructure for reinforcing units
- Transportation and O&M for exercises due to enlargement
- Upgrades to exercise facilities to NATO needs and standards
- Port upgrades

AFPC is downright bullish about force stability and the rise in promotion rates for officer and enlisted alike.

Report From the

Personnel Center

By Suzann Chapman, Managing Editor

THE drawdown is not really over—not for the Air Force. End strength reductions continue. In fact, the Pentagon's Quadrennial Defense Review slapped USAF with an active personnel cut larger than any imposed on the other three military services. DoD ordered the Air Force to eliminate 26,900 troops but sought only 18,000 from the Navy, 15,000 from the Army, and 1,800 from the Marine Corps.

Even so, Air Force personnel specialists say that the drawdown's effect isn't nearly as harsh as in previous years. The force experienced no involuntary exits in either Fiscal 1996 or 1997. Air Force Personnel Center officials at Randolph AFB, Texas, predict that Fiscal 1998 cuts, though perhaps more extensive than first anticipated, can be met with volunteers and normal attrition. What's more, AFPC is downright bullish about force stability and the rise in promotion rates for officer and enlisted alike.

AFPC officials realize they have a key role in dealing with what is seen as a major danger for the Air Force: the escalating loss of its pilots and navigators. Pilot retention is the No. 1 personnel problem right now, said Maj. Gen. Susan L. Pamerleau, head of the 1,500-member AFPC.

High Promotion Rate

Still, there are many bright spots. For example, this year marked a return to the 90 percent promotion rate for captains looking to enter the field grades. In Fiscal 1997 the Air Force not only promoted more officers to major than it had since 1991 but also promoted more pilots than it had since 1985.

For all new captains, the good news will continue as

the service plans to leave the promotion rate at 90 percent into the foreseeable future.

This marks the beginning of an era of some stability, stated AFPC officials. There are smaller year groups entering the promotion zone to major.

The Air Force decided to leave the rates for promotion to lieutenant colonel and colonel at their drawdown levels. In 1991, it dropped the rate for promotion to lieutenant colonel from 75 percent to 70 percent and to colonel from 55 percent to 50 percent. The rates will remain at the lower levels for some time, according to AFPC officials.

Despite the growing pilot shortage, officials stated that promotion boards continue to look for the best qualified officer regardless of career field. AFPC analyzes how rated and nonrated officers fare in the process but does not levy percentage quotas based on those numbers.

As a concession to the hardships caused by high operations tempo, which seems to affect rated officers disproportionately, the service did mask the academic degree level for the March 1996 majors board. In effect, USAF told the board members to ignore whether a captain had obtained a master's degree or not. Many rated officers of recent years have been too busy to pursue such academic credentials.

AFPC officials stated they found no negative impact as a result of masking the degree information. Their analyses showed that it did not significantly impact overall selection rates. The 1996 selection rate for pilots was 75 percent, compared to 74 percent in 1995 and 77 percent for 1993 and 1994 boards. For nonrated line officers, the rate was 72 percent in both 1996 and 1995,

exceeding the 71 percent rate for the 1993 and 1994 boards.

Air Force officials, commenting on the high quality of the force these days, noted the high caliber of officers who do not win promotions these days. The quality, they say, is nothing short of "unbelievable."

Pamerleau emphasized that the promotion good news extended in particular to noncommissioned officers. "We have never had as high a promotion select rate as we've had this year—highest in 10 years," she stated.

As with the officer corps, the Air Staff sets the enlisted promotion quota. The difference, though, is that the Air Force promotes within its enlisted force based on an equal distribution among enlisted career fields, with rare exceptions. There is a chronic critical skills list which AFPC officials said gets just a tiny fraction more promotions.

AFPC closely watches the enlisted promotion opportunity selection rate to ensure that it doesn't get too high and impact quality. However, they said the rates will continue to "shoot through the ceiling" in Fiscal 1998 as they did in Fiscal 1997—a sign of increasing stability in the force.

AFPC officials maintain that, under the Weighted Airman Promotion System (used for promotions to staff, technical, and master sergeant), the individual controls 75 percent of the elements that go into promotion consideration. The only two areas outside their control are time in grade and time in service.

To help a member who may be retraining into another career field, USAF in 1996 began to use his or her Promotion Fitness Examination score twice, rather than forcing the Air Force member to take a Speciality Knowledge Test.

In another change, senior NCOs benefitted from the fact that there are now two chief master sergeants and only one colonel on promotion boards for the top two enlisted grades.

According to CMSgt. Gregory Haley, chief of the AFPC Enlisted Promotion and Military Testing Branch, USAF's goal is to ensure that the enlisted promotion system is "visible, understandable, and acceptable."

Progress in Assignment Systems

Those same words could apply to the Air Force assignment system. AFPC is pushing toward simpler, faster, more accessible assignment processes for both officer and enlisted members.

There are currently eight different ways for officers to volunteer for assignments. The largest number of officers do so by using the Internet. In fact, AFPC estimates that about 70 percent of officers now volunteer for assignments via the World Wide Web.

In its first Officer Assignment System review in 1996, officers expressed the need for more information and more voice in the process. Since then, AFPC has made the Web volunteer process more informative and accessible. Not only can an officer volunteer online, but the officer's current commander can include comments, which the officer can read, and the gaining commander can, with a few keystrokes, review information on all eligible and qualified volunteers.

AFPC plans another OAS review in the near future.

The establishment of the Enlisted Quarterly Assign-

ments Listing in 1992 went a long way toward opening up the process for the enlisted force. AFPC releases EQUAL four times each year through the base military personnel flights and now also puts it on the Web. Air Force officials said that, in one quarter, the EQUAL Web page will get more than 90,000 hits.

AFPC officials said the system is working well. They maintain that the cornerstone of the business is equity—sharing of good and bad assignments. Someone may not want to volunteer for an overseas assignment. However, since some 70 percent of all Air Force enlisted members eventually go overseas, officials noted it's wise for individuals to keep their preferences current.

As the drawdown continues, the question looms: Will the Air Force have to institute another round of involuntary separations and retirements? Officials at AFPC do not think that will be the case, given the large number of personnel who came on during the buildup years and now become eligible for retirement.

However, they are concerned at the high cost of some of DoD's drawdown tools. They are expensive to implement. "In the early part of the drawdown we were not as concerned as we are now with the cost," stated Lt. Col.

The Consolidation Move

Faced with the DoD-wide mandate to cut its civilian personnel function by half, the Air Force decided to fall back on its many years of experience with centralized handling of military personnel. It consolidated its military and civilian personnel functions.

AFPC chief Maj. Gen. Susan L. Pamerleau took special note of the consolidation and its ongoing streamlining measures, which fall under a program called Palace Compass. "We had all this infrastructure, and the civilian career management folks were just down the street so it made a lot of sense to consolidate," she said.

In 1963, USAF created Air Force Military Personnel Center to perform tasks that it is now doing with Palace Compass, explained the general. These, she said, are "the kinds of things that allow us to do centralized counseling or centralized payment information."

"For instance, if someone wants to retire, they can call up on an 800 number, and they can get a retirement calculation," she added. "There are a variety of things they can do just by using the automated voice system—24 hours a day."

The Air Force now has centralized hiring authority. Instead of using the lengthy old Standard Form 171s, AFPC takes a resume just as would a private business. "We scan it in using commercial off-the-shelf software, which matches skills, education, and experience—what used to take about 45 days now takes about nine days," said Pamerleau.

AFPC is also investigating a consolidated assignments approach for civilians and officers in certain career fields, such as the Office of Special Investigation and Public Affairs—fields where civilians and military officers often perform the same type of work.

One of the major undertakings is to regionalize civilian personnel services under the Directorate of Civilian Personnel Operations at AFPC. The Randolph center will handle centralized staffing and classification (for bases with 500 or fewer employees) programs, benefits and entitlements, such as insurance and retirements, and maintain the Official Personnel Folders. Each base will retain a civilian personnel flight to provide management advisory services and to coordinate skills training and off-duty education, among other actions.

Dean Sandmire, chief of AFPC's Retirements and Separations Division.

For example, he said, the Temporary Early Retirement Authority is a mixed blessing. In the long term, costs will be lower because those individuals will draw less money in terms of military retirement pay. In the short term, the services have to put the money to fund the X-number of years short of 20 into a separate pot to pay separation costs. It comes out of the current year's spending—not the regular retirement account.

"TERA in the current year is not cheap for the services to execute," said Sandmire. "It saves money in the long run, but that first year is expensive."

Early in the drawdown, Congress provided extra funding for TERA and other drawdown tools, like the annual payments and lump sum packages. Now, Congress asks the services to work the programs first.

Pilot Predicament

For all the good news, the pilot problem is never very far from the minds of AFPC officials. They have crafted a number of steps to help bring the situation under control.

For example, the Air Staff and AFPC have mandated a 100 percent fill-rate for all line fighter pilot combat and training positions. AFPC may also overfill these positions, if needed, to maintain the necessary experience levels.

Overall, the service is reducing the number of rated positions it has traditionally maintained on Air Staff and major command staffs. For fighter pilots, Pamerleau stated, manning for major command and other agency staff jobs had already been reduced to 75 percent and would go down to 69 percent.

Unfortunately, that can act as a career disincentive for many fliers who have been brought up in the Air Force tradition that to get ahead an individual must follow a standard career progression which includes the requisite staff jobs. Other fliers may relish the chance simply to stay in the cockpit.

Taking older pilots and navigators out of staff jobs and putting them back in their aircraft is a short-term solution. It is one that, unfortunately, creates additional problems later on.

The Air Force has for years told its rated crew members that they can't fly forever. Now it must reverse that education process and assure them that they will not be passed over during promotion reviews.

In the case of fighter pilots, according to Col. Fred Wall, chief operations officer in AFPC's Assignments Division, the service now confronts a deep dip in pilot numbers—a "bathtub" that it simply can't fill—even by returning older pilots to the cockpit.

One of the problems with downsizing in general, explained Wall, is that you can't just cut from the bottom. A typical F-15 fighter wing has 60 percent inexperienced and 40 percent experienced pilots. If a base closes tomorrow, he said, those 60 percent inexperienced pilots could go no place but to another F-15 wing. The 40 percent are easily placed into instructor slots, staff jobs, or even other aircraft.

In the long run, he said, cutting exclusively from the bottom reduces the service's ability to absorb new fighter pilots into the system. When USAF reduced its primary

aircraft authorized in a squadron from 24 to 18, it cut its absorption rate. "I can take fewer fighter pilots into the force because I don't have iron on the ramp, I don't have airplanes to put them into," stated Wall.

The only way to make things come out right is to take that base-level cut, and cut everything above it, too, he added. That's the difficult part.

Trimming Headquarters Staffs

Faced with a growing shortage of rated officers, the Air Force is cutting its headquarters staffs and changing the way it views operational staff jobs, many of which traditionally required wings. This is a move that's carrying its own "good news/bad news" effect, according to Wall.

On the positive side, shifting staff jobs from pilots to other operational fields is in sync with USAF's avowed plan to shift from being an air force to an air and space force and then a space and air force.

"We don't necessarily need all fighter pilots working in XO," he said. "We need people who understand command and control, or space and missiles."

The change is not something the Air Force can simply carry out overnight, he added. Each career field has operated with a set number of jobs to fill. "It will take a little time to get the force balanced the way we want."

And, even with elimination of some staff jobs for fighter pilots, the bathtub will still be hard to fill. Other measures are needed.

For instance, the Air Force is taking unprecedented numbers of "late-rated" officers into pilot training.

These are officers who could not get into pilot training during the early drawdown years because of the pilot excess but still meet age and other requirements. This is not a new program, but the numbers have been "a trickle compared to now," said Wall. "This is the right thing to do for those kids who went through college thinking they were going to fly, then couldn't."

However, the service cannot simply open the valve on pilot production. "People don't realize it's a six, seven, or eight year process," explained Wall.

That process entails balancing various estimates based on the number of pilots currently required, predicted end strength, and attrition rates. During the height of the drawdown, when it still had an excess of pilots, the service cut back on recruiting qualified pilot candidates into the Air Force Academy and ROTC programs and went instead for more scientists and engineers.

"You're dealing with so many unknowns, because you're dealing so far in the future," said Wall.

For fighter pilots, the problem is compounded by unevenness in requirements. Even as the force in general shrank, USAF had no reduction in its remote overseas needs. In fact, given the large number of peacekeeping actions around the world, the requirement has actually grown.

The percentage of CONUS pilots going to overseas remote assignments has gotten out of whack, stated Wall. As a result, in the case of an F-16 pilot, the Air Force can't forward that pilot's name for a particular career building job the pilot might want to apply for. "We have such a high draw out of that career field that we need to keep rotating them through short tour locations," he said. "That becomes very frustrating for the pilot." ■

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The B-47 first flew 50 years ago this month. Its influence went far beyond its military role. A whole host of airliners followed its basic design characteristics.



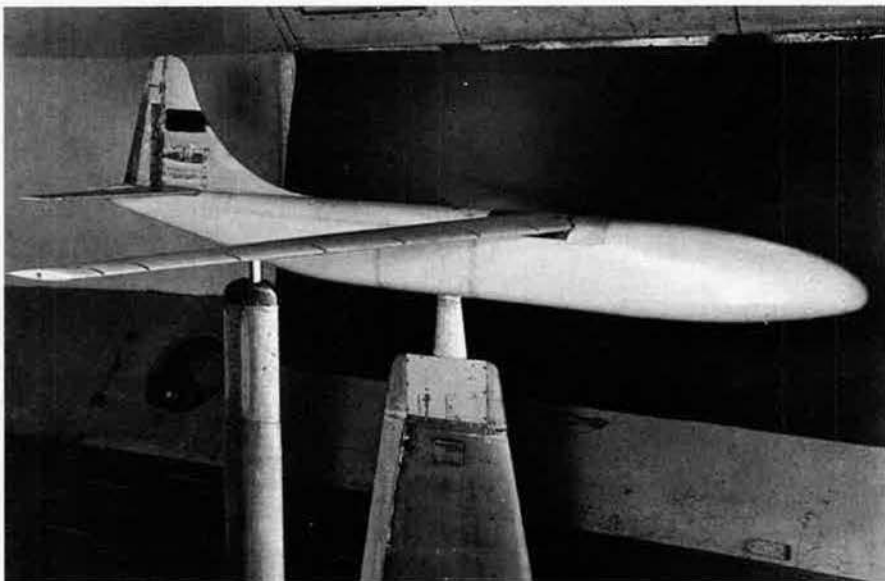
The Long Reach



By Walter J. Boyne

of the Stratojet

Displaying the characteristics that defined a half-century of aircraft, a Lockheed-built Boeing B-47E Stratojet banks its swept wings as its pod mounted jet engines pour out the power. The aircraft markings are typical for the later period of B-47 service.



The future for both civilian and military jet aircraft takes shape in the form of swept wings tested in December 1945 on this wind tunnel model. The smooth body and tail, typical of a B-29, were incidental to the tests.

THE Air Force's B-47 bomber was radically new in design, a sleek, swept-wing beauty built with all the expertise that Boeing had acquired in World War II and inspired by the latest and best in American and German technology. Unlike previous aircraft, the new bomber was powered by six jet engines. The Stratojet, whose first flight was made 50 years ago this month, was the most influential multijet aircraft in aviation history.

Gen. Curtis E. LeMay, commander of Strategic Air Command, seized on the B-47 to endow SAC with awesome power, equipping no fewer than 28 bombardment and five strategic reconnaissance wings with the new long-range aircraft. No one who has witnessed the take-off of a wing of 45 B-47s will ever forget the sight of the powerful aircraft rolling down the runway, one after the other, separated only by seconds, seeming to take forever to lift off and then vanishing swiftly in the distance.

At the time of their debut, and for years afterward, the B-47s formed the most powerful bomber fleet in the world, each bomb bay packed with explosive force equivalent to scores of thousands of tons of TNT. Faster than most fighters at operational altitude and with global range provided by in-flight refueling, the bomber confronted the Soviet Union with a virtually insoluble defensive problem.



The future unveiled. In this early press release photo, Boeing's "radical" XB-47 Stratojet faces a partially completed B-50, the last propeller-driven bomber delivered to the Air Force.

The Progenitor

Had it done nothing more than serve in its military deterrent role, the B-47's place in history would be secure, but the aircraft's basic design characteristics were so fundamentally sound that they dominated the aviation industry for decades. Its combination of cylindrical fuselage, swept wings, and podded engines would be adopted not only by tankers and the next generation of bombers but also by most of the world's commercial jet transports.

The basic B-47 design was translated directly into the KC-135 tanker

and the Boeing 367-80 prototype. The latter led to a series of epoch-making 707 airliners, which in turn spawned all of the follow-on aircraft from the 727 to the 777 that have made Boeing an industry giant. The B-47's basic formula was also seen in the designs of other US and foreign manufacturers, including the Convair 880/990, the Douglas DC-8, and the European Airbus Industrie series.

The B-47 was an enormously flexible aircraft. Over the first decade of the Cold War, as Soviet defenses improved, so did B-47 tactics. The B-47 was created to be a high altitude penetrator, but later its pilots embraced low-level "oil burner" tactics to slip under radar. Low-level tactics included the "pop-up," which featured a low-level run-in followed

by a quick pull up to 18,000 feet. After bomb release, the aircraft would turn sharply and dive for the ground.

Pilots reached an extreme with what was called the low altitude bombing system maneuver. Like the pop-up, the LABS also featured a low-level run-in, but this time it was followed by a pull up into a half loop, with the nuclear bomb released at the quarter-loop point. The aircraft would continue with the half loop, rolling out in an Immelmann turn, then dive away.

LeMay flaunted the B-47's power as a matter of policy, sending it on

record-setting missions, operating it from overseas bases, and taking every opportunity to make clear to the Soviets that the US possessed an unparalleled offensive nuclear force and would use it if necessary.

Spurred by the Suez Crisis of 1956, SAC demonstrated its ability to launch a large strike force on short notice. In a two-week period, more than 1,000 B-47s were flown on nonstop simulated combat missions, averaging 8,000 miles each, over North America and the Arctic.

In 1958, SAC's B-47 strength peaked with 1,367 bombers (in 28 wings) and 176 RB-47s in service. These two aircraft fleets were reinforced by 380 jet-powered B-52s, 22 aging Convair B-36s, and a mixed fleet of 780 KC-97 and 182 KC-135 tankers. The mix changed as newer aircraft and missiles entered service, but the basic premise remained the same: The US would use SAC's strength and proficiency to contain the Soviet Union and blunt its policy of expansion.

As the fleet grew, the Air Force's requirements expanded. Fortunately, the basic design was versatile, lending itself to no fewer than 38 variants, ranging from the XB-47A prototype through the "standard" B-47E bomber to tankers, electronic and photographic reconnaissance models, missile carriers, drones, and weather birds. It even served in Vietnam as a communications relay aircraft.



Steve Richards via Warren Thompson

A B-47 and F-94 fly into Ladd AFB, Alaska, in 1951. In 1958, SAC's arsenal of the versatile B-47 peaked at 1,367 bombers in 28 wings and 176 reconnaissance models. In all, there were 38 variants.

Still, the B-47's creation was filled with uncertainty, and, in its early years, its promise was almost overshadowed by its problems.

Remarkable Requirements

In June 1943, alert to the strong possibilities of turbine power, US Army Air Forces asked several manufacturers to produce designs for a multijet aircraft. On Nov. 17, 1944, a formal requirement was issued for a jet-powered medium bomber with a maximum speed of 550 mph, a range of 4,100 miles, and a service ceiling of 45,000 feet. These were

remarkable requirements; the respective figures for the B-29, which was just being proven in service, were 358 mph, 3,500 miles, and 31,850 feet.

Boeing went through a long series of design studies, but the critical breakthrough came when George Schairer, Boeing's chief aerodynamicist, analyzed German research on the swept wing and asked that it be applied to the XB-47. The resulting tests showed such promise that a nearly \$10 million contract for two prototypes was issued.

More than two years of design and production effort followed, with the prototype aircraft emerging from the factory on Sept. 12, 1947. It was unlike anything ever seen before and represented a total departure from Boeing practice. Its slender, flexible, laminar-flow wing was swept back 35 degrees and drooped under the weight of its structure and six engines. The 3,750-pound-thrust General Electric J35 engines were installed three on a side, two in-board engines suspended in a streamlined pod, with the outer engine faired tight beneath the wing. The wing was too thin to contain either fuel or landing gear. The streamlined fuselage was marred by only a few bumps and was large enough to house a series of longitudinally placed tanks, which meant that fuel use had to be carefully managed to maintain the center of gravity within limits.

Fred Johnsen via Walter J. Boyne



Even with landing gear and flaps down, the B-47 was so clean that it required a parachute to provide additional drag on approach. The pilot maintained power on the slow-to-accelerate jet so that a go-around could be made quickly if needed.



Any B-47 takeoff was interesting, but when ATO bottles were used, it was spectacular. Early B-47s had 18 bottles mounted internally. Later versions had an external 33-bottle unit.

The bicycle-style landing gear—two sets of two wheels in tandem, supplemented by a pair of small outrigger wheels that retracted into the inboard engine nacelles—derived from the Martin Aircraft Co. experiments. This arrangement dictated some of the aircraft's flying characteristics, for the gear placement meant that the aircraft could not be rotated for takeoff or flared for landing. For descents, the aft gear was extended to double the drag of the entire aircraft.

The three-man crew was grouped in a small pressurized compartment. The radar observer/navigator/bombardier sat in a dark cubbyhole forward, while the two pilots sat in tandem with an unrestricted view from the fighter-like canopy. Early planning called for all three crew members to be "triple rated," and thus able to do each other's job, but this proved to be impossible to sustain as the B-47 program expanded.

Boeing and the Air Force committed to the XB-47 program some of their top pilots, including Capt. Jack Ridley, Capt. Chuck Yeager (who flew a P-84 chase aircraft), Maj. Guy Townsend, Bob Robbins, and Scott Osler.

On Dec. 17, 1947, the anniversary date of the historic first flight at Kitty Hawk in 1903, Boeing test pilots Robbins and Osler made the short flight from Boeing Field in Seattle to company facilities at Moses Lake, Wash. (Later, Osler

would become the first man to lose his life in a B-47, killed when a cockpit canopy came off in flight.)

From Skepticism to Belief

The two pilots were impressed by the performance of the new bomber, but, like everyone else, they had no idea of just how much it would shape the future of the company, the industry, the Air Force, and the country. The crucial test flight came when Col. Pete Warden persuaded Maj. Gen. K.B. Wolfe, the patron saint of the B-29 program, to take a short flight with Townsend. After a 20-

minute ride, Wolfe had become a firm believer in the B-47, and promised large-scale production, with the first production order for 10 B-47As coming on Sept. 3, 1948.

Later, the B-47 became the first airplane to receive a weapon-system designation, the bomber becoming WS-100A and the reconnaissance version WS-100L.

The second prototype and all subsequent production B-47s were fitted with General Electric J47 engines, whose thrust was increased over time to a maximum of 7,200 pounds (with water injection) in the B-47E series. Additional thrust was provided by ATO—assisted take-off—bottles. The early aircraft had 18 ATO bottles mounted internally, but this system was replaced on the E model by a jettisonable rack of 33 of the 1,000-pound thrust units.

While the dimensions and the external appearance remained remarkably stable over the life of the aircraft, maximum gross weight increased over time from the 125,000 pounds of the prototypes to 230,000 pounds for the E bomber model. At higher gross weights, the aircraft was sluggish and slow to accelerate, particularly at high temperatures and high density altitudes.

Despite teething problems, production orders increased, and both Douglas and Lockheed were tasked to build the aircraft. Ultimately, Boeing would build 1,373, Douglas 274, and Lockheed 385 for a total of



In 1955, pilot Ray Shewfelt took this self portrait showing off the superb visibility afforded by the B-47's fighter-like canopy. Created as a high altitude penetrator, its pilots later embraced low-level "oil burner" tactics.

2,032. No bomber since World War II has been produced in such quantity.

Problems stemming from the developmental nature of the jet engine and the very clean design of the B-47 combined to create difficulties in flying the aircraft. The jet engines required 12 to 20 seconds to spool up from idle to full power, which meant that approaches had to be planned very carefully. The problem was eased by the introduction of a 16-foot drogue parachute, which was deployed in the landing pattern. The parachute created enough drag to permit the pilot to maintain the engine rpm in a range permitting quick acceleration in case of a go-around, at which point the drogue chute would be jettisoned.

Braking was also a problem, leading to the incorporation of an antiskid device. On Townsend's suggestion, a 32-foot-diameter ribbon-style brake chute, developed by Theodore Kanake, was fitted to the airplane to reduce landing roll. Usually, the pilot did not apply the brakes after the brake chute had caused the bomber to decelerate below 100 knots. (The brake chute could also salvage a bad landing, if deployed at just the right moment at the top of the bounce.)

Despite the two parachutes, the B-47 was so clean that excess speed on the approach caused an exceedingly long landing run, so approach speeds were carefully calculated and maintained. It was not difficult to do so; the merest touch of the throttle served to adjust the speed in single knot increments.

Ankle-Biters

For all of the B-47's technical marvels, a variety of mechanical problems cropped up during its early development, and there were frequent groundings. Fuel leaks plagued maintenance crews, and there were many difficulties with the early K-2 and K-4A bombing systems. The tail armament (originally two .50-inch machine guns and later two 20 mm cannons) was operated by the copilot, whose seat could be turned 180



Boeing photo

The slightly longer nose of the RB-47E, shown here (foreground) with the bomber version, added elegance to the sleek jet. A few reconnaissance Stratojets continued in service after all bombers had gone to the boneyard.

degrees. However, the guns were often rendered useless by difficulties with the fire-control system.

The aircraft was pleasant to fly, although it exhibited Dutch roll, a name for the tendency of the airplane to make a series of S turns, each of slightly greater amplitude. This was corrected by the invention of the yaw damper, a device which automatically supplied just enough rudder motion to offset the Dutch roll. There were other aerodynamic problems. Early B-47s exhibited a tendency to pitch up. This problem was solved by the introduction of vortex generators—small lifting vanes which diffused the airflow and which can be seen today on almost every high speed aircraft.

A problem which was simply accepted rather than solved was the fact that, at speeds of 456 knots and higher, the ailerons became ineffective because the flexible wing twisted. The aircraft was placarded at 425 knots to provide an ample safety margin.

The greatest hazard to the B-47 was corrosion and metal fatigue. Between March 13 and April 16, 1958, no fewer than six B-47s

crashed. The investigation revealed widespread problems ranging from fatigue in the lower wing skin to failure due to stress corrosion of the "milk bottle pin," the main fitting holding the wing to the fuselage. The solution was Project Milk Bottle, an expensive, time-consuming modification that nonetheless gave the B-47 fleet an additional six years of service.

As the Cold War deepened, the requirement for aircraft on alert increased from one-third of the fleet to 50 percent, and this put such a strain on manpower that it was decided to phase out some B-47 wings to make the personnel available to other units. The phaseout was accelerated as more B-52s and ICBMs came on line, but two world crises—Berlin in 1961 and Cuba in 1962—temporarily delayed the process.

By February 1966, all B-47 bombers had been retired to the boneyard at Davis-Monthan AFB, Ariz. A handful of reconnaissance versions continued to operate. The last Air Force Stratojet, an RB-47H, was retired in December 1969. The Navy had a specialized test version that it kept in use until 1976.

Now, though the B-47 has flown its last, at least 15 examples are preserved and on display in museums or at airfields, and the B-47 Stratojet Association is growing in numbers. These artifacts are all that remain of the beautiful aircraft that burst onto the scene a half-century ago. ■

Walter J. Boyne, former director of the National Air and Space Museum in Washington, is a retired Air Force colonel and author. He has written more than 400 articles about aviation topics and 28 books, the most recent of which is Beyond the Wild Blue: A History of the United States Air Force, 1947–1997. His most recent article for Air Force Magazine, "Linebacker II," appeared in the November 1997 issue.

World Gallery of Trainers

By John W. R. Taylor and Kenneth Munson

Jet Trainers

Alpha Jet

The Alpha Jet was developed to meet a joint Franco-German requirement, flying for the first time Oct. 26, 1973. Production exceeded 500. French Alpha Jets, of which about 110 of the original 176 remain in service, had clocked half a million flying hours by the beginning of 1996. The three squadrons of No. 9 Wg., Belgian Air Force, continue to fly most of the 33 supplied from early production, but the last few of its original 175 were retired this year by Germany's Luftwaffe, 50 having been donated to Portugal and a further 100-plus awaiting disposal. Aircraft built for Germany have 3,175 lb thrust Larzac 04-C20 engines, a podded 27-mm Mauser gun, provision for two self-defense Sidewinder AAMs, and a characteristic "needle" nose.

Thanks to the German donation, Portugal is now the second largest operator, although many of its 50 are reserved to provide spares for the remainder, which replaced such assorted other types as the Lockheed T-33A, Cessna T-37C, Northrop T-38A, and Fiat G91. They equip No. 103 Sq. for transition training and No. 301 Sq. for close air support and attack. Six have been equipped with Italian Elettronica ACE 2000 EW equipment, installed in the rear cockpit.

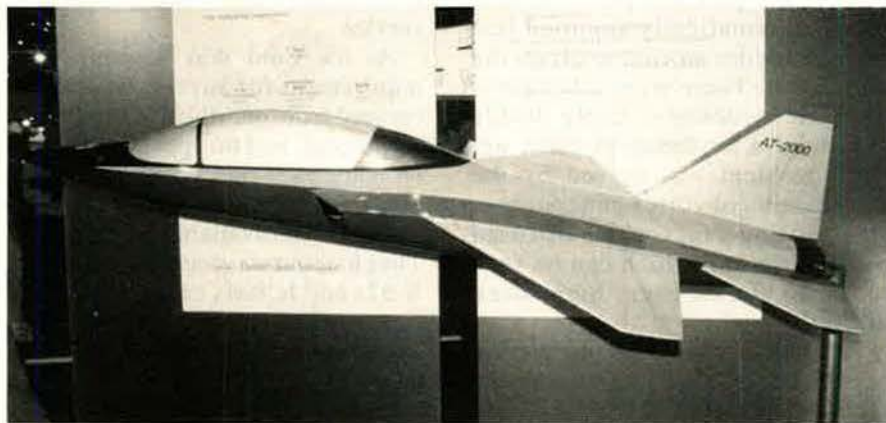
Non-European customers included Egypt (30, designated MS1), Ivory Coast (seven), Morocco (24), Nigeria (24), Qatar (six), and Togo (six). Ivory Coast has



Alpha Jet MS2s, Egyptian Air Force



AT-3 Tsu-Chiang, Taiwan Air Force



Model of the AT-2000 (Paul Jackson)

been trying to get two of its last five airworthy again with Cassault assistance. Dassault also produced an alternative close-support version, with inertial platform, head-up display (HUD), laser range finder, and radar altimeter; Egypt ordered 15 (as MS2s) and Cameroon seven.

Contractors: Dassault, France, and Dornier, Germany.
Power Plant: two SNECMA/Turbomeca Larzac 04-C6 turbofans standard; each 2,976 lb thrust.

Dimensions (trainer): span 29 ft 10 $\frac{3}{4}$ in, length 38 ft 6 $\frac{1}{2}$ in, height 13 ft 9 in.

Weights: empty 7,374 lb, gross 11,023–17,637 lb.
Performance (at 11,023 lb weight, 04-C6 engines): max speed at 32,800 ft Mach 0.85, at S/L 621 mph, stalling speed (gear and flaps down) 104 mph, ceiling 48,000 ft, T-O run 1,215 ft, landing run 1,640 ft, radius of action at high altitude 764 miles on internal fuel, 901 miles with external tanks, g limits (ultimate) +12/-6.4.

Accommodation: crew of two, on tandem zero-height/104 mph or zero/zero ejection seats.

Armament: centerline stores pylon or pod for 30-mm DEFA or 27-mm Mauser gun. Provision for two hardpoints under each wing for 18-tube rocket packs, bombs of up to 882 lb, cluster bombs, 30-mm gun pods, Sidewinder or Magic AAMs, Maverick ASMs, a reconnaissance pod, drop tanks, and other stores. Max load on five pylons 5,510 lb.

AT-3 Tsu-Chiang

After 80 hours of basic training on T-34Cs, student pilots at Taiwan's Air Force Academy, Kangshan AB, progress to 120 hours of advanced training, including initial combat instruction, on the AT-3. The first of 63 built was delivered in March 1984, and about 38 remain in use in these roles, including those flown by the Taiwan Air Force's Thunder Tige's aerobatic display team. Twenty were converted to use the AT-3's stores-carrying capability in a night and all-weather close-support role. They serve with No. 35 Sq., Taiwan Air Force, also at Kangshan.

Contractor: Aero Industry Development Center, Taiwan.

Power Plant: two AlliedSignal TFE731-2-2L turbofans; each 3,500 lb thrust.

Dimensions: span 34 ft 3 $\frac{3}{4}$ in, length (incl probe) 42 ft 4 in, height 14 ft 3 $\frac{3}{4}$ in.

Weights: empty 8,500 lb, gross 11,500–17,500 lb.

Performance (at max gross weight): max speed at S/L 558 mph, max cruising speed at 36,000 ft 548 mph, stalling speed (gear and flaps down) 104 mph, ceiling 48,000 ft, T-O run 1,500 ft, landing run 2,200 ft, max range on internal fuel 1,415 miles.

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

Armament: two hardpoints under each wing and one under fuselage for up to 6,000 lb of single, cluster, or fire bombs, flare dispensers, or rocket launchers. Centerline hardpoint can be occupied instead by a semirecessed machine gun pack or (in conjunction with outboard under-wing pylons) an aerial target system. Provision for infrared AAM at each wingtip.

AT-2000

This proposal for a two-seat trainer/single-seat attack aircraft first appeared in 1989 as a joint venture between Daimler-Benz Aerospace (DASA) and Aermacchi, combining low-observable design with supersonic performance. The Italian company withdrew in 1994 to concentrate on its involvement with the Yak-130, but DASA has since teamed with South Africa's Denel (for the avionics) and South Korea's Hyundai (component manufacture). Wind tunnel tests were completed in 1996, and a first flight is planned for 2000. Features include a blended wing/body configuration, fly-by-wire control of flaperons, rudder, and all-moving tailplane, and option for radar and an internal gun in the trainer version. (All data provisional.)

Contractors: DASA (Germany), Denel (South Africa), and Hyundai (South Korea).

Power Plant: one Eurojet EJ200 turbofan; approx 13,490 lb thrust (dry or derated) or approx 20,250 lb thrust with afterburning, depending on customer requirement.

Dimensions: span 25 ft 0 in, length 45 ft 0 in, height 15 ft 0 in.

Weights: empty 12,500 lb, gross 16,755–18,300 lb.

Performance: max speed at height Mach 1.5–1.8; g limits +9/-3.

Accommodation (trainer): crew of two on tandem ejection seats.

Armament (trainer): internal gun and external hardpoints optional.

C-101 Aviojet

The first of four Aviojet prototypes flew June 27, 1977, followed by 88 C-101EB basic and advanced trainers for the Spanish Air Force, by which they are known as the E.25 Mirlo. About 78 continue in service, some with the Air Force's Patrulla Aguila display team. They have 3,500 lb thrust AlliedSignal TFE731-2-2J engines. An armed version, with a 3,700 lb thrust TFE731-3-1J turbofan, was ordered by Chile (12 C-101BB-02s, Chilean Air Force designation T-36 Halcón: "Hawk") and Honduras (four C-101BB-03s). Eight of the former were assembled by Empresa Nacional de Aeronáutica de Chile (ENAER), with partial local manufacture.

Like most modern jet trainers, the Aviojet can be used in other military roles, with an internal bay under the rear cockpit large enough to accommodate guns, reconnaissance and ECM packages, or other combat aids. A dedicated light attack version, designated C-101CC-02 in Spain and A-36CC Halcón by the Chilean Air Force, was developed jointly by CASA and ENAER. Twenty-four, with more powerful TFE731-5-1J engines, were built for the Chilean Air Force; four were supplied from Spain, the others coproduced by ENAER, which also upgraded the T-36s to A-36BB standard for tactical training. Twelve (from 16) similar C-101CC-04s serve with Nos. 2 (weapons training) and 11 (basic training) Sqs. of the Royal Jordanian Air Force, at King Hussein Air College, Mafrq. (Data for C-101CC.)

Contractor: CASA, Spain.

Power Plant: one AlliedSignal TFE731-5-1J turbofan;

4,300 lb thrust, with military power reserve (MPR) rating of 4,700 lb thrust.

Dimensions: span 34 ft 9½ in, length 41 ft 0 in, height 13 ft 11¼ in.

Weights: empty 7,650 lb, gross 11,023–13,890 lb.

Performance (at 9,590 lb weight, except where indicated): max speed at 15,000 ft with MPR 518 mph, stalling speed (gear and flaps down) 102 mph IAS, ceiling 44,000 ft, T-O run 1,835 ft, landing run 1,575 ft, mission radius (armed) 287–374 miles, g limits at 10,802 lb weight +7.5/-3.9.

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

Armament: ventral bay for quick-change packages, incl a 30-mm DEFA 553 gun with 130 rds, twin 12.7-mm Browning machine guns, reconnaissance camera, ECM package, or laser designator. Six under-wing hardpoints for up to 4,960 lb of stores, incl four pods of 5-in rockets, six 550-lb bombs, two Maverick ASMs, or Sidewinder or Magic AAMs.

CM 170 Magister

France and Belgium are the only original customers still operating the **CM 170 Magister** first-generation jet trainer (first flight July 23, 1952). About 20 still fly with the French Air Force, but are being withdrawn, and Belgium's also are on the verge of retirement. Israel's 40 or more Magisters (local name **Tzukit**: "Merlin") were rebuilt and upgraded between 1981 and 1986 by IAI's Bedek Aviation Division, but a replacement is being sought. Other Magisters, many of them second-hand, still serve with the air forces of Algeria (fewer than 20), Cameroon (six), Gabon (five), Ireland (six), Lebanon (three, but probably not airworthy), Morocco (up to 20), El Salvador (seven), and Senegal (five), often in both training and counterinsurgency roles.

First delivered in 1956, the basic CM 170 has 880 lb thrust Marboré IIA turbojets, but the last 137 production aircraft have upgraded Marboré VIs and are known as **Super Magisters**. (Data for *Super Magister*.)

Contractor: Aerospatiale (originally Fouga), France.
Power Plant: two Turbomeca Marboré VI turbojets; each 1,058 lb thrust.

Dimensions: span over tip tanks 39 ft 10 in, length 33 ft 0 in, height 9 ft 2 in.

Weights: empty 5,093 lb, gross 6,280–7,187 lb.

Performance: max speed at S/L 435 mph, at 30,000 ft 451 mph, ceiling 13,125 ft, T-O run 1,970 ft, range 870 miles.

Accommodation: crew of two, on tandem ejection seats.

Armament: two 7.62-mm machine guns, with 200 rds/gun, in nose; hardpoint under each wing for rocket launcher, wire-guided missile, or bomb.

CT-114 Tutor

Thirty-eight years after the first flight Jan. 13, 1960, about 120 **CT-114 Tutors** remain in service with Canadian Forces, including more than 80 with No. 2 Flying Tng. School, and 14 with No. 431 Sq., which provides the service's Snowbirds aerobatic display team, all at CFB Moose Jaw, Saskatchewan. Other Tutors equip the Central Flying School at CFB Winnipeg, Manitoba. A late-1970s upgrade of 113 aircraft introduced an improved canopy jettison system, updated avionics, and provision for external fuel tanks. A program to rewire and otherwise refurbish Tutors is under way, to extend their service life to 2010.

Contractor: Canadair, Canada.
Power Plant: one Orenda-built General Electric J85-CAN-40 turbojet; 2,663 lb thrust.

Dimensions: span 36 ft 6 in, length 32 ft 0 in, height 9 ft 3¼ in.

Weights: empty 4,895 lb, gross 7,397 lb.

Performance: max speed at 28,500 ft 498 mph, stalling speed 81 mph, ceiling 43,000 ft, T-O to 50 ft: 2,160 ft, landing from 50 ft: 2,330 ft, max range 944 miles.

Accommodation: crew of two, on side-by-side zero-height ejection seats.

Armament: provision for single pylon under each wing for a machine gun or rocket pod, napalm tank, or 500-lb bomb.

G-2A Galeb and G-4 Super Galeb

Following a first flight in May 1961, more than 220 straight winged **G-2A Galeb** ("Seagull") trainers were built for the former Yugoslav Air Force (designation **N-60**) during 1963–83, but their one-for-one replacement from 1985 by the swept-wing, anhedral-tail **G-4 Super Galeb (N-62)** makes it unlikely that many G-2As remain in service. The civil war has made it difficult to quantify the numbers and disposition of both types, but the Croatian Air Force acquired a few G-2As, and the Bosnian Serb Air Force is thought to have some of each. The former Yugoslav Air Force may have nearly 50 G-4s. An improved **G-4M** ground-attack prototype appeared in 1991 but is unlikely to have entered production before Soko's badly damaged Mostar



CT-114 Tutors from the Canadian Forces display team, the Snowbirds (Guy Aceto)



G-4 Super Galeb, Myanmar Air Force (Paul Jackson)



Hawk Mk 51, Finnish Air Force (Denis Hughes)

factory was abandoned in May 1992. Unconfirmed reports have suggested that the Utva facility at Pancevo, Serbia, to which some G-4 jigs and tools were transferred, has built two prototypes of a single-seat development, designated **G-5**. Optimized for ground attack, this aircraft is said to have the GSh-23L gun built in, freeing the centerline station for other weapons, and wingtip rails for R-60 ("Aphid") AAMs.

Up to 80 of the 120 G-2A—Es supplied to Libya before 1984 may still survive, though not all may be operational. Two of Zambia's original six G-2As are thought to remain. More recently, at least six of a Myanmar order for 12 G-4s are known to have been delivered. (Data for *G-4*.)

Contractor: Soko, Yugoslavia.

Power Plant: one Rolls-Royce Viper Mk 632-46 turbojet; 4,000 lb thrust.

Dimensions: span 32 ft 5 in, length 40 ft 2¼ in, height 14 ft 1¼ in.

Weights: empty 6,993 lb, gross 10,379–13,889 lb.

Performance (at 10,379 lb gross weight): max speed at 13,120 ft 565 mph, max cruising speed at 19,700 ft 525 mph, stalling speed (gear and flaps down) 112 mph, ceiling 42,160 ft, T-O run 1,877 ft, landing run 2,674 ft, range with two drop tanks 1,553 miles.

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

Armament: removable centerline gun pod containing 23-mm GSh-23L twin-barrel gun with 200 rds. Two pylons under each wing for such weapons as napalm tanks, cluster bombs containing eight 35-lb fragmentation munitions, containers for 40 antipersonnel or 54 antitank bomblets, 16-tube rocket packs, triple carriers for 220-lb bombs, 12.7-mm gun pods, or drop fuel tanks. Max weapon load 2,822 lb.

Hawk

The first **Hawk** to fly, on Aug. 21, 1971, was a production-standard **T. Mk 1** for Britain's Royal Air Force, which, from April 1976, eventually received 176, powered by 5,200 lb thrust Adour 151 turbofans. From 1984, 89 of them were upgraded to combat-capable **T. Mk 1A** standard, of which 50 are NATO-declared for point defense, to accompany radar-equipped Tornados on medium-range air defense missions as par: of the RAF's Mixed Fighter Force. A pylon under each wing carries a Sidewinder AAM, supplementing the standard underbelly 30-mm gun pack. In 1991, 15 T. Mk 1s and T. Mk 1As replaced Canberras of No. 100 Sq. for target towing and as "silent targets" for electronic warfare training. Five T. Mk 1s and eight T. Mk 1As have been transferred to the Fleet Requirements and Aircraft Direction Unit to provide target facilities and EW training for the Royal Navy.

Export orders for the 30 percent heavier **Hawk 50** series, with a 5,200 lb thrust Adour 851, 70 percent greater disposable load and 30 percent longer range, began in 1977 with Finland (57 Mk 51/51A, with a 12.7-mm centerline gun), followed by Kenya (12 Mk 52) and Indonesia (20 Mk 53). The further improved **Hawk 60** series, with four-position flaps, modified wing leading-edge devices, and other refinements, has been bought since 1982 by Zimbabwe (13 Mk 60/60A), Dubai (nine Mk 61), Abu Dhabi (16 Mk 63, since upgraded, and four Mk 63C), Kuwait (12 Mk 64), Saudi Arabia (30 Mk 65 and 20 Mk 65A), Switzerland (20 Mk 66), and South Korea (20 Mk 67). Thirteen of the 16 Abu Dhabi Mk 63s have been upgraded to Mk 63A and two to Mk 63B, with 5,845-lb thrust Adour 871 and new wings with four pylons and wingtip Sidewinders.

The **Hawk 100** is a more specialized, high-performance, dual-role trainer and strike version. To date it has been ordered by Abu Dhabi (18 Mk 102), Australia (33 Mk 127), Indonesia (eight Mk 109), Malaysia (10 Mk 108), Oman (four Mk 103), and Qatar (18), most with wingtip rails for Sidewinders, a Sky Guardian radar warning receiver, and laser range finder. With the Super Tucano, the Hawk 100 has been selected (26 Mk 115) for the prestigious NATO Flying Tng. in Canada program. The **Hawk 200** is a dedicated single-seat strike model. The **T-45A Goshawk** version of the trainer for the USN is described separately. (Data for *Hawk 60 series*.)

Contractor: British Aerospace, UK.

Power Plant: one Rolls-Royce Turbomeca Adour 861 turbofan; 5,700 lb thrust.

Dimensions: span 30 ft 3¼ in, length (incl probe) 38 ft 10¼ in, height 13 ft 0¾ in.

Weights: empty 8,845 lb, gross 20,061 lb.

Performance: max speed at S/L 627 mph, stalling speed (gear and flaps down) 110 mph, ceiling 46,000 ft, T-O run 2,330 ft, landing run 1,800 ft, combat radius with 5,000-lb weapons load 620 miles, with 2,000-lb load 900 miles, g limits +8/-4.

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

Armament: centerline 30-mm Aden gun with 120 rds, or 12.7-mm gun pack, or pylon, plus two pylons under each wing. Within overall max of 6,614 lb, typical loads can incl centerline gun pack or reconnaissance pod and four under-wing rocket packs; five 1,000-lb bombs; 36 x 80-lb runway denial bombs; five 600-lb cluster bombs; four Sidewinder or two Magic AAMs; two Maverick ASMs; or two 156-gal drop tanks.

HJT-16 Kiran

Between 1968 and 1989, HAL delivered 118 Viper-engined **Kiran Mk I** basic trainers, 72 **Mk IA**s with a

hardpoint under each wing to carry armament for weapons training, and 61 Mk IIs with a more powerful Orpheus turbojet, updated instruments and avionics, improved hydraulics, and two additional under-wing stations. About 160 Kirans of all versions equip the Indian Air Force Academy (including the IAF's Surya Kiran display team) and the Flying Instructors' School; 12 Indian Navy aircraft serve with INAS 551 at Dabolim, which also provides that service's Phantoms aerobatic team. The long-anticipated decision on a replacement has yet to be announced. (Data for Mk II.)

Contractor: Hindustan Aeronautics, India.

Power Plant: one Rolls-Royce Orpheus 701-05 turbojet; 4,200 lb thrust.

Dimensions: span 35 ft 1 1/4 in, length 34 ft 9 1/2 in, height 11 ft 11 in.

Weights: empty 6,603 lb, gross 9,369–11,023 lb.

Performance (at max gross weight): max speed at S/L 418 mph, max cruising speed at 15,000 ft 386 mph IAS, stalling speed (gear and flaps down) 98 mph IAS, ceiling 39,375 ft, T-O run 1,772 ft, landing from 50 ft: 4,725 ft, max range (internal fuel) 457 miles.

Accommodation: crew of two, on side-by-side zero-height ejection seats.

Armament: two 7.62-mm machine guns in nose; two hardpoints under each wing for 551-lb bombs, 18-tube rocket pods, or drop tanks.

I-22, M-93, and M-96 Iryda

PZL Mielec developed the Iryda ("Iridium") as an all-Aspect replacement for the Polish Air Force's TS-11 Iskra and LiM-6 (MiG-17) basic and advanced trainers. The first of five prototypes flew March 5, 1985, but development has been troublesome.

The first five production aircraft (one of which has since been lost) were I-22s, with 2,425 lb thrust PZL-5 engines and zero-height/94 mph Polish ejection seats; the next seven were M-93Ks (first flight July 6, 1994), with more powerful K-15 turbojets, Martin-Baker zero-zero seats, and French (Sextant Avionique) avionics. One prototype, with an eye toward possible export orders, was refloated as the M-93V, powered by 3,307 lb thrust Rolls-Royce Viper 545 engines, in April 1994.

Further airframe changes, which entered flight test early this year, brought in a new designation of M-96, in which aerodynamic improvements include Fowler flaps, LERX, leading-edge wing slats and a taller vertical tail. The four surviving I-22s and 13 M-93Ks so far ordered are expected to be completed or modified to the M-96 standard. Mielec has projected a number of possible Iryda derivatives, as detailed in the December 1996 edition of this Gallery, but in view of the type's checkered history their prospects of realization seem increasingly remote. (Data for M-93K.)

Contractor: PZL Mielec, Poland.

Power Plant: two Instytut Lotnictwa K-15 turbojets; each 3,307 lb thrust.

Dimensions: span 31 ft 6 in, length 43 ft 4 1/2 in, height 14 ft 1 1/4 in.

Weights: empty 10,251 lb, gross 14,771–19,180 lb.

Performance (at 13,007 lb clean gross weight except where indicated): max speed at 16,400 ft 590 mph, stalling speed (gear and flaps down) 127 mph, ceiling 44,940 ft, T-O run 2,200 ft, landing run (with brake chute) at 14,550 lb weight 1,380 ft, radius at 19,180 lb weight with max external stores 155 miles, g limits +7.3/-4.

Accommodation: crew of two, on tandem zero-zero ejection seats. Rear seat raised.

Armament: one centerline 23-mm twin-barrel GSz-23L gun with 50–200 rds; two multiple stores carriers under each wing for up to 3,968 lb total load of bombs (up to 1,102-lb size), cluster bombs, gun pods, guided or unguided rockets, camera pods, or (inboard stations only) 100-gal drop tanks.

IA 63 Pampa

The first of three prototypes of this basic, advanced, and weapons training aircraft flew Oct. 6, 1984, and delivery of an initial batch of 18 to the Argentine Air Force began in April 1988. About four have since been lost, the original requirement for a further 46 remains unfulfilled due to budgetary constraints, and those in service have become increasingly difficult to maintain. Development of a naval version is in abeyance. Following the Pampa's lack of success in the USAF/USN JPATS contest, and the absence of domestic funding, it seems that further manufacture is unlikely. Existing aircraft, six of which were fitted with an AAF-developed HUD, a new Elbit weapon delivery and navigation system, a podded 30-mm gun, and under-wing weapon stations, serve with the Fighter Group Fighter School at Mendoza.

Contractor: Lockheed Aircraft Argentina (formerly FMA), Argentina.

Power Plant: one AlliedSignal TFE731-2-2N turbofan; 3,500 lb thrust.

Dimensions: span 31 ft 9 1/2 in, length 35 ft 9 1/4 in, height 14 ft 1 in.

Weights: empty 6,219 lb, gross 8,157–11,023 lb.

Performance (at 8,377 lb clean gross weight except where indicated): max speed at S/L 466 mph, stalling speed 106 mph, ceiling 42,320 ft, T-O run (at 8,157 lb weight) 1,390 ft, landing run (at 7,716 lb weight) 1,515 ft, range 932 miles (1,151 miles with external tanks), g limits +6/-3.

Accommodation: crew of two, on tandem zero-zero ejection seats. Rear seat raised.

Armament: hardpoint under fuselage and two under each wing for up to 2,557 lb (with standard internal fuel) of gun pods, bombs, and rockets.

IAR-99 Soim and IAR-109 Swift

The Romanian Air Force is reported to have ordered 50 IAR-99 Soims ("Hawks") for intermediate and advanced training, with light attack capability; but only 26 are thought to have been delivered, in 1987–91. The aircraft made its first flight Dec. 21, 1985. Israel Aircraft Industries assisted Avioane in upgrading the aircraft by installing state-of-the-art avionics in a demonstrator, known as the IAR-109 Swift, which flew for the first time in Israel in November 1993. Proposed production versions were the IAR-109T "all-through" jet trainer and the IAR-109TF combat trainer/light attack version, but no orders for the IAR-109T/TF have been announced. (Data for IAR-99.)

Contractor: Avioane, Romania.

Power Plant: one Turbomecanica license-built Rolls-Royce Viper Mk 632-41M turbojet; 4,000 lb thrust.

Dimensions: span 32 ft 3 3/4 in, length 36 ft 1 1/2 in, height 12 ft 9 3/8 in.

Weights: empty 7,055 lb, gross 9,700–12,258 lb.

Performance (at 9,700 lb clean gross weight): max speed at S/L 537 mph, ceiling 42,320 ft, T-O run 1,480 ft, landing run 1,805 ft, max range 683 miles, g limits +7/-3.6.

Accommodation: crew of two, on tandem zero-zero ejection seats. Rear seat raised.

Armament: centerline 23-mm GSh-23 gun pod with 200 rds; two hardpoints under each wing for 550-lb or smaller bombs, two twin 7.62-mm gun pods, four 16-rd pods of 57-mm rockets or 32-rd pods of 42-mm rockets, infrared AAMs, drop tanks (inboard stations only), or other stores.



JHT-16 Mk II, Indian Air Force Surya Kiran display team (Simon Watson)



M-93K Iryda testbed for M-96 (R.J. Malachowski)



Model of the Samsung KTX-2 (Paul Jackson)

K-8 Karakorum 8

The K-8 is a conventional jet basic trainer and light ground-attack aircraft. Pakistan's Aeronautical Complex has a 25 percent share in the program. The first of three flying prototypes made its initial flight Nov. 21, 1990, in China. These were followed by a preproduction batch, of which six were delivered to the Pakistan Air Force in November 1994, for a 1,200-hour evaluation at the PAF Academy, Risalpur. According to that nation's secretary for defense production, up to 100 K-8s are required to replace PAF Cessna T-37s and possibly also the Chengdu FT-5 combat trainer. The Chinese Air Force also has received six K-8s and is expected to receive several hundred eventually. Reports that the K-8 has flown with an indigenous WS11 turbofan remain unconfirmed; meanwhile, China has ordered Russian AI-25TL engines for initial production K-8s to overcome problems in obtaining the Western TFE731.

Contractor: Nanchang Aircraft, China.

Power Plant: one AlliedSignal TFE731-2A-2A turbofan in prototypes, preproduction K-8s, and aircraft for Pakistan; 3,600 lb thrust. Production aircraft for China to have 3,792 lb thrust Progress (Ivchenko) AI-25TL turbofan.

Dimensions: span 31 ft 7 1/2 in, length (incl nose pitot) 38 ft 0 3/4 in, height 13 ft 9 3/4 in.

Weights: empty 5,924 lb, gross 8,003–9,546 lb.

Performance (at 8,003 lb clean gross weight): max speed at S/L 501 mph, stalling speed (gear and flaps down) 94 mph, ceiling 42,660 ft, T-O run 1,345 ft, landing run 1,645 ft, max range on internal fuel 870 miles, g limits +7.33/-3.

Accommodation: crew of two, on tandem zero-zero ejection seats. Rear seat raised.

Armament (optional): one 23-mm gun pod under center fuselage; two hardpoints under each wing for a total 2,080 lb of external stores. Twin-store inboard stations each for two small bombs; single-store outboard stations can each carry a PL-7 AAM, 12-rd pod of 57-mm rockets, a single 550-lb or smaller bomb, or a 66-gal drop tank.

KTX-2

As part of the offset deal centered on South Korea's F-16 program, Lockheed Martin assisted Samsung in designing the KTX-2 supersonic advanced trainer, a lead-in fighter trainer and light combat aircraft, which has much in common with the US fighter. Work began in 1992, and the design was frozen in 1995, with wing sweep on only the leading edge of midmounted wings, and large curved leading-edge root extensions (LERX) over the engine air ducts. Features include digital fly-by-wire control, color MFDs, HUD, nav/attack system for lead-in training, and radar for combat versions. Full-scale development was approved in July 1997, and Samsung hopes to fly the first prototype KTX-2 in 2001, allowing delivery of 94 production aircraft for the South Korean Air Force to begin in 2005. Production will be at Samsung's Sachon plant, with Lockheed Martin responsible for wings, flight control system, and avionics integration. (Data provisional.)

Contractor: Samsung Aerospace Industries, South Korea.

Power Plant: one turbofan (probably General Electric F404 or SNECMA M88-2) in 16,000 lb thrust class.

Dimensions: span 29 ft 10 in, length 42 ft 0 in, height 14 ft 5 in.

Weight: gross 18,960 lb.

Performance: max speed Mach 1.4, ceiling 45,000 ft, g limits +9/-3.

Accommodation: crew of two in tandem; rear seat raised.

Armament: one internal 20-mm gun; hardpoints on centerline, two under each wing, and at each wingtip for AAMs, ASMs, bombs, rocket pods, or gun packs.

L-29 Delfin

The L-29 Delfin ("Dolphin") first flew April 5, 1959, and was followed by 3,568 production Delfins built between 1961 and 1974. About 3,000 were delivered to the USSR, most of the remainder being supplied as the standard jet basic trainer for all other members of the former Warsaw Pact except Poland. Estimates of current strengths are Bulgaria (40), Czech Republic (29), Slovak Republic (16), Romania (30), Russia (800, plus some in Azerbaijan and Kazakhstan), and Ukraine (20). Russian and some other inventories have been depleted in recent years by secondhand sales to other air forces and the civil market. At least nine other nations received L-29s, of which Afghanistan (24), Cuba (30), Ghana (eight), Mali (six), and Syria (60) still operate the Delfin, often for counterinsurgency roles. An L-29R version was produced for light attack duties, with under-wing stores pylons and nose-mounted cameras. (Data for standard L-29.)

Contractor: Aero Vodochody, Czech Republic.

Power Plant: one Walter M 701c 500 turbojet; 1,960 lb thrust.

Dimensions: span 33 ft 9 in, length 35 ft 5 1/2 in, height 10 ft 3 in.

Weights: empty 5,027 lb, gross 7,231–7,804 lb.

Performance (at 7,165 lb weight): max speed at S/L 382 mph, stalling speed (flaps down) 81 mph, ceiling 36,100 ft, T-O run 1,805 ft, landing run 1,444 ft, max range with under-wing tanks 555 miles.

Accommodation: crew of two, on tandem ejection seats. Rear seat raised.

Armament: single attachment point under each wing for rocket pod, 7.62-mm machine gun pod, 220-lb bomb, or drop fuel tank.

L-39 and L-139 Albatros

First flown Nov. 4, 1968, and in continuous production since 1971, except for a two-year hiatus in 1991–92, more than 2,800 L-39s have been built (including 2,094 L-39C basic and advanced trainers for the former USSR), bringing the Aero factory's jet trainer output to an unrivaled total of more than 6,400. Latest L-39 customers are Bangladesh and Thailand.

Apart from the Czechoslovak Air Force (36), other L-39C recipients include Afghanistan (12), Algeria (seven), Cuba (30), Ethiopia (20), Iraq (22), and Vietnam (24). Ex-Soviet L-39Cs have been acquired by Lithuania (four) and Latvia; Ukraine also is now disposing of some surplus Cs. Eight examples of the L-39V, a specialized target-towing version, were built for Czechoslovakia (six) and East Germany (two) in 1976. The L-39Z0, with strengthened wings for additional stores carriage, was exported to East Germany (52, of which 20 transferred to Hungary in 1993), Iraq (59), Libya (181, of which 10 later transferred to Egypt), and Syria (55). The ground-attack/reconnaissance L-39ZA, which adds a centerline 23-mm gun pod to the capability of the Z0, was built for Algeria (32), Bangladesh (eight), Bulgaria (36), Czechoslovakia (31), Nigeria (24), Romania (32), Syria (44), and Thailand (40, RTAF designation BKF.1). The last-named (designated L39ZA/ART by Aero and having Elbit avionics) were delivered for Nos. 101, 102, and 401 Sqs. in 1994 and 1996. Cambodia recently received six secondhand L-39ZAs upgraded by Israel. Current Czech and Slovak strengths are 20 Cs/two Vs/18 ZAs and eight Cs/two Vs/nine ZAs, respectively.

Aero also offers the L-139 Albatros 2000 with an AlliedSignal turbofan, Flight Visions HUD, and Bendix/King avionics. First flight was made May 8, 1993, but no orders have yet been announced. (Data for L-39C, with L-139 in parentheses.)

Contractor: Aero Vodochody, Czech Republic.

Power Plant: one Progress/Ivchenko AI-25TL (AlliedSignal TFE731-4-1T) turbofan; 3,792 lb (4,080 lb) thrust.

Dimensions: span over integral tip tanks 31 ft 0 1/2 in, length 39 ft 9 1/2 in, height 15 ft 7 3/4 in.

Weights: empty 7,617 lb (7,628 lb), gross 9,976–10,362 lb (10,031–13,117 lb).

Performance (L-39C at 9,921 lb clean gross weight): max speed at S/L 435 mph, at 16,400 ft 466 mph, stalling speed 103 mph, ceiling 36,100 ft, T-O run 1,740 ft, landing run 2,135 ft, range with max internal fuel 683 miles, g limits +8/-4.

Performance (L-139 at 10,031 lb clean gross weight): max speed at 20,000 ft 478 mph, stalling speed 105 mph, ceiling 38,720 ft, T-O run 1,705 ft, landing run 2,005 ft, range with max internal fuel 1,050 miles.

Accommodation: crew of two, on tandem zero-height/94 mph (zero/zero) ejection seats. Rear seat raised.

Armament: centerline pod for 23-mm GSh-23 twin-barrel gun. Two under-wing pylons for up to 626 lb of practice weapons or drop tanks. L-39Z0 has two under-wing stations on each side for a total of 2,535 lb of stores incl bombs, rocket pods, IR AAMs (outer pylons only), or (port inner pylon only) a reconnaissance pod. External load increased to 2,844 lb on L-39ZA and 3,307 lb on L-139.

L-59 and L-159 Albatros

First flown in definitive form Sept. 30, 1986, the prototype of this L-39 derivative was originally designated L-39MS; the L-59 designation, acknowledging it as essentially a new type, was adopted in about 1990, although the Czech and Slovak Air Force aircraft retain the earlier designation. Its new and more powerful DV-2 turbofan, of Russian (Ivchenko/Lotarev) design, is built in the Slovak Republic. Other major differences include a strengthened fuselage with slightly longer nose, enlarged tip tanks, powered aileron and elevator controls, and upgraded avionics. The first five production aircraft were delivered to the Czech and Slovak air forces (three and two, respectively) in 1991–92, and deliveries of 48 L-59Es to the Egyptian Air Force followed in 1993–94. Twelve L-59Ts were delivered to the Tunisian Air Force 1995–96.

The L-159, first flown Aug. 2, 1997, is an advanced trainer/light attack derivative of the L-59 powered by a 6,300 lb thrust AlliedSignal/ITEC F124 turbofan. Czech government approval was given in April 1995 for 72 to be ordered for the country's air force. Some of these,



L-29 Delfin, Czech Air Force
(Peter R. Foster)



L-39ZA Albatros, Nigerian Air Force



MB-326K, Zaire Air Force



MB-339FD prototype

like the first prototype, will be in two-seat combat-capable L-159T trainer configuration. Deliveries should begin by 1999. The single-seat L-159 will have a nose-mounted radar, armored cockpit, and Western avionics, plus an additional fuel tank in place of the second seat. (Data for L-59.)

Contractor: Aero Vodochody, Czech Republic.

Power Plant: one PS/ZMK Progress DV-2 turbofan; 4,850 lb thrust.

Dimensions: span over tip tanks 31 ft 3 1/2 in, length 40 ft 0 1/4 in, height 15 ft 7 3/4 in.

Weights: empty 8,885 lb, gross 12,257–15,432 lb.

Performance (at 12,257 lb clean gross weight): max speed at 16,400 ft 544 mph, stalling speed (gear and flaps down) 114 mph, ceiling 38,480 ft, T-O run 2,100 ft, landing run 2,365 ft, range on internal fuel 752 miles, g limits +8/-4.

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

Armament: one 23-mm GSh-23 twin-barrel gun, with up to 150 rds, in under-fuselage pod; four under-wing pylons for a total of 2,425 lb of stores, incl bombs of up to 1,102 lb, four 16 x 57-mm rocket pods, or two 39.5-gal or 92.5-gal drop tanks.

MB-326, Impala, and AT-26 Xavante

Only six original 1960-vintage Aermacchi MB-326 tandem-seat trainers (2,500-lb thrust Viper 11 turbojet) remain in service with the Italian Air Force. Others continue to fly with the air forces of Australia (28 326H

for lead-in training, about 20 more in store) and Tunisia (four 326B), although the former has recently ordered Hawks as replacements. The trainer/light attack MB-326GB combines six-hardpoint, strengthened wings with the more powerful Viper 540; versions of the GB built by Aermacchi serve with the Argentine Navy (two) and the air forces of Zaire (five) and Zambia (15). Others, license-built by Embraer, are used by the Argentine Navy (nine) and air forces of Brazil (100, as AT-26 Xavante), Paraguay (six), and Togo (four). Final Italian-built variants were the single-seat MB-326K for operational training/ground attack, and two-seat MB-326L advanced trainer, each with a 4,000 lb thrust Viper 632; three Ks and two Ls serve with the United Arab Emirates Air Force (Dubai), 11 Ks and Ls in Tunisia, and four Ks in Ghana. Atlas Aircraft in South Africa built MB-326Ms, under license as Impala Mk 1 trainers, and MB-326Ks, as Impala Mk 2s. Replacements are being studied for the 57 Impalas (30 + 27) still operational. (Data for MB-326GB.)

Contractor: Aermacchi, Italy.

Power Plant: one Rolls-Royce Viper 20 Mk 540 turbojet; 3,410 lb thrust.

Dimensions: span 35 ft 7 1/4 in, length 35 ft 0 1/4 in, height 12 ft 2 in.

Weights: empty 5,920 lb, gross 10,090–11,500 lb.

Performance (trainer at 8,680 lb gross weight, internal fuel only): max speed 539 mph, max cruising speed 495 mph, ceiling 47,000 ft, T-O run 1,350 ft, landing from 50 ft: 2,070 ft, range 1,150 miles.

Accommodation: crew of two, on tandem ejection seats.

Armament: three attachment points under each wing for up to 4,000 lb of gun or rocket pods, bombs, wire-guided missiles, camera pack, or drop fuel tanks.

MB-339

Aermacchi delivered its 200th MB-339 in April this year. The first production MB-339A for the Italian Air Force (4,000 lb thrust Viper 632-43 engine) flew July 20, 1978; the total of 105 eventually delivered included three MB-339RM (radiomisure) calibration aircraft (since restored to trainer duties) and 21 MB-339PANs for the Frece Tricolori aerobatic display team, with added smoke generator but with wingtip tanks deleted to aid formation keeping. Most IAF MB-339As are camouflaged for use as an emergency close-support force. MB-339As were also delivered to Argentina (Navy, 10 AA), Dubai (seven), Ghana (four), Malaysia (13 AM, with MB-339C-standards avionics and Marte 2A antiship ASMs), Nigeria (12 AN), and Peru (16 AP). The MB-339B prototype of 1984, with a 4,400 lb thrust Viper 680-43, larger tip tanks, EFIS displays, and air-to-air refueling capability, paved the way for more recent models.

A first flight Dec. 17, 1985, introduced the MB-339C, produced for the Royal New Zealand Air Force (18) and Eritrean Air Force (six). This has an uprated engine, new vertical tail surfaces, HOTAS controls, and advanced systems including GEC-Marconi radar, twin computers for navigation and weapons release, a stores management system, twin HUDs, an RWR, one monochrome multifunction display (MFD), INS, radar altimeter, laser range finder/chaff/flare dispenser, and active ECM pod. The RNZAF aircraft equip No. 14 Sq. and the Pilot Tng. School. Later variants are the MB-339CD (C digital) and MB-339FD (full digital), with Viper 632-43 and 680-43 power plants, respectively. Italy operates 15 of the former, with all-digital avionics, HOTAS controls, and provision for in-flight refueling, as lead-in trainers for Tornado crews. The export FD, not yet ordered, differs mainly in having three color liquid crystal MFCs in each cockpit. (Data for MB-339C.)

Contractor: Aermacchi, Italy.

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

Dimensions: span over integral tip tanks 36 ft 9 3/4 in, length 36 ft 10 1/2 in, height 13 ft 1 in.

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

Performance (at 10,983 lb clean gross weight): max speed at S/L 558 mph, at 30,000 ft 508 mph, stalling speed 98 mph, ceiling 46,700 ft, T-O run 1,610 ft, landing run 1,510 ft, ferry range with two drop tanks 1,266 miles, g limit +7.33.

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

Armament: six under-wing hardpoints for up to 4,000 lb of stores incl 12.7-mm or 30-mm gun pods, rockets of 50-mm to 5-in caliber, 500-lb bombs, 100-mm runway demolition bombs, AIM-9L Sidewinder or Magic AAMs, AGM-65 Maverick ASMs, Marte MK 2A sea-skimming antiship missiles, and other weapons.

MiG-AT

The first of three prototype MiG-ATs flew for the first time March 21, 1996, and the trainer is being evaluated in competition with the Yak-130 to replace Czech L-29 and L-39 trainers in Russian service. The configuration is conventional, except for the overwing engine ducts

to reduce risk of FOD; but the airframe is state of the art. Control is fly-by-wire, with carbon fiber honeycomb fin, tailplane, and control surfaces. Avionics, integrated by the GoSNIAS research institute in Russia and Sextant Avionique of France, include two liquid-crystal color MFDs in each cockpit, helmet-mounted displays, and a wide-field HUD with input from color video and TV camera. The standard suite provides for onboard simulation of maneuvering targets, weather conditions, and system failures via the HUD, as well as specific training for all operational modes of individual types of Russian and foreign combat aircraft. Emergency equipment includes a "panic button" on the control stick, to restore the aircraft to a wings-level, nose-up attitude in flight.

The basic MiG-AT is capable of training and combat use with AAMs, in conjunction with a helmet-mounted target designator, and with unguided weapons against land and sea targets. In MiG-ATS form, it carries a guidance pod for ASMs. The MiG-AS will be a single-seat light tactical fighter with a built-in gun and radar



MiG-AT, second prototype in ATS configuration (Paul Jackson)

for all-weather use of weapons carried on seven hardpoints. Manufacture of 15 preproduction aircraft for operational evaluation is under way. The Russian requirement is for 200-250 trainers in this category. (Data for basic MiG-AT.)

Contractor: MAPO-MiG, Russia.

Power Plant: two Turbomeca-SNECMA Larzac 04-R20 turbofans initially; each 3,175 lb thrust. Indigenous engine under development for production aircraft.

Dimensions: span 33 ft 4 in, length 39 ft 5 in, height 14 ft 6 in.

Weight: gross 10,163-15,430 lb.

Performance (estimated): max speed at 8,200 ft 621 mph, at S/L 528 mph, ceiling 45,940 ft, T-O run 1,775 ft, landing run 1,870 ft, range 745 miles at Mach 0.5, ferry range 1,242 miles, g limits +8/-3.

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

Armament (MiG-AS): up to 4,410 lb of guided and unguided missiles, guns, and bombs, on seven hardpoints (one on centerline, two at wingtips, two under each wing).

S.211

First flown April 10, 1981, the basic S.211 was supplied to the air forces of Singapore (30) and Philippines (24). The first six for Singapore were delivered as kits and the remainder produced locally. Most of the 29 still active fly with No. 130 Sq. from RAAF Pearce in Western Australia, where pilots of the Singapore Air Force receive their basic training. The first four Philippine S.211s were Italian-built; the remainder were assembled in Manila by PADC, but attrition has reduced the fleet to 18, of which only 10 are believed to be airworthy. They are used for advanced training by No. 100 TW at Fernando AB and for combat training by No. 5 FW at Basa AB.

An updated version, the S.211A, with a more powerful (3,190 lb thrust) JT15D-5C turbofan and supercritical wings with drooped tips, made its first flight Sept. 17, 1992, but has not yet attracted customers. Compared with the original S.211, the A has higher gross weights (6,393-8,267 lb) and a max speed of 476 mph at 25,000 ft. New wing fittings raise the g limits to +7/-3.5. (Data for basic S.211.)

Contractor: AerMacchi (originally SIAI Marchetti), Italy.

Power Plant: one Pratt & Whitney Canada JT15D-4C turbofan; 2,500 lb thrust.

Dimensions: span 27 ft 9 in, length 31 ft 3 3/4 in, height 12 ft 2 1/4 in.

Weights: empty 4,078 lb, gross 6,063-6,944 lb.

Performance (at 5,511 lb gross weight): max cruising speed at 25,000 ft 414 mph, stalling speed (gear and flaps down) 86 mph, ceiling 40,000 ft, T-O run 1,280 ft, landing run 1,185 ft, max range on internal fuel 1,036 miles, g limits (clean) +6/-3.

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

Armament: two hardpoints under each wing for up to 1,455 lb of gun pods (single or twin guns), rocket launchers, bombs, napalm tanks, cartridge throwers, two camera/IR reconnaissance pods, or two drop tanks. Philippine Air Force aircraft can carry a 0.50-in gun pod under the front fuselage.

Saab 105 (SK60)

In service since 1966, the Saab 105 has since 1967 been the Swedish Air Force's only training aircraft, covering all aspects from primary to advanced, weapon,

and tactical tuition. A total of 150 were delivered in five versions: SK60A two-seat primary/basic/advanced trainer; SK60B two-seat light attack/advanced trainer; SK60C two-seat light attack/reconnaissance/advanced training aircraft; SK60D four-seat liaison; and SK60E four-seat liaison with civil avionics. Of these, 105 are embarking on their third lease of life, following a wing strengthening/life extension program carried out during 1988-91. These aircraft (about 40 As, 25 Bs, and 40 Cs) are being refitted in 1995-98 with 1,800 lb thrust Williams-Rolls FJ44-1C turbofans, with which they are redesignated SK60W and destined to continue in service until 2015. Instruments and avionics are also being upgraded. The SK60Ws are in service with the Basic Flying School of F5 Wg, at Ljungbyhed and No. 5 Light Attack and Basic Tactical TS at Uppsala. The Ds and Es (about 20 aircraft) are used for support duties.

Forty Saab 105XTs, with General Electric J85 engines, strengthened structure, more internal fuel, more advanced avionics, and much greater weapon-carrying capability than the Swedish version, were built for the Austrian Air Force during 1970-72, under the designation 105OE. About 30 remain in service for conversion training, ground attack, and tactical reconnaissance with an under-wing Vinten camera pod. (Data for SK60A; 105OE in parentheses.)

Contractor: Saab Military Aircraft, Sweden.

Power Plant: two Turbomeca/SNECMA RM9B Aubisque turbofans (General Electric J85-GE-17B turbojets); each 1,636 lb (2,850 lb) thrust.

Dimensions: span 31 ft 2 1/4 in, length 35 ft 5 1/4 in, height 8 ft 10 1/2 in.

Weights: empty 6,404 lb (6,281 lb), gross 9,085 lb (10,218 lb).

Performance (trainer): max speed at S/L 453 mph (602 mph), at 20,000 ft 478 mph (578 mph), ceiling 39,370 ft (44,950 ft), T-O run 3,002 ft (1,247 ft), landing run 1,640 ft (1,969 ft), ferry range 1,180 miles (1,430 miles).

Accommodation: crew of two, side by side on ejection seats (four fixed seats in SK60D/E).

Armament (SK60B/C): up to 1,764 lb on six under-wing hardpoints. Two 30-mm Aden gun pods or 12.7-mm practice gun pods; up to 12 x 135-mm rockets or six 60-mm practice rockets. (Up to 4,410 lb on 105OE.)

T-2 and T-2A

A quarter-century ago, the XT-2 prototype was the first supersonic aircraft designed and manufactured by Japan's aerospace industry. Ninety production aircraft were manufactured for the Air Self-Defense Force, of which 28 were configured as T-2 unarmed advanced trainers and the rest as T-2A armed combat proficiency trainers. Standard equipment includes Mitsubishi Electric AWG-11 radar, HUD, and SIF/IFF. Twenty-five T-2s and 54 T-2As are currently in service.

Contractor: Mitsubishi, Japan.

Power Plant: two Ishikawajima-Harima TF40-IHI-801A (license-built Rolls-Royce Turbomeca Adour Mk 801A) turbofans; each 7,305 lb thrust with afterburning.

Dimensions: span 25 ft 10 1/4 in, length 58 ft 7 in, height 14 ft 5 in.

Weights: empty 13,905 lb, gross 21,616-28,219 lb.

Performance (clean): max speed at height Mach 1.6, ceiling 50,000 ft, T-O run 2,000 ft, ferry range 1,610 miles.

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

Armament (T-2A): one JM61 Vulcan multibarrel 20-mm gun in lower fuselage, aft of cockpit on port side. Hardpoints on centerline and two under each wing for up to 4,410 lb of drop tanks or weapons. Wingtip attachments for Sidewinder AAMs.

T-2 Buckeye

Although the US Navy's T-2C Buckeyes are being replaced gradually by T-45A Goshawks, about 100 remain active, mostly at NAS Meridian, Miss., and Pensacola, Fla. They provide jet pilot, navigator, NFO, and weapons training, plus the carrier qualification part of the strike training syllabus.

The Venezuelan Air Force acquired 24 T-2Ds, generally similar to the C except for their avionics and deletion of carrier landing capability. Eighteen still serve as advanced trainers with No. 142 Sq. of the Air Academy at Maracay, some with a secondary attack capability. The attack kit was developed originally for 40 T-2Es supplied to the Greek Air Force; 35 still equip Sqs. 362 and 363 at Kalamata, for advanced and weapons training, respectively, with provision for 3,500 lb of stores on six under-wing hardpoints. (Data for T-2C.)

Contractor: Rockwell (originally North American), USA.

Power Plant: two General Electric J85-GE-4 turbojets; each 2,950 lb thrust.

Dimensions: span over tip tanks 38 ft 1 1/2 in, length 38 ft 3 1/2 in, height 14 ft 9 1/2 in.

Weights: empty 8,115 lb, gross 13,180 lb.



S.211, Philippine Air Force (Anglo Philippine Aviation)



SK60W, Swedish Air Force



T-2A, Japan Air Self-Defense Force (Katsumi Hinata)

Performance: max speed at 25,000 ft 530 mph, stalling speed 100 mph, ceiling 45,500 ft, max range 1,070 miles.

Accommodation: crew of two, on tandem ejection seats. Rear seat raised.

Armament: two under-wing hardpoints for up to 640 lb of practice bombs, gun pods, or rocket launchers.

T-4

First flown July 29, 1985, this unarmed intermediate trainer and combat support aircraft was developed to replace the Lockheed T-33As and Fuji T-1s of the Japan Air Self-Defense Force. Including the four prototypes, 184 had been ordered (of a total of about 200 required) and 153 delivered by spring 1997. As well as equipping Nos. 31 and 32 Sqs. of the 1st Air Wg. of Air Tng. Command at Hamamatsu, Nos. 11, 21, and 22 Sqs. of the 4th Wg. at Matsushima, and No. 13 FTW at Ashiya, they are used by the instrument rating and communications flights of combat squadrons. Four under-wing hardpoints can carry drop tanks or travel pods; an under-fuselage pylon can be used for target-towing equipment, an ECM/chaff dispenser pod, or air sampling pack.

Eight T-4s equip the JASDF's Blue Impulse aerobatic team. These have windscreens more resistant to bird strikes, increased rudder movement, and one fuel tank replaced by an oil tank for smoke trails.

Contractor: Kawasaki, Japan.

Power Plant: two Ishikawajima-Harima F3-IHI-30 turbofans; each 3,680 lb thrust.

Dimensions: span 32 ft 7 1/2 in, length incl nose probe 42 ft 8 in, height 15 ft 1 1/4 in.

Weights: empty 8,356 lb, gross 12,430-16,535 lb.

Performance (at 12,544 lb clean gross weight): cruising speed Mach 0.75, ceiling 50,000 ft, T-O run 2,000 ft, landing run 2,100 ft, max range with two drop tanks 1,036 miles, g limits +7.33/-3.

Accommodation: crew of two, on tandem ejection seats. Rear seat raised.

Armament: none.

T-33A Shooting Star

The number of survivors diminishes a little more each year, yet a half-century after this two-seat descendant of America's first operational jet fighter first flew (as the TP-80C) March 22, 1948, it still shows no sign of retiring from service. Pilot training is still the duty of South Korean (25) and Thai (four) T-33As, but most others are employed for other roles. AT-33A counterinsurgency versions are still flown by Bolivia (seven, plus 11 T-33As), Mexico (30), Paraguay (six), and Uruguay (five). Pakistan operates nine T-33As as target tugs, plus two of the RT-33A tactical reconnaissance version; Thailand also has three RT-33As. Largest T-33A fleets are those of Canada, whose 45 CT-133A Silver Stars still have their original 5,100 lb thrust Rolls-Royce Nene engines; Greece (47); and Japan (20). Greek T-33As are used for combat support; Japan's T-33As are now used only for liaison and other duties. Canada's CT-133As also serve with combat support squadrons. Ten are modified as ET-133 "electronic aggressors;" others are used for maritime support. A digital cockpit upgrade is under way for 35 aircraft, with an option for the other 10. (Data for T-33A.)

Contractor: Lockheed, USA.

Power Plant: one Allison J33-A-35 turbojet; 5,400 lb thrust.

Dimensions: span 38 ft 10 1/2 in, length 37 ft 9 in, height 11 ft 8 in.

Weights: empty 8,084 lb, gross 11,965-14,442 lb.

Performance: max speed at S/L 590 mph, at 25,000 ft 543 mph, ceiling 48,000 ft, max range 1,275 miles.

Accommodation: crew of two, in tandem.

Armament: none in T-33A; provision for 0.50-in twin-gun pod under each wing in AT-33A.

T-37 Tweet

More than 40 years after the first flight of Cessna's Model 318 side-by-side trainer prototype, Oct. 12, 1954, the T-37B major production version will remain USAF's standard primary trainer until the T-6A Texan II begins to replace it in about two years' time. As of September 1996, USAF listed 420 active, with an average age of 33.2 years. All are being upgraded by SLEP kits manufactured by Sabreliner Corp. The majority are operated by AETC, but a number serve at ACC bases. Twelve were transferred to Bangladesh in late 1995, to replace Magisters. Germany has 34 T-37Bs, based in the US.

The T-37C, delivered to fill MAP orders only, is generally similar to the B in its primary and intermediate training roles but also has provision for under-wing armament, a gunsight, and reconnaissance camera. The South Korean Air Force has 25 T-37Cs; mixed fleets of T-37Bs and Cs are operated by the air forces of Chile (15), Columbia (5 + 4), Greece (17 + 18), Pakistan (50), Thailand (12), and Turkey (62). (Data for T-37B.)

Contractor: Cessna, USA.

Power Plant: two Continental J69-T-25 (license Turbomeca Marboré) turbojets; each 1,025 lb thrust.



T-4, Japan ASDF Blue Impulse display team (Shojiro Ootake)



T-33A, Royal Thai Air Force (Denis Hughes)



T-38A Talon, Taiwan Air Force (Peter R. Foster)



T-45A Goshawks of TW-2, US Navy

Dimensions: span 33 ft 9 1/4 in, length 29 ft 3 in, height 9 ft 2 1/4 in.

Weights: empty 3,870 lb, gross 6,575 lb.

Performance: max speed at 25,000 ft 426 mph, cruising speed at 35,000 ft 360 mph, ceiling 35,100 ft, T-O to 50 ft: 2,000 ft, landing from 50 ft: 2,545 ft, range at 360 mph with standard fuel 870 miles.

Accommodation: crew of two, side by side on ejection seats.

Armament (T-37C): provision for two 250-lb bombs under wings, or four Sidewinder AAMs, and for fuselage-mounted camera.

T-38 and AT-38 Talon

The first US supersonic aircraft designed from the start as a trainer, the YT-38 prototype first flew April 10, 1959, and was followed by 1,187 production T-38As over the next decade. More than 1,100 of these were for USAF, which still had 378 on charge in late 1996, mostly with AETC but also including some allocated for Companion Trainer Program duty with ACC. A SLEP named Pacer Classic is extending the service life of USAF's T-38s until 2020. The original total included 46 (of which 40 remain) allocated for US-based training of German pilots. NASA has 31; the US Navy received 18 (of which about six remain). Other current T-38A operators are South Korea (30 leased), Taiwan (40 leased), and Turkey (69).

A total of 132 of the USAF aircraft were modified to AT-38B configuration for specialized weapons training, with an under-fuselage gun pod or practice bomb dispensers; 73 of these remained in September 1996. Boeing, with Israel Aircraft Industries as major subcontractor, is to upgrade two Talons to T-38C standard with HUD, cockpit MFDs, HOTAS controls, INS with embedded GPS, and a collision avoidance system. First flight is slated for June 1998, with the prospect of up to 425 production upgrades to follow from 1999. (Data for T-38A.)

Contractor: Northrop, USA.

Power Plant: two General Electric J85-GE-5A turbojets; each 3,850 lb thrust with afterburning.

Dimensions: span 25 ft 3 in, length 46 ft 4 1/2 in, height 12 ft 10 1/2 in.

Weights: empty 7,164 lb, gross 12,093 lb.

Performance: max speed at 36,000 ft more than Mach 1.23 (812 mph), typical cruising speed at 43,400 ft 578 mph, stalling speed (gear and flaps down) 156 mph IAS, ceiling above 55,000 ft, T-O run 2,500 ft, landing run 3,000 ft, range 1,093 miles.

Accommodation: crew of two, on tandem ejection seats. Rear seat raised.

Armament: none in T-38A; SUU-11 0.30-in gun pod or SUU-20/A rocket/practice bomb carrier in AT-38B.

T-45A Goshawk

Based on the British Aerospace Hawk, the T-45A won a 1981 competition for an undergraduate jet pilot trainer to replace the US Navy's T-2C Buckeye and TA-4J Skyhawk. First flight took place April 16, 1988. Changes introduced by the US prime contractor, McDonnell Douglas (now Boeing), include a new main and nose landing gear, an arrester hook, and airframe strengthening to make the aircraft carrier-compatible. The Hawk airbrake and ventral strakes are replaced, avionics and cockpit displays changed for compatibility with USN front-line fighters, and full-span leading-edge slats added. Production was initiated in FY 1988. At present, 170 T-45As are planned to enter USN service by 2006, of which 108 had been contracted by FY 1997. A prototype with a digital/"glass" Cockpit 21, HUD, and GPS/INS navigation flew March 19, 1994, and production aircraft to this standard, beginning with the 84th T-45A, were to begin delivery to NAS Meridian, Miss., in October this year. Earlier aircraft will be retrofitted.

A first group of US Navy student pilots began flying T-45A Goshawks of Sq. VT-21, Kingsville, Texas, in early 1994 and graduated Oct. 5. Clearance for fleet introduction was recommended July 5, 1994, with USS Forrestal as the primary sea platform. The T-45 fleet had totaled 10,000 flight hours by February 1997.

Contractors: Boeing (McDonnell Douglas), USA, and British Aerospace, UK.

Power Plant: one Rolls-Royce Turbomeca F405-RR-401 (Adour Mk 871) turbofan; 5,845 lb thrust.



Yak-130 prototype (Photo Link)

Dimensions: span 30 ft 9 3/4 in, length (incl probe) 39 ft 4 in, height 14 ft 0 in.

Weights: empty 9,834 lb, gross 12,750–14,081 lb.

Performance: max speed at 8,000 ft 625 mph, max Mach number in dive 1.04, ceiling 40,000 ft, T-O to 50 ft: 3,610 ft, landing from 50 ft: 3,310 ft, ferry range, internal fuel 952 miles, g limits +7.33/-3.

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

Armament: one pylon under each wing for practice multiple bomb rack, rocket pod, or drop fuel tank. Provision for centerline stores pod.

TS-11 Iskra-Bis

Developed for the Polish Air Force in preference to the Czech L-29 Delfin, the *Iskra* prototype first flew in February 1960, and the first of 423 production examples entered service in 1964. About 100 remain with the PAF, some with the official aerobatic display team. The initial *Iskra 100* (31 built) had a 1,720 lb thrust HO-10 turbojet, replaced from 1967 by the 2,205 lb thrust SO-1, from 1969 by the identically rated SO-3, and finally by the SO-3W. There were four basic mission models. The *Iskra 100-Bis A* (45 built) and *B* (134 built) were two-seat primary trainers, with two and four under-wing hardpoints, respectively; the *Iskra 200 ART-Bis C* (five built) was a single-seat reconnaissance version; the *200 SB-Bis DF* (208 built) was similar to the *B* but with a wider range of weapons and had three Soviet AFA-39 cameras in the nose. Polish Air Force downsizing has resulted in several *Iskras* being sold in the civil market.

Six DFs were converted to *TS-11R* configuration for the Polish Naval Air Force's 7th Regiment a few years ago. With a Bendix/King RDS-81 weather radar in the nose and the rear cockpit dual controls replaced by a radar display screen and artificial horizon, they fulfill a dual attack and coastal reconnaissance role. Eleven others are employed as standard trainers.

About 30 of the 50 *Iskras* acquired in 1975–76 for the Indian Air Force Academy at Hakimpet are still in service. (Data for *Iskra 200 SB-Bis DF*.)

Contractor: PZL Mielec, Poland.

Power Plant: one Instytut Lotnictwa SO-3W turbojet; 2,425 lb thrust.

Dimensions: span 33 ft 0 in, length 36 ft 7 in, height 11 ft 5 1/2 in.

Weights: empty 5,655 lb, gross 8,232–8,465 lb.

Performance (at 8,232 lb gross weight): max speed at 16,400 ft 478 mph, normal cruising speed 373 mph, stalling speed (gear and flaps down) 114 mph, ceiling 37,725 ft, T-O run 2,150 ft, landing run 2,330 ft, range 783 miles, g limits (ultimate) +8/-4.

Accommodation: crew of two, on tandem lightweight ejection seats.

Armament: 23-mm gun in starboard side of nose; two hardpoints under each wing for gun or rocket pods or small bombs of up to 220 lb.

Yak-130

Developed by Yakovlev in partnership with AerMacchi of Italy, the prototype *Yak-130* first flew April 25, 1996, and is competing with the MiG-AT to replace L-29 and L-39 jet trainers of the Russian Air Force. Ten, including the three prototypes, have been ordered by the Russian government, and the Slovak Air Force has stated a firm requirement for "a substantial batch." The *Yak-130* has a three-channel digital fly-by-wire control system but is inherently stable. Production *Yak-130s* are intended to have five percent longitudinal instability, to reproduce the handling characteristics of the MiG-29/Su-27 families of combat aircraft, and will be

slightly smaller than the prototype. The winglets fitted originally have been removed, pending redesign.

The advanced configuration of the *Yak-130* is intended to permit flight at angles of attack up to 35° (over 30° already demonstrated). Each cockpit is equipped with two liquid-crystal color MFDs, with a front cockpit HUD forming part of a collimated flight and sighting display linked with the pilot's helmet-mounted target designator. Radar is optional. Roles will range from basic pilot training to weapons training and light fighter/attack/reconnaissance missions. A projected naval version, with folding wings, will make possible aircraft carrier deck training. (Estimated data for production *Yak-130*.)

Contractor: Yakovlev OKB, Russia.

Power Plant: two RD-35M (Klimov-modified ZMKB Progress DV-2) turbofans; each 4,852 lb thrust.

Dimensions: span 34 ft 1 1/2 in, length 36 ft 10 1/2 in, height 15 ft 7 1/2 in.

Weight: gross 11,905–19,841 lb.

Performance: max speed at height 607 mph, at S/L 621 mph, ceiling 41,000 ft, T-O run 1,020 ft, landing run 1,590 ft, max range 1,380 miles, g limits +8/-3.

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

Armament: provision for seven (optionally nine) hardpoints for up to 6,614 lb of weapons training and attack stores, incl AAMs, ASMs, and laser-guided weapons.

Piston-Engine Trainers

Air Beetle

This fully aerobatic military primary trainer first flew in 1989, and the three prototypes completed 1,750 hours of flight testing by 1993. The Nigerian Air Force then ordered 60 *T 18 Air Beetles*, at a production rate of up to three per month, to replace its BAe Bulldogs. The design is based on the US Van's RV-6A homebuilt lightplane, with the assistance of Dornier of Germany. The flat-four engine can run on either avgas or mogas. Conventional three-axis flying controls are all equipped with electric trim, and a Bendix/King IFR package is standard. The *T 18* is Nigeria's first production aircraft, but it has not been possible to establish how many have so far been completed. Future versions were planned to include the 160 hp *T 16* and the 200 hp *T 20*, but there has been no recent news of any progress with these. (Data for *T 18*.)

Contractor: AIEP, Nigeria.

Power Plant: one Textron Lycoming O-360-A1A piston engine; 180 hp.

Dimensions: span 23 ft 0 in, length 20 ft 2 1/4 in, height 7 ft 6 1/2 in.

Weights: empty 1,100 lb, gross 1,850 lb.

Performance: max speed at S/L 173 mph, max cruising speed at 10,000 ft 178 mph, stalling speed (flaps down) 58 mph, ceiling 20,000 ft, T-O run 480 ft, landing run 725 ft, range 605 miles, g limits +6/-3.

Accommodation: crew of two, side by side; up to 66 lb of baggage aft of seats.

Armament: none.

Airtrainer CT4

Twenty-three of these small primary trainers are in

service with No. 1 Flying Tng. School of the Royal Thai Air Force, with whom they have the service designation **BF.16**. Six are **CT4Bs**, built to supplement the remaining 17 of 24 **CT4As** delivered in the 1970s and recently modified by the RTAF to extend their wing-fatigue life. Pupils at No. 1 FTS at Kampensaeng fly 65 hours on the CT4 before changing up to the PC-9s of No. 2 FTS. Twelve **CT4Bs** built for the BAe/Ansett Flying College in 1991–92 provide pilot training for the Royal Australian Air Force. The Royal New Zealand Air Force, with 17 of its original 19 **CT4Bs**, is the only other military operator. These serve with the CFS and Pilot Tng. School at Ohakea. Three took part in conspicuity trials in 1995, painted in different black, white, and yellow color schemes and fitted with strobe lights. (Data for **CT4B**.)

Contractor: Pacific Aerospace, New Zealand.

Power Plant: one Teledyne Continental IO-360-HB9 piston engine; 210 hp.

Dimensions: span 26 ft 0 in, length 23 ft 2 in, height 8 ft 6 in.

Weights: empty approx 1,600 lb, gross 2,650 lb.

Performance: max speed at S/L 166 mph, max cruising speed at S/L 161 mph, stalling speed (flaps down) 51 mph, ceiling 14,500 ft, T-O run 733 ft, landing run 510 ft, max range 691 miles, g limits +6/-3.

Accommodation: two seats, side by side. Space to rear for third seat or 115 lb of baggage.

Armament: none.

AS 202 Bravo

This two/three-seat piston-engined primary trainer continues in military service in four countries, and a turboprop version is also available; but no new orders have been announced for some years. Subtypes with a 180 hp Textron Lycoming engine include the **AS 202/18A2**, with higher max T-O and landing weights than the basic **18A**, an extended canopy, and electric instead of mechanical trim; the **A3**, which differs from the **A2** in having mechanical trim, and 24V instead of 12V electrics; and the **A4**, with British CAA-approved special instrumentation. All versions are fully aerobatic. Estimated numbers in current service are 25 with No. 101 Primary Tng. Sq. of the Indonesian Air Force; 20 with the Iraqi Air Force; 10 at the Royal Moroccan Air Force Tng. School, Marrakech-Ménara AB; and two with the Royal Air Force of Oman.

The **AS 202/32TP Turbine Bravo** is similar to the **AS 202/18A4** but has a 420 shp Allison 250-B17D turboprop. Wingtip fuel tanks increase span to 32 ft 7 3/4 in; length is 25 ft 6 1/4 in. Max T-O weight is unchanged. No military order has yet been announced. (Data for **AS 202/18A4**.)

Contractor: FFA Flugzeugwerke Altenrhein, Switzerland.

Power Plant: one Textron Lycoming AEIO-360-B1F piston engine; 180 hp.

Dimensions: span 32 ft 1 in, length 24 ft 7 1/4 in, height 9 ft 2 1/4 in.

Weights: empty 1,565 lb, gross (utility) 2,380 lb.

Performance (at max gross weight): max speed at S/L 150 mph, stalling speed (flaps down) 56 mph, ceiling 17,000 ft, T-O run 705 ft, landing run 690 ft, max range 707 miles, g limits (aerobatic) +6/-3.

Accommodation: crew of two, side by side in aerobatic version; space behind these in utility version for third seat or 220 lb of baggage.

Armament: none.

Bulldog

The first 98 production **Bulldog Series 100s** were followed by the **Series 120**, with a strengthened wing center section and higher aerobatic takeoff weight. Eighty-five of the RAF's 102 surviving **Bulldog T. Mk 1s** (Model 121), which equip British University Air Sqs. and Air Experience Flights, are to be replaced by civilian-operated trainers; 11 others are used by No. 3 Flying Tng. School. **Bulldogs** also serve with the air forces of Jordan (15 Model 125/125A), Kenya (12 Model 103/127), Lebanon (five Model 126), and Malaysia (10 Model 102). The Swedish Air Force has about 60 **Bulldog 101s** (SwAF designation **SK61**), but these are used for liaison and other nontraining duties. (Data for **Series 120**.)

Contractor: British Aerospace, UK.

Power Plant: one Textron Lycoming IO-360-A1B6 piston engine; 200 hp.

Dimensions: span 33 ft 0 in, length 23 ft 3 in, height 7 ft 5 1/4 in.

Weights: empty 1,430 lb, gross 2,238–2,350 lb.

Performance: max speed at S/L 150 mph, max cruising speed at 4,000 ft 138 mph, stalling speed (flaps down) 61 mph EAS, ceiling 16,000 ft, T-O run 900 ft, landing run 500 ft, max range 621 miles, g limits +6/-3.

Accommodation: crew of two, side by side; optional third seat or 220 lb of baggage at rear.

Armament: normally none, but provision for four underwing hardpoints for up to 640 lb of air-to-surface weapons, machine gun pods, bombs, grenade launchers, or other stores.

CAP 10

Only two of the 56 fully aerobatic CAP 10s and later CAP 10Bs (enlarged rudder) used by the French Air Force to upgrade cadet pilots now remain, the rest having been withdrawn for sale from 1995. However, eight CAP 10Bs still serve with No. 51 Escadrille de Servitude of the French Navy. Two others are attached to the Royal Moroccan Air Force's aerobatic team of single-seat CAP 231s. The South Korean Air Force acquired two CAP 10Bs for evaluation in 1994, but an expected larger order did not materialize. (Data for CAP 10B.)

Contractor: Avions Mudy, France.

Power Plant: one Textron Lycoming AEIO-360-B2F piston engine; 180 hp.

Dimensions: span 26 ft 5¼ in, length 23 ft 6 in, height 8 ft 4½ in.

Weights: empty 1,213 lb, gross 1,675–1,829 lb.

Performance (at 1,829 lb max gross weight): max speed at S/L 168 mph, max cruising speed 155 mph, stalling speed (flaps down) 50 mph IAS, ceiling 16,400 ft, T-O run 1,150 ft, landing run 1,185 ft, max range 621 miles, g limits +6/-4.5.

Accommodation: crew of two, side by side; space behind seats for 44 lb of baggage.

Armament: none.

CJ-6A

This Chinese primary trainer was developed from the veteran Soviet Yak-18, which was itself license-built at Nanchang, as the CJ-5, between 1954 and 1958. Shenyang's original CJ-6 (first flight Aug. 27, 1958) was underpowered with only a 145 hp Mikulin M-11ER engine but improved two years later when this was replaced by a 260 hp Ivchenko AI-14R. A new prototype flew July 18, 1960, and further redesign by Nanchang, which then took over development, resulted in flight of the first production-standard aircraft Oct. 15, 1961. More than 2,200 CJ-6s have been built, and some 1,500 are still in Chinese service. Standard version since December 1965 has been the CJ-6A (Westernized designation PT-6A), with uprated engine, although 10 armed CJ-6Bs were built in 1964–66. The CJ-6A retains the general configuration of the Yak-18A/CJ-5 but has an all-metal airframe and fully retractable landing gear, with low-pressure tires for operation from grass strips. Export examples are currently operated by Albania (20), Bangladesh (38), North Korea (100 or more, including some CJ/PT-5s), and Zambia (10). (Data for PT-6A.)

Contractor: Nanchang Aircraft, China.

Power Plant: one SAEC (Zhuzhou) HS6A radial piston engine (Chinese development of AI-14R); 285 hp.

Dimensions: span 33 ft 6½ in, length 27 ft 9 in, height 10 ft 8 in.

Weights: empty 2,414 lb, gross 3,086 lb.

Performance: max speed 185 mph, landing speed 72 mph, ceiling 20,500 ft, T-O run 920 ft, landing run 1,150 ft, max range 428 miles.

Accommodation: crew of two, in tandem.

Armament: none.

F33 Bonanza

The F33C and nonaerobatic F33A are conventional-tailed versions of Beech's V-tailed Model 35 Bonanza. The Iranian Air Force has about 20 A/Cs and is reported to have developed its own derived version. The Mexican Air Force's flying school at Zapopan has 35 F33Cs for basic training; its Navy's counterpart has six F33Cs and five F33As. The Spanish Air Force uses 24 F33As (designated E.24A) at the Air Academy's navigation school, San Javier, and with No. 421 Sq. at Getafe to provide refresher training for transport pilots and for communications. Indonesia's Navy has two F33As. Four F33Cs serve with the Ivory Coast Air Force, and the Colombian Navy has two. Three, owned by the airline Lufthansa, are used for pilot grading by the German Air Force training squadron at Goodyear, Ariz. (Data for F33A.)

Contractor: Raytheon Aircraft, USA.

Power Plant: one Teledyne Continental IO-520-BB piston engine; 285 hp.

Dimensions: span 33 ft 6 in, length 26 ft 8 in, height 8 ft 3 in.

Weights: empty 2,242 lb, gross 3,400 lb.

Performance: max speed at S/L 209 mph, max cruising speed at 6,000 ft 198 mph, stalling speed (flaps and gear down) 59 mph IAS, ceiling 17,850 ft, T-O run 1,000 ft, landing run 760 ft, max range 1,023 miles.

Accommodation: four seats, in tandem pairs; optional fifth seat.

Armament: none.

G 115

Two versions of this all-composites side-by-side two-seat light aircraft have been selected for military pilot training, and the type has been short-listed as a possible replacement for the Royal Air Force's Bulldogs. Short Brothers of the UK operates five G 115D2s, known as Herons, to provide elementary training for

cadet pilots at the Plymouth-based Royal Navy Flying Grading Flight. This model is fully aerobatic, with a 160 hp AEIO-320 fuel-injection engine, and fuel and oil systems for inverted flight.

Top-of-the-range model, developed originally for USAF's Enhanced Flight Screener competition, is the G 115TA Acro, which has beaten established competition aircraft in aerobatic contests. A 260 hp engine, three-blade constant-speed propeller, and retractable landing gear ensure a greatly enhanced performance. It was first flown June 11, 1992, and 12 were recently delivered to the United Arab Emirates Air Force (Abu Dhabi), which has options on 12 more. (Data for G 115D2; G 115TA Acro in parentheses.)

Contractor: Burkhart Grob, Germany.

Power Plant: one Textron Lycoming AEIO-320-D1B (AEIO-540-D4A5) piston engine; 160 hp (260 hp).

Dimensions: span 32 ft 9¾ in (both), length 24 ft 11¼ in (26 ft 10¾ in), height 7 ft 10½ in (8 ft 5½ in).

Weights: empty 1,455 lb (1,962 lb), gross 2,183 lb (2,866 lb).

Performance: max speed at S/L 168 mph (205 mph), max cruising speed at 5,000 ft 155 mph (190 mph), stalling speed, flaps down 53 mph (66 mph), ceiling 16,000 ft (18,000 ft), T-O run 690 ft (1,025 ft), landing run 595 ft (725 ft), max range 598 miles with no reserves (814 miles with 45 min reserves), g limits +6/-3 (+6/-4).

Accommodation: two seats side by side.

Armament: none.

HPT-32 Deepak

The aerobatic HPT-32, which first flew Jan. 6, 1977, was designed for multirole capability, but with the key requirement to perform two consecutive training missions 50 km (31 miles) from base before needing to refuel. Of 142 Deepaks built (production ended in March 1997), eight serve with No. 550 Sq. of the Indian Navy at Cochin. Most of the others are used for primary training at the Indian Air Force Academy, Allahabad, and at its Instructor Tng. School at Tambaram.

Contractor: Hindustan Aeronautics, India.

Power Plant: one Textron Lycoming AEIO-540-D4B5 piston engine; 260 hp.

Dimensions: span 31 ft 2 in, length 25 ft 4 in, height 9 ft 5½ in.



CJ-6A, Chinese Air Force
(Kenneth Munson)



G 115TA, United Arab Emirates Air Force



MD3-160 Tiga, Royal Malaysian Air Force
(Paul Jackson)

Weights: empty 1,962 lb, gross 2,756 lb.

Performance: max speed at S/L 164 mph IAS, max cruising speed at 10,000 ft 132 mph, stalling speed (flaps down) 69 mph, ceiling 18,045 ft, T-O run 1,132 ft, landing run 720 ft, max range 462 miles, g limits +6/-3.

Accommodation: two seats, side by side.

Armament: none.

IR-02

Formed in 1993 as an affiliate of the Iranian Ministry of Industries, All (Aviation Industries of Iran) was tasked with developing an indigenous primary trainer to avoid dependence on foreign imports. The result is the IR-02, a conventional low-wing, fixed-gear design of mainly metal construction, tailored to European VLA (very light aircraft) certification standards. Program details are sparse as yet, but All began construction in 1996 on a prototype and hoped to make a first flight by the end of this year.

Contractor: Aviation Industries of Iran.

Power Plant: one Textron Lycoming O-320-B2B piston engine; 160 hp.

Dimensions: span 28 ft 0 in, length 20 ft 0 in, height 6 ft 8¼ in.

Weights: empty 990 lb, gross 1,650 lb.

Performance (estimated): max speed at S/L 172 mph, ceiling 21,060 ft, range 666 miles.

Accommodation: two seats, side by side.

Armament: none.

L-70 Vinka

A few Vinkas are detached for communications duties with combat wings of the Finnish Air Force, but most of the 28 in the inventory equip the Basic Tng. Division of the Air Academy at Kauhava. Their main roles are primary, aerobatic, night, instrument, and tactical training before pupils progress to jet-powered Hawks, but they can be used also for liaison, medevac, search and rescue, supply dropping, weapons training, target towing, and reconnaissance. The Vinka first flew July 1, 1975, and entered service in 1980. It is adaptable for ski takeoffs and landings.

Contractor: Valmet Aviation, Finland.

Power Plant: one Textron Lycoming AEIO-360-A1B6 piston engine; 200 hp.

Dimensions: span 31 ft 7¼ in, length 24 ft 7¼ in, height 10 ft 10¼ in.

Weights: empty 1,691 lb, gross 2,293–2,756 lb.

Performance (at 2,205 lb gross weight): max speed at S/L 146 mph, max cruising speed at 5,000 ft 138 mph, stalling speed (flaps down) 53 mph, ceiling 16,400 ft, T-O run 755 ft, landing run 575 ft, max range 590 miles, g limits +6/-3.

Accommodation: crew of two, side by side; space behind these for two more seats or up to 617 lb of baggage.

Armament: two hardpoints under each wing for (as two-seater) up to 661 lb of bombs, flare pods, rocket pods, machine gun pods, antitank missiles, TV or still camera pods, or life raft/rescue packs and a searchlight.

MD3-160 Tiga

The MD3-160 basic, aerobatic, and instrument trainer was designed in Switzerland in the late 1960s, but the prototype was not flown until Aug. 12, 1983, after further work by designer Max Dätwyler to achieve maximum component commonality in its construction. Nine identical pieces make up the ailerons, flaps, elevators, and rudder; five others the aileron, elevator, and rudder tabs; three more the tailplane halves and fin; and another three the fin and tailplane tips. Inner and outer interspar panels can be used on either wing, as can the glass-fiber wingtips and the four metal sections that make up the leading edge. A second prototype flew in 1990, and FAR Pts 21 and 23 certification was obtained in September 1992. The first prototype was later modified to MD3-116 standard, with a 116 hp Lycoming O-235-N2A engine; an MD3-160A prototype, with an AEIO-320 engine and modified fuel and oil systems, was also completed in Switzerland.

In 1993 the rights to the MD3 were sold to SME Aviation, which is producing 20 for the Indonesian Ministry of Communications' Curug flight training center as well as 20 for the Royal Malaysian Air Force's No. 1 Flying Tng. Center at Alor Setar. When the first two production Tigas were handed over to the RMAF on Dec. 7, 1995, following a first flight May 25, they represented the first aircraft of any type completely manufactured by that country's embryonic aircraft industry. (Data for MD3-160.)

Contractor: SME Aviation, Malaysia.

Power Plant: one Textron Lycoming O-320-D2A piston engine; 160 hp.

Dimensions: span 32 ft 9¾ in, length 23 ft 3¾ in, height 9 ft 7 in.

Weights: empty 1,411 lb, gross 1,852–2,337 lb.

Performance (at 1,852 lb aerobatic gross weight): max cruising speed at 5,000 ft 150 mph IAS, stalling

speed (flaps down) 53 mph IAS, T-O run 455 ft, landing run 570 ft, max range 677 miles, g limits +6/-3.

Accommodation: crew of two, side by side; space to rear for up to 110 lb of baggage.

Armament: none.

Mushshak, Safari, and Supporter

The initial versions of this family of two/three-seat light aircraft were produced in Sweden by Saab as the civil **Safari**, with under-wing hardpoints for stores, such as relief supplies, food, and medicines for disaster areas, and the military **Supporter** with weapon-carrying capability. The wings' 5° of forward sweep enhances the view from the cockpit, and provision is made for full IFR instrumentation and radio. Current operators of these aircraft, for training and other duties, include the air forces of Denmark (28, designated T-17), Norway (19), and Zambia (15, dual training/counterinsurgency).

Following the import of 15 Safari/Supporters from Sweden, 92 more were assembled from kits at Risalpur for the Pakistan Army and Air Force in 1975-81. The Pakistan Aeronautical Complex then became a licensed production center for the aircraft, known locally by the Urdu name **Mushshak** ("Proficient"). By early 1997 a further 167 had been delivered: 37 to the Pakistan Air Force and 96 to the Army, plus exports to Iran (25), Oman (three), and Syria (six). Production is continuing. (Data for *Mushshak*.)

Contractor: Pakistan Aeronautical Complex, Pakistan.
Power Plant: one Textron Lycoming IO-360-A1B6 piston engine; 200 hp.

Dimensions: span 29 ft 0½ in, length 22 ft 11½ in, height 8 ft 6½ in.

Weights: empty 1,424 lb, gross 1,984-2,645 lb.

Performance (at 2,205 lb utility gross weight): max speed at S/L 148 mph, stalling speed (flaps down) 63 mph, ceiling 15,740 ft, T-O run 495 ft, landing run 460 ft, endurance 5 hr 10 min, g limits (aerobatic) +6/-3.

Accommodation: two seats, side by side; provision for rearward-facing seat or 220 lb of baggage to rear.
Armament: provision for six under-wing hardpoints for up to 661 lb of external stores; typical loads can include two 7.62-mm or 5.56-mm machine gun pods, two pods of seven 75-mm or 2.75-in rockets, four pods of seven 68-mm rockets, 18 75-mm rockets, or six Bantam wire-guided antitank missiles.

MX-7-180 and MX-7-235

More than 2,000 Maule M-7 series light aircraft have been built since 1984, currently in 14 versions with two to five seats, Lycoming piston engines of 160 to 235 hp or a 420 shp Allison 250 turboprop, and on tailwheel or tricycle landing gear, or floats. The first military customer, in 1991, was Mexico, which has 20 **MX-7-180s** in the Primary Tng. Sq. of the Air Force's Military Aviation Flying School at Zapopan; 11 are used for a similar role by the Mexican Naval Aviation School at Veracruz and for patrol duties by a Naval Air Flight at Tulum. A single **MX-7** is assigned to coastal patrol by the Turkish Coast Guard. The only other military operator is the Royal Thai Army, which bought 12 **MX-7-235s** in 1992 for its fixed-wing training unit at Lop Buri. (Data for *MX-7-180*; *MX-7-235* in parentheses.)

Contractor: Maule Air, USA.
Power Plant: one Textron Lycoming O-360-C1F (O-540-J1A5D) piston engine; 180 hp (235 hp).

Dimensions: span 32 ft 11 in (both), length 23 ft 6 in (both), height 6 ft 4 in (tailwheel gear), 8 ft 4 in (tricycle gear).

Weights: empty 1,350 lb (1,475 lb), gross 2,500 lb (both).
Performance: max cruising speed 145 mph (160 mph), stalling speed (flaps down) 40 mph (35 mph), ceiling 15,000 ft (20,000 ft), T-O run 200 ft (150 ft), max range 1,050 miles (875 miles).

Accommodation (both): four persons in pairs.

Armament: none.

SF.260

The **SF.260** no longer enjoys the high production rates it achieved in the 1970s and 1980s, but more than 860, in various forms, have been delivered to civilian customers and to 23 air forces worldwide. The basic military **SF.260M** flew for the first time Oct. 10, 1970, becoming the Italian Air Force's standard primary and basic trainer, capable of instrument flying, aerobatics including spinning, night flying, navigation instruction, and formation flying. Successively refined and updated versions are the **SF.260C, D, E, and F**; dual-role trainer/tactical support counterparts are designated **SF.260W Warrior**. Countries still operating the piston-engine models include Belgium (34 M/D), Brunei (two W), Burundi (five C/W), Chad (two W), Ireland (seven W), Italy (41 M), Libya (190 W), Singapore (20 M/W), Sri Lanka (five W), Thailand (10 M, local designation **BF.15**), (Tunisia 14 C/W), Turkey (40 D), Zambia (eight M), and Zimbabwe (15 C, plus 1997 order for six F, local name **Genet**). (Data for *SF.260F*.)

Contractor: Aeromacchi (originally SIAI Marchetti), Italy.

Power Plant: one Textron Lycoming O-540-E4A5 piston engine; 260 hp. (Aerobatic AIO-540-D4A5 in SF.260E.)

Dimensions: span over tip tanks 27 ft 4¾ in, length 23 ft 3½ in, height 7 ft 11 in.

Weights: empty 1,717 lb, gross 2,645 lb, (Warrior, max gross 2,976 lb.)

Performance: max speed at S/L 215 mph, max cruising speed at 10,000 ft 205 mph, stalling speed (gear and flaps down) 70 mph, ceiling 19,000 ft, T-O run 1,575 ft, landing run 1,460 ft, max range 926 miles, g limits (aerobatic) +6/-3.

Accommodation: two seats, side by side, with third seat to rear.

Armament: none in trainer; Warrior, two under-wing pylons for up to 661 lb of weapons or other stores when flown solo.

Su-29 and Su-49

The **Su-29**, which first flew in 1991 and entered production in 1992, is a tandem two-seat primary trainer which embodies many features of the single-seat Su-26 aerobatic competition aircraft. The Argentine Air Force ordered eight earlier this year. The **Su-49** is of broadly similar configuration but features wing-root LERX, area-increasing flaps, and retractable tricycle landing gear instead of the Su-29's fixed taildragger type. The prototype was expected to fly in late 1997. If all goes according to plan, it will be followed by up to 1,500 Su-49s, to succeed Romanian-built Yak-52s, in two initial models. The basic aircraft will be delivered to DOSAAF training units; those for the Russian Air Force will have more extensive equipment. The fuselage longerons and wing spars are made of carbon fiber; wing, fuselage, and tail unit skin panels are of a Kevlar-type composite and glass fiber. The stepped cockpit is air-conditioned and pressurized. The Su-49's initial M-14PF nine-cylinder radial engine is expected to give way later to a license-built P&WC Klimov PK6A-25 turboprop if funding permits. Options include provision for a radar pod, an integral gun, bombs, antitank missiles, and AAMs for combat use. (Data for *Su-29*; *Su-49* in parentheses.)

Contractor: Sukhoi OKB, Russia.



SF. 260M, Italian Air Force
(Peter R. Foster)



Model of the Sukhoi Su-49
(Paul Jackson)



Cessna 150, Sri Lanka Air Force
(Denis Hughes)

Power Plant (both): one VOKBM M-14PF radial piston engine; 395 hp.

Dimensions: span 27 ft 10¼ in (both), length 23 ft 10¼ in (both), height 9 ft 5¼ in, (8 ft 6½ in).

Weights: empty 1,620 lb (1,874 lb), gross 2,655 lb (2,866-3,307 lb).

Performance (Su-29): max speed 202 mph, stalling speed 72 mph, ceiling 13,120 ft, T-O run at 2,015 lb gross weight 395 ft, landing run at same weight 1,250 ft, max range 745 miles.

Performance (Su-49, estimated): max speed 230 mph, stalling speed (flaps down) 56 mph, ceiling 22,960 ft, T-O run 755 ft, landing run 820 ft, range with max internal fuel 932 miles, with external tanks 1,242 miles, g limits +11/-8.

Accommodation (both): two seats, in tandem, with SKS-94 crew extraction system (through canopy, without seats).

Armament (both): none in primary trainer.

T-25 Universal

Only the Brazilian Air Force still operates the all-metal **Universal**, which first flew April 1966 and entered service in 1971. About 60 serve with the 2d Air Tng. Sq. of the Air Force Academy at Pirassununga in two forms: students fly 65 hours of basic training, mostly in standard T-25As, but with some five hours of IFR training on T-25Cs with uprated instrumentation, before progressing on to Tucanos. About 30 other T-25s are used in support roles by a variety of units.

Contractor: Neiva, Brazil.
Power Plant: one Textron Lycoming IO-540-K1D5 piston engine; 300 hp.

Dimensions: span 36 ft 1 in, length 28 ft 2½ in, height 9 ft 9¾ in.

Weights: empty 2,535 lb, gross 3,306-3,747 lb.

Performance (at 3,306 lb aerobatic gross weight): max speed at S/L 186 mph, max cruising speed at S/L 177 mph, stalling speed (flaps down) 65 mph, ceiling 20,000 ft, T-O run 1,148 ft, landing from 50 ft 1,970 ft, range 621 miles.

Accommodation: crew of two, side by side; space for baggage or optional third seat at rear.

Armament: none in training roles.

T-35 Pillán

The **Pillán** aerobatic and instrument flying trainer was designed by Piper to embody components of the PA-28 Dakota and PA-32 Saratoga. The first of two Piper-built prototypes flew March 6, 1981. After small refinements, series production in Chile by ENAER started in September 1984. Sixty **T-35A** primary trainers and 20 **T-35B** instrument trainers were delivered to the Chilean Air Force, of which a total of 44 remain with the Basic Tng. School, El Bosque AB, Santiago, and the Operational Tng. Flight of 11 Gp. at Los Cerillos AB.

Kits for 41 **T-35Cs** (of which about 36 remain) were supplied by ENAER to Spain, where they were assembled by CASA for the Spanish Air Force Academy at San Javier; equipped as primary trainers, most of them serve with No. 791 Sq., with the Spanish designation **E.26 Tamiz**. Eight **T-35D** instrument trainers are flown by the Panamanian Air Force and 11 **T-35Bs** by the Paraguayan Air Force. (Data for *T-35A*.)

Contractor: ENAER, Chile.
Power Plant: one Textron Lycoming IO-540-K1K5 piston engine; 300 hp.

Dimensions: span 29 ft 0 in, length 26 ft 3 in, height 8 ft 8 in.

Weights: empty 2,050 lb, gross 2,900-2,950 lb.

Performance: max speed at S/L 193 mph, max cruising speed at 8,800 ft 166 mph IAS, stalling speed (gear and flaps down) 72 mph, ceiling 19,160 ft, T-O run 940 ft, landing run 780 ft, max range 748 miles, g limits +6/-3.

Accommodation: two seats, in tandem. Rear seat raised.

Armament: none.

T-41 Mescalero and Cessna 150/152/172

The smallest of this family of high-wing lightplanes, the side-by-side two-seat **Model 150**, first flew in 1957. Versions up to the 150E had an unswept fin and 100 hp Continental O-200-A engine. A swept fin was introduced on the **Model 150F** in 1966. From 1977, the 150s were superseded by the **Model 152** range, with a 110 hp Textron Lycoming O-235 engine. The four-seat **Model 172**, first flown in 1955, has a 145 hp Continental O-300-A in its basic form. It, too, acquired a swept fin, in 1960, when the deluxe Skyhawk version also appeared. A more powerful **R172E** (210 hp Continental IO-360) was introduced in 1964. The basic 172 was uprated with a 150 hp Lycoming O-320 in 1968; the standard Skyhawk engine from 1977 was the 160 hp O-320. Aircraft with an F or FR prefix were built in France by Reims Aviation.

The **T-41A Mescalero**, no longer in service, represented off-the-shelf procurement of 204 Cessna 172s for USAF. Then came 255 **T-41Bs** for the US Army, 52 **T-41Cs** for USAF, and 238 **T-41Ds** for MAP export to

friendly nations, all based on the civil R172E. Other nations train with about 160 T-41s (mostly Ds), some 40 Cessna 150/152s, and about 50 Model 172s, including Argentina (Army, five T-41Ds), Bolivia (three 172s), Burundi (Army, three FRA150s), Chile (Army, 10 172s), Colombia (12 T-41Ds), Dominican Republic (three T-41Ds), Ecuador (Air Force, two T-41Ds; Army, three 172s), Greece (Air Force 20 T-41Ds, Coast Guard two 172s), Guatemala (four 172s), Haiti (three 150s), Honduras (six T-41Ds), Indonesia (10 T-41s, two 172s), Madagascar (four 172s), Nicaragua (two T-41Ds), Paraguay (Navy, two 150s), Peru (12 T-41Ds, two 150s), Philippines (12 T-41Ds), El Salvador (two T-41Ds), Saudi Arabia (13 F172s), Seychelles (Coast Guard, one A150), South Korea (15 T-41Ds), Sri Lanka (two 150s), Thailand (Army, seven T-41Bs), Turkey (Air Force 32 T-41Ds, Army 26), Uruguay (six T-41Ds), and Zaïre (12 FRA150s). Many others are used for communications and other light duties. (Data for R172E/T-41D.)

Contractor: Cessna, USA.

Power Plant: one Teledyne Continental IO-360-D piston engine; 210 hp.

Dimensions: span 35 ft 10 in, length 26 ft 11 in, height 8 ft 9 1/2 in.

Weights: empty 1,405 lb, gross 2,550 lb.

Performance: max speed at S/L 153 mph, max cruising speed at 5,500 ft 145 mph, ceiling 17,000 ft, T-O run 740 ft, landing run 620 ft, max range 1,010 miles.

Accommodation: four seats, in tandem pairs; up to 200 lb of baggage aft of rear seats.

Armament: none.

T67M and T-3A Firefly

Winning USAF's Enhanced Flight Screener program in April 1992, and the award of a British Design Council prize, set the seal on the already successful career of this elegant GFRP trainer, some 300 of which had been delivered to military and commercial customers in 13 countries by the beginning of 1997. The top-of-the-range T67M260, designed specifically to meet the EFS requirement, first flew May 1991, and in early 1996 USAF accepted the last of 113 as the T-3A, all except the first few shipped as kits for assembly by Northrop Worldwide Aircraft Services at Hondo Airport, Texas. Half (57) were for the 3d FTS at Hondo, where training in the T-3A started in March 1994; the remaining 56 were for the USAF Academy, Colorado Springs, Colo., for training courses that began in early 1995. Extra features include electric elevator trim, plus cockpit air-conditioning for the aircraft at Hondo.

The basic T67C3, with a carburetor version of Textron Lycoming's 160 hp engine and fixed-pitch propeller, is used for primary training of Canadian military and Dutch naval and airline pilots, among others. The lowest-powered military model is the T67M Mk II, with 160 hp fuel-injected Lycoming AEIO-320-D1B, two-blade constant-speed propeller, 42-gallon increased fuel capacity, and fuel and oil systems suitable for inverted flight. Customer countries include Japan, Netherlands, and Switzerland. Seventeen are in service at RAF Barkston Heath, UK, where Hunting Contract Services operates a Joint Elementary Flying Tng. School for student pilots of the RAF, Army, and Royal Navy. This fleet has recently been augmented by 23 of the M260 version. The intermediate T67M200, serving the Belize Defense Force (one), plus government and private agencies in Hong Kong (two), Netherlands (three), Norway (six), and Turkey (16), has a 200 hp AEIO-360-A1E and a three-blade propeller. The M200 is considered a strong candidate for RAF Bulldog replacement. (Data for T67M260/T-3A.)

Contractor: Slingsby Aviation, UK.

Power Plant: one Textron Lycoming AEIO-540-D4A5 piston engine; 260 hp.

Dimensions: span 34 ft 9 in, length 24 ft 10 in, height 7 ft 9 in.

Weights: empty 1,780 lb, gross 2,525 lb (aerobatic), 2,550 lb (max).

Performance: max speed at S/L 175 mph, max cruising speed at 8,500 ft 161 mph, stalling speed (flaps down) 71 mph, ceiling 19,000 ft, T-O run 1,045 ft, landing run 1,315 ft, max range 469 miles, g limits +6/-3.

Accommodation: two seats, side by side.

Armament: none.

TB 20 Trinidad

First flown Nov. 14, 1980, and certificated by the FAA in January 1984, the Trinidad is essentially a higher-powered, retractable-gear version of Socata's TB 10 Tobago, and both have been selected by a number of civil or government agencies, such as SFACT in France (45 Trinidads) and CAAC in China (32), to provide flying training for air traffic controllers and airline pilots. Dual controls are standard at the two front seats, and the flight deck can be equipped for VFR or IFR flying. The three-person rear bench seat is removable. Six Trinidads were delivered during the early months of 1995 to Topel, Turkey, to fulfill an FMS



T-3A Firefly, US Air Force



TB 30 Epsilon, French Air Force
(Peter R. Foster)



Z-142 CAF, Czech Air Force

contract with the Turkish Navy. These are being used by No. 301 Sq., a former S-2E Tracker unit, to maintain pilots' flying hours until an S-2 replacement is found. The Greek Coast Guard operates two Trinidads. From 1995 the Israeli Air Force received 22 Trinidads, known as Pashosh ("Lark"), to replace Cessna Stationairs for liaison duties.

Contractor: Socata, France.

Power Plant: one Textron Lycoming IO-540-C4D5D piston engine; 250 hp.

Dimensions: span 32 ft 0 1/4 in, length 25 ft 3 1/2 in, height 9 ft 4 1/4 in.

Weights: empty 1,763 lb, gross 3,086 lb.

Performance: max speed 192 mph, max cruising speed at 8,000 ft 187 mph, stalling speed (flaps and gear down) 62 mph, ceiling 20,000 ft, T-O run 970 ft, landing run 755 ft, max range at 10,000 ft 1,109 miles.

Accommodation: four or five persons.

Armament: none.

TB 30 Epsilon

This all-metal basic and primary trainer first flew Dec. 22, 1979. Delivery of 150 to the French Air Force began in 1984, and about 130 remain. Direct-entry pupils (as opposed to career officers) complete full *ab initio* and basic training on the Epsilon with EPAA (Air Force Pilot School) 315 at Cognac/Chateaubernard, then progress directly to an operational type without intermediate transition training. Epsilons also replaced CAP 10Bs for pilot grading at the École de l'Air, Salon-de-Provence.

Esquadron 101 of the Portuguese Air Force, at Beja, still has 16 of its original 18 Epsilon primary trainers, all but one of which were assembled locally by OGMA. Togo's three Epsilons are of an armed version, which can loiter for 30 minutes at low altitude over a combat area 195 miles from base.

Contractor: Socata, France.

Power Plant: one Textron Lycoming AEIO-540-L1B5D piston engine; 300 hp.

Dimensions: span 25 ft 11 1/4 in, length 24 ft 10 3/4 in, height 8 ft 7 1/2 in.

Weights: empty 2,046 lb, gross 2,756 lb.

Performance: max speed at S/L 237 mph, max cruising speed at 6,000 ft 222 mph, stalling speed (gear

and flaps down) 73 mph, ceiling 23,000 ft, T-O run 1,345 ft, landing run 820 ft, range at 184 mph at 12,000 ft 783 miles, g limits +6.7/-3.35.

Accommodation: crew of two, in tandem. Rear seat raised.

Armament (Togolese aircraft only): four under-wing hardpoints for up to 661 lb of stores when flown as a single-seater. Typical loads can incl two gun pods (each with two 7.62-mm machine guns), two 275-lb bombs or grenade launchers, four packs of six 68-mm rockets, or four survival-kit pods.

Utv-75

First flown May 19, 1976, more than 150 of these adaptable little aircraft were produced by the Utva ("Sheildrake") factory at Pancevo, near Belgrade, from about 1978 until 1986. By early 1992, before the disintegration of Yugoslavia, about 70 were in service with the Yugoslav Air Force and some 30 to 40 with civilian flying clubs, most of the former being retained by the Serbian/Montenegrin faction after the outbreak of hostilities.

Sturdily built and able to operate from grass or unprepared strips of 500 ft or less, the Utv-75s were originally used for basic training, glider towing, and a range of utility duties. However, they can also carry light weapon loads and have been used in this capacity in the ensuing conflicts, with their red and white trainer livery replaced by a camouflage finish. About 10, captured from Serb forces, are now flown by the Croatian Air Force.

Contractor: Utva, Yugoslavia.

Power Plant: one Textron Lycoming IO-360-B1F piston engine; 180 hp.

Dimensions: span 31 ft 11 in, length 23 ft 4 in, height 10 ft 4 in.

Weights: empty 1,510 lb, gross 2,116 lb.

Performance: max speed 133 mph, max cruising speed 115 mph, stalling speed (flaps down) 51 mph, ceiling 13,120 ft, T-O run 4' 0 ft, landing run 330 ft, max range on internal fuel 497 miles, g limits +6/-3.

Accommodation: two seats, side by side.

Armament: pylon under each wing for a bomb, two-rd rocket launcher, machine gun pod, 220-lb cargo container, or drop fuel tank.

Yak-52

First flown in early 1975, Yakovlev's Yak-52 is a latter-day descendant of the Yak-18 primary trainer, which entered production immediately after World War II. License manufacture at Bacau began in 1979, the Romanian prototype having first flown in May 1978. About 1,800 have so far been built, mainly for the air forces of Romania and the former Soviet Union. Production continues, though at a low rate in recent years. Russia, from whom about 20 were acquired recently by Lithuania, probably still has more than 1,000 and Ukraine about 250. Only about a dozen still serve with the Romanian Air Force. In spring 1994, Aerostar delivered 12 to the Hungarian Air Force Fighter Tng. School at Szolnok. Basic configuration and structure differ little from the Yak-18, but a metal semi-monocoque rear fuselage replaces the original fabric-covered one, and a smooth cowling encloses the more powerful engine. All three wheels of the tricycle landing gear remain exposed when retracted, offering greater safety in a wheels-up emergency landing.

Contractor: Aerostar, Fomania.

Power Plant: one Romanian-built VOKBM (Bakanov) M-14P radial piston engine; 360 hp.

Dimensions: span 30 ft 6 1/4 in, length 25 ft 5 in, height 8 ft 10 1/4 in.

Weights: empty 2,238 lb, gross 2,877 lb.

Performance: max speed at S/L 177 mph, at 3,280 ft 167 mph, stalling speed (flaps down) 56 mph, ceiling 13,120 ft, T-O run 560 ft, landing run 985 ft, max range 341 miles, g limits +7/-5.

Accommodation: two seats, in tandem.

Armament: none.

Zlin Z-142 and Z-242

More than 440 of these Czech lightplanes have been produced since the prototype Z-142 flew in December 1978. It continues as the current production version of the Z-42/42 M/43 family used over the past quarter-century for *ab initio* training and other duties. Construction is basically all-metal, with composites skin panels on the center fuselage. Options include an auxiliary tank on each wingtip and equipment for night flying and IFR training. The Czech Air Force's eight, equipping No. 343 Sq., are designated Z-142 CAF. The Bulgarian Defense Ministry recently acquired eight Z-142s to provide some 20 hours of preselection flying for civilian candidates for military service. Other Z-142s are used by the Algerian Air Force (20) and by Cuban border patrol forces.

The Z-242L, first flown in February 1990, has a US engine and some aerodynamic detail refinements. The Slovenia Defense Force has eight. (Data for Z-142; Z-242L in parentheses. Aerobatic category in both cases.) **Contractor:** Moravan, Czech Republic.

Power Plant: one LOM M 337AK piston engine; 210 hp (Textron Lycoming AEIO-360-A1B6; 200 hp).
Dimensions: span 30 ft 0 1/2 in (30 ft 7 3/4 in), length 24 ft 0 1/2 in (22 ft 9 1/4 in), height 9 ft 0 1/4 in (9 ft 8 1/4 in).
Weights: empty 1,609 lb (both), gross 2,138 lb (both).
Performance: max speed at 1,640 ft 143 mph (146 mph CAS), stalling speed (flaps down) 64 mph (59 mph), ceiling 15,580 ft, T-O run 760 ft (690 ft), landing run 625 ft, range 364 miles (308 miles), g limits +6/-3.5 (both).
Accommodation: two seats, side by side.
Armament: none.

Turboprop Trainers

EMB-312/S312 Tucano and Super Tucano

The **EMB-312 Tucano** prototype flew Aug. 16, 1980, and deliveries of 133 to the Brazilian Air Force (designation **T-27**, or **AT-27** in armed configuration) began in September 1983. Including 158 British-built Tucanos, orders total 623, all of which have been delivered. Export customers include the air forces of Argentina (30), Colombia (14), Egypt (54), France (50), Honduras (12), Iran (25), Iraq (80), Paraguay (six), Peru (30), and Venezuela (31). The French **EMB-312F** version has a strengthened airframe and ventral air brake like those of the **S312**, improved deicing and demisting, and French avionics.

The **S312** license-built by Shorts in the UK has a 1,100 shp AlliedSignal TPE331 turboprop, ventral air brake, strengthened structure, new cockpit layout, and mainly British equipment. The Royal Air Force received 130 as **T. Mk 1s** between June 1988 and January 1993, of which about 80 are currently active and 48 in store. Strengthened flying controls, modified com/nav equipment, and structural improvements to extend fatigue life to 12,000 hours have been retrofitted. Shorts also delivered 12 **T. Mk 51s** to the Kenyan Air Force in 1990-91 and 16 **T. Mk 52s** to No. 19 Sq. of the Kuwait Air Force in 1995.

As a JPATS candidate, Embraer developed the **EMB-312H Super Tucano**, with a stretched fuselage, modified wings and tail, pressurized cockpit with zero/zero seats, pressure refueling, and other improvements. Two production-standard **EMB-312HJs**, with a 1,300 shp PT6A-68A, five-blade propeller, and "glass" cockpit, flew for the first time May 15 and Oct. 14, 1993. Although unsuccessful for JPATS, 27 Super Tucanos, together with BAe Hawks, form the Bombardier package recently adopted to meet the NATO Flying Tng. in Canada requirement. A light attack (**ALX**) version is now under development for a major Brazilian border surveillance program requiring 99 aircraft in both single-seat (**A-29**) and two-seat (**AT-29**) versions. The two **EMB-312HJs** will be modified as prototypes. (Data for standard **EMB-312**, with **EMB-312H** in parentheses.)

Contractor: Embraer, Brazil.
Power Plant: one Pratt & Whitney Canada PT6A-25C (PT6A-68A) turboprop; 750 shp (1,300 shp).

Dimensions: span 36 ft 6 1/2 in (both), length 32 ft 4 1/4 in (37 ft 5 1/4 in), height 11 ft 1 1/4 in (12 ft 9 1/2 in).
Weights: empty 4,123 lb (5,335 lb), gross 5,622-7,000 lb (5,335-7,033 lb).

Performance (**EMB-312** at 5,622 lb clean gross weight): max speed at 10,000 ft 278 mph, stalling speed (gear and flaps down) 77 mph EAS, ceiling 30,000 ft, T-O run 1,250 ft, landing run 1,215 ft, max range on internal fuel 1,145 miles, g limits +6/-3.

Performance (**EMB-312H** at 5,335 lb clean gross weight): max speed at 20,000 ft 346 mph, stalling speed (gear and flaps down) 90 mph EAS, ceiling 35,000 ft, T-O run 1,150 ft, landing run 1,805 ft, max range on internal fuel 974 miles, g limits +7/-3.5.

Accommodation: crew of two, on tandem zero-height/81 mph (zero/zero) ejection seats. Rear seat raised.

Armament (both): four under-wing hardpoints for up to 2,205 lb of stores, incl (typically) two 0.30-in machine gun pods, four 250-lb bombs, or four seven-tube rocket launchers.

KTX-1 Woong-Bee

South Korea's **Woong-Bee** ("Great Flight") tandem-seat basic trainer program was launched in early 1988, at that time being named Yeo-Myoung ("Dawn"). The first two prototypes, flown in late 1991 and early 1992, were each powered by a 550 shp PT6A-25A turboprop. The third flew for the first time in August 1995 with a 950 shp PT6A-62 and the fourth, with a shorter nose and lower-mounted tailplane, in June 1996. Delivery of the 100 production trainers required by the South Korean Air Force is scheduled to begin in 2000, preceded by the first flight early next year of a single preproduction aircraft. (Data for third prototype.)

Contractor: Daewoo, South Korea.
Power Plant: one Pratt & Whitney Canada PT6A-62 turboprop; 950 shp.

Dimensions: span 34 ft 9 1/4 in, length 33 ft 8 in, height 12 ft 0 1/2 in.

Weights: empty 4,567 lb, gross 5,960-7,066 lb.

Performance: max speed at 10,000 ft 299 mph, ceiling 38,000 ft, T-O to 50 ft: 800 ft, landing from 50 ft: 1,300 ft, range 1,036 miles.

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

Armament: none.

M-290 TP Redigo

The **Redigo** was designed in the early 1980s by Finnish manufacturer Valmet, who, after testing prototypes with Allison 250 and Turbomeca TP 319 turboprops, chose the former for its production L-90 TP Redigos. It optimized the design to cover primary and basic, aerobatic, night, instrument, navigation, formation, and tactical flying training. The Finnish Air Force, however, allocated its 10 Redigos to replace Piper Arrows in liaison and communications roles. Exports from Finnish production comprised 10 aircraft for the Mexican Naval Aviation School at Bajadas, Veracruz, and eight for the Eritrean Air Force. Finnish production ended in 1995, and Italy's Aermacchi acquired the production rights in January 1996, but no further orders have yet been announced.



Tucano T. Mk 1, Royal Air Force
(Peter J. Cooper)



KXT-1 Woong-Bee, fourth prototype



M-290 TP Redigo, Finnish Air Force
(Lindsay Peacock)



PC-7 Turbo-Trainer, Austrian Air Force

Contractor: Aermacchi, Italy (orig. Valmet, Finland).
Power Plant: one Allison 250-B17F turboprop; 450 shp (flat rated).

Dimensions: span 34 ft 9 1/4 in, length 27 ft 11 1/4 in, height 10 ft 6 in.

Weights: empty 2,138 lb, gross 2,976-4,189 lb.

Performance (at 2,976 lb clean gross weight): max speed at 10,000 ft 218 mph, stalling speed (flaps down) 58 mph, ceiling 25,000 ft, T-O run 495 ft, landing run 600 ft, max range, 30 min reserves, 870 miles, g limits (aerobatic) +7/-3.5.

Accommodation: crew of two, side by side; space behind these for two more seats or 440 lb of baggage. Zero/zero rocket escape system optional.

Armament (optional): three hardpoints under each wing can (when aircraft is flown solo) carry up to 1,764 lb of photographic, TV, radar, or reconnaissance pods and two flares, or other stores.

PC-7 Turbo-Trainer and PC-7 Mk II

The **PC-7**, first flown Aug. 18, 1978, is a fully aerobatic trainer suitable for primary, transition, and aerobatic training and, with added equipment, for IFR and tactical training. More than 420 have been delivered to 19 countries, for the air forces of Abu Dhabi (24), Angola (25), Austria (16), Bolivia (24), Botswana (seven), Chad (two), Chile (Navy, 10), France (five), Guatemala (12), Iran (35), Iraq (52), Malaysia (46), Mexico (88), Myanmar (17), Netherlands (13), Suriname (three), Switzerland (40), and Uruguay (six). South Africa has inherited the three delivered earlier to Bophuthatswana.

In addition, the South African Air Force placed an order in 1993 for 60 improved **PC-7 Mk IIs** (SAAF name **Astra**) to replace its veteran T-6 Harvard primary trainers. To avoid conflict with UN sanctions then in force, these have two (instead of six) under-wing hardpoints, plumbed only for auxiliary fuel tanks. The airframe is based largely on that of the aerodynamically cleaner **PC-9** and fitted with a more powerful engine, mainly South African avionics, and Martin-Baker CH-11A ejection seats instead of the usual fixed or optional CH-15A ejection seats. The **Mk II** prototype first flew Sept. 28, 1992. Pilatus kits were assembled and outfitted locally by Denel (formerly Atlas) Aviation; deliveries began in 1994. Brunei received the first of four **Mk IIs** last year. (Data for standard **PC-7**, with **Mk II Astra** in parentheses.)

Contractor: Pilatus, Switzerland.

Power Plant: one Pratt & Whitney Canada PT6A-25A (PT6A-25C) turboprop; 550 shp (flat rated) (700 shp).
Dimensions: span 34 ft 1 1/2 in (33 ft 2 1/2 in), length 32 ft 1 in (33 ft 2 3/4 in), height 10 ft 6 1/4 in (10 ft 8 1/4 in).

Weights: empty 2,932 lb (3,682 lb), gross 4,188-5,952 lb (4,960-7,054 lb).

Performance (**PC-7** at 4,188 lb clean gross weight): max cruising speed at 20,000 ft 256 mph, stalling speed (gear and flaps down) 74 mph EAS, ceiling 33,000 ft, T-O run 790 ft, landing run 970 ft, max range 745 miles, g limits +6/-3.

Performance (**Mk II** at 4,960 lb clean gross weight): max speed 345 mph EAS, max cruising speed at 10,000 ft 288 mph, stalling speed (gear and flaps down) 81 mph EAS, ceiling 30,000 ft, T-O run 905 ft, landing run 1,200 ft, max range 886 miles, g limits +7/-3.5.

Accommodation: two seats, in tandem; ejection seats optional (standard on **Mk II**). Space for 55 lb of baggage aft of seats.

Armament: Swiss law prohibits export of aircraft equipped for combat duties, but **PC-7s** operated by several air forces carry a wide variety of stores on under-wing weapon pylons installed separately by armament manufacturers.

PC-9

A more powerful turboprop, stepped cockpits, ejection seats as standard, a ventral air brake, modified wing airfoils and tips, new ailerons, a longer dorsal fin, larger wheels with high-pressure tires, and mainwheel doors are the main differences between the **PC-9** and its **PC-7** predecessor. The first preseries **PC-9** flew May 7, 1984, and more than 230 have been built for, or ordered by, air forces which include those of Angola (four), Australia (67 **PC-9As**), Croatia (20), Iraq (20), Myanmar (10), Saudi Arabia (50), Slovenia (three, ex-US Army), Switzerland (14), and Thailand (36); the Cyprus National Guard has two, and the German Air Force leases 10 **PC-9Bs** from Condor Flugdienst to provide target-towing services. The RAAF **PC-9As** have Bendix/King EFIS cockpit displays, **PC-9** low-pressure tires, and bulged mainwheel doors. Two were supplied in flyaway form, 17 as kits, and 48 were built in Australia. They equip the Central Flying School and Roulettes display team at East Sale, Victoria, and No. 2 FTS at Pearce, Western Australia; two with No. 76 Sq. have taken on the forward air control role previously performed by Winjeels; and one is allocated to the RAAF Chief of Air Staff's office at Fairbairn, near Canberra. See separate T-6A entry for US version based on the **PC-9 Mk II**. (Data for standard **PC-9**.)
Contractor: Pilatus, Switzerland.

Power Plant: one Pratt & Whitney Canada PT6A-62 turboprop; 950 shp (flat rated).
Dimensions: span 33 ft 5 1/4 in, length 33 ft 4 3/4 in, height 10 ft 8 1/4 in.
Weights: empty 3,715 lb, gross 4,960-7,054 lb.
Performance (at 4,960 lb aerobatic gross weight): max speed at S/L 311 mph, at 20,000 ft 345 mph, stalling speed (gear and flaps down) 81 mph EAS, ceiling 38,000 ft, T-O run 745 ft, landing run 1,370 ft, max range 1,020 miles, g limits +7/-3.5.
Accommodation: crew of two, on tandem zero-height/70 mph ejection seats. Rear seat raised. Space for 55 lb of baggage aft of seats.
Armament: see remarks under PC-7 entry.

PZL-130 Orlik

Originally a piston-engined design, the **Orlik** ("Spotted Eaglet") switched to turboprop power when the third prototype, refitted with a PT6A-25A engine, flew July 13, 1986. Two further prototypes, designated **PZL-130TM** and **PZL-130T**, were then flown with, respectively, a Czech 750 shp Walter M 601 E power plant and a 550 shp PT6A-25A in January 1989 and March 1990. The **PZL-130TB**, first flown Sept. 17, 1991, was the initial Polish Air Force production model. Based on the TM, it had a fully aerobatic M 601 T engine, increased span and incidence, double-slotted flaps, new ventral fin, Polish ejection seats, six (instead of four) underwing stations, and other changes. One of the nine production TBs was lost early on; the remainder were upgraded to **PZL-130TC-1s**, with Bendix/King avionics and Martin-Baker seats, which is now the Polish Air Force standard version. By early 1997, the PAF strength was 27 Orliks: three TMs, one TP, eight delivered as TBs upgraded to TC-1s, and 15 new-build TC-1s. An export **TC** prototype, first flown June 2, 1993, but lost in January 1996, had the TC-1 improvements plus a 950 shp PT6A-62 engine and Flight Visions HUD; development of a **TC-2** prototype, similar except for a 750 shp PT6A-25C turboprop and simplified avionics, has been postponed. (Data for **PZL-130TC-1**.)

Contractor: PZL Warszawa-Okecie, Poland.

Power Plant: one Walter M 601 T turboprop; 750 shp.
Dimensions: span 29 ft 6 1/4 in, length 29 ft 6 1/4 in, height 11 ft 7 in.

Weights: empty 3,527 lb, gross 4,409-5,952 lb.

Performance (at 4,409 lb aerobatic clean gross weight): max speed at 19,680 ft 311 mph, at S/L 282 mph, ceiling 33,000 ft, T-O run 730 ft, landing run 605 ft, range on internal fuel 602 miles, g limits +6/-3.

Accommodation: crew of two, on tandem zero-height/104 mph ejection seats. Rear seat raised.

Armament: six under-wing hardpoints for up to 1,764 lb of 220-lb or smaller bombs, 7.62-mm twin-gun pods, launchers for 57-mm or 80-mm rockets, or infrared AAMs.

SF.260TP

The **SF.260TP** is identical to the piston-engine SF.260 except for the power plant, automatic fuel feed system, and an inset rudder tab. It first flew in July 1980. More than 60 have been sold to various air forces, several of which use them in a secondary light attack role. Current operators include Dubai (five), Ethiopia (12), Haiti (three), Philippines (33), Sri Lanka (seven), and Zimbabwe (12). Sri Lanka's SF.260TPs are assigned to No. 1 FTW at Anuradhapura, but some have been detached for use in a counterinsurgency role at Jaffna with locally produced 110-lb or 200-lb bombs and 2.75-in or 70-mm unguided rockets. No. 6 Sq. of the Zimbabwe Air Force has some SF.260TPs converted locally from piston-engine SF.260s; the Philippine Air Force total includes 18 which it converted from the piston-engine model. (Data as for SF.260, except as follows.)

Power Plant: one Allison 250-B17D turboprop; 350 shp (flat rated).

Dimensions: length 24 ft 3 1/4 in.

Weights: empty 1,654 lb, gross 2,645-2,866 lb.

Performance (at 2,645 lb gross weight): max speed at 10,000 ft 265 mph, max cruising speed at 10,000 ft 248 mph, stalling speed (gear and flaps down) 70 mph, ceiling 24,600 ft, T-O run 980 ft, landing run 1,010 ft, max range 589 miles.

T-5

The prototype T-5 was produced by replacing the piston engine of a KM-2 primary trainer (developed by Fuji from the license-built Beech T-34 Mentor) with an Allison 250 turboprop. First flown June 28, 1984, as the KM-2D, this aircraft was selected by the Japan Maritime Self-Defense Force to replace its existing KM-2s, after additional changes to the cockpit structure, tail unit, and equipment. Deliveries began in August 1988. A total of 36 T-5s has been ordered for service with No. 201 Sq. of Ozuki Air Tng. Gp., nearly all of which have been delivered.

Contractor: Fuji, Japan.

Power Plant: one Allison 250-B17D turboprop; 350 shp (flat rated).



PC-9, Royal Thai Air Force
(Denis Hughes)



PZL-130 Orlik TC1, Polish Air Force
(R.J. Malachowski)



Proposed USAF markings for T-6A Texan II



T-34C-1 Turbo Mentor, Argentine Navy

Dimensions: span 32 ft 11 1/4 in, length 27 ft 8 1/4 in, height 9 ft 8 1/2 in.

Weights: empty 2,385 lb, gross 3,494-3,979 lb.

Performance (at 3,494 lb aerobatic gross weight except where indicated): max speed at 8,000 ft 222 mph, econ cruising speed at 8,000 ft 178 mph, stalling speed (gear and flaps down) 65 mph, ceiling 25,000 ft, T-O run 990 ft, landing run 570 ft, range (at 3,979 lb max gross weight) 587 miles.

Accommodation: crew of two, side by side, in aerobatic configuration. Second pair of seats behind these in utility version.

Armament: none.

T-6A Texan II

For the USAF/USN JPATS competition, Pilatus teamed with Beech (now Raytheon) in offering the

PC-9 Mk II, which was selected as the winning candidate in June 1995 and officially dubbed **T-6A Texan II** early this year. Beech built two "missionized" production prototypes with a 1,100 shp flat-rated PT6A-68 engine, modified tail unit, increased fuel, single-point fueling, new Bendix/King digital avionics, and a pressurized cockpit with deeper, bird-strike-proof canopy and zero/zero seats. These were first flown Dec. 23, 1992, and July 29, 1993. Current requirements are for up to 711 (USAF 372 to replace the T-37B, USN 339 to replace the T-34C). Initial production contracts are for one manufacturing development aircraft and the first 24 production examples. Initial USAF deliveries should be to the 12th FTW at Randolph AFB, Texas, in May 1999, followed by IOC n 2001 with the 47th FTW at Laughlin AFB, Texas. Later units will include the 14th, 71st, and 80th FTWs. US Navy training on the T-6A will start in 2003 with TW-5 at NAS Whiting Field, Fla., followed later by TW-4 and TW-6. The USAF/USN procurement is now to stretch over 20 years (to 2017) instead of the previously planned 12.

Contractor: Raytheon Aircraft, USA.

Power Plant: one Pratt & Whitney Canada PT6A-68 turboprop; 1,100 shp (flat rated).

Dimensions: as for PC-9.

Weights: empty approx 4,415 lb.

Performance: no details released.

Accommodation: crew of two on tandem zero/zero ejection seats. Rear seat raised.

Armament: none.

T-34

The US Navy inventory still lists about 280 of the 353 turboprop **T-34Cs** it received from November 1977. They are scheduled to be replaced eventually by the JPATS T-6A Texan II. About 120 T-34C-1 armament systems trainers, with FAC and light attack capability, continue in service with Algeria (six), Argentina (Navy, 10, used also to train Brazilian Navy pilots), Ecuador (Air Force 19, Navy three), Gabon (three), Indonesia (24), Morocco (10), Peru (Navy, five), Taiwan (36), and Uruguay (Navy, two).

Original piston-engine **T-34A/Bs** remain in service in Argentina (Air Force, 20), Colombia (nine), Dominican Republic (seven), El Salvador (three), Indonesia (two), Uruguay (Air Force 10, Navy four), and Venezuela (14, local name **Manta**), though by no means all of these are still fully airworthy. (Data for T-34C, except where indicated.)

Contractor: Beech Aircraft, USA.

Power Plant: one Pratt & Whitney Canada PT6A-25 turboprop; 400 shp (550 shp version optional).

Dimensions: span 33 ft 4 in, length 28 ft 8 1/2 in, height 9 ft 7 in.

Weights: empty 2,960 lb, gross 4,300 lb.

Performance: max cruising speed at 17,000 ft 246 mph, stalling speed (gear and flaps down) 61 mph, ceiling 30,000 ft, T-O run 1,155 ft, landing run 740 ft, max range 814 miles, g limits +6/-3.

Accommodation: crew of two, in tandem.

Armament (T-34C-1): four under-wing hardpoints for total of 1,200 lb of stores, incl practice bomb/flare containers, LAU-32 or LAU-59 rocket launchers, Mk 81 bombs, SUU-11 Minigun pods, BLU-10/B incendiary bombs, AGM-22A wire-guided antitank missiles, and target-towing equipment. ■

AFA / AEF National Report

By Frances McKenney, Assistant Managing Editor

Improve Our Outreach, Says AFA President

At the annual State Presidents' Orientation, held Oct. 30–Nov. 1, Air Force Association National President Doyle E. Larson presented several concrete suggestions on how chapters can more effectively carry out one of AFA's basic missions—getting the airpower message out to the general public.

He encouraged chapters to establish a speakers bureau and said that a new national award will be created to reward such community outreach efforts.

Speakers bureaus are not a far-fetched goal, he added, since every



Photos by Paul Kennedy



In top photo, former National Secretary Mary Anne Thompson, National President Doyle Larson, and AFA staffer Jim Simpson conduct activities at the State Presidents' Orientation. Seated in front of them (clockwise from top) are State Presidents Raymond Chuvala, Cy LaManna, Dennis Mills, and Bill Dyer. State presidents Jean Clifford and Baldwin Domingo (bottom photo) discuss an item.

chapter is sure to have an airpower expert among its members, and churches and service clubs are always on the lookout for guest speakers.

Larson suggested that chapters can strengthen their ability to gather information by downloading material from the AFA home page, using the new AFA private area, and re-

trieving documents through the fax on demand system (800-232-3563). He mentioned that *Air Force Magazine's* monthly editorials are a good source of ideas and information to be used in speeches for community groups.

The AFA president also spoke about revitalizing chapters through a combination of approaches, including mentoring and special workshops conducted by the state or regional AFA organization.

Finally, Larson, who takes a laptop computer on his travels, reminded state presidents to keep pushing all their chapters to establish online capability.

AFA in the Pacific

President Larson met with AFA chapter leaders and members in Hawaii and Japan on an outreach trip in late summer.

The **Hawaii Chapter** held a membership meeting at the Hickam AFB Officers' Club in conjunction with Larson's first stop in the Pacific. Gen. Richard B. Myers, Pacific Air Forces Command commander, served as a guest speaker and in his remarks lauded the Hawaii Chapter for its educational programs, which then—



Photo by Susan Kennedy



On her last day in office as Secretary of the Air Force, Sheila Widnall (second from left) was honored with an Eaker Fellowship, presented to her by Russell Dougherty, former AFA executive director; John Shaud, AFA executive director; and Mary Anne Thompson, former AFA national secretary (l-r).

Chapter President Norm Baker said was the group's main focus.

As part of the gathering, the chapter's new officers were introduced: President Richard M. May Jr.; Vice President Col. Mike Soloman; and Treasurer James K. Iwamura. Baker will this year serve as chapter secretary.

After the general membership meeting, Larson conducted a workshop with the chapter's board of directors, covering among other topics AFA's future directions and the chapter's role. Arthur F. Trost, AFA national vice president (Far West Region) participated in Larson's activities in the 50th State.

Larson's first AFA stop in the Far East was at Misawa, Japan, where he conducted a workshop and met the **Misawa Chapter**, whose president is Capt. Ronald G. Bransford.

At Yokota AB, Japan, AFA activities included a combined social event and membership drive at the Officers' Club, where Larson delivered a briefing. He also dined with leaders from the **Tokyo Chapter**, including

President Maj. Gregory R. Fournier, Lt. Col. Charles R. Pittman Jr., former chapter treasurer, and Capts. Marcus Smith and Mark Haberichter, who were the membership drive points of contact.

A visit with the **Keystone Chapter** at Kadana AB, Japan, included an AFA luncheon and a workshop. Among the AFA members Larson met were Lt. Col. Mark Bracich, chapter president, Brig. Gen. John R. Baker, 18th Wing commander, Col. Don Michael Bradford, and Al Misener.

In conjunction with this trip, Ken I. Manako was appointed as AFA's special assistant Pacific. Manako is vice president, North Pacific operations, for Northrop Grumman International in Tokyo.

New Chapter in Georgia

In July, the **South Metro (Ga.) Chapter** was chartered in Peachtree City, Ga. Then-State President Jack H. Steed presented the charter at the state convention's awards luncheon.

The new chapter's officers are Frederick W. Sine, president; Bob M.

Tricare—How Goes It?

Tricare is a major change in health care delivery for Air Force members, their families, and retirees. AFA has worked diligently to monitor the implementation of this program to ensure it is meeting your needs. Now we need your help. If you have a Tricare story, be it a success or a problem, please write to us including any attachments you deem appropriate. Direct your material to Brian Smith, AFA, 1501 Lee Highway, Arlington, VA 22209-1198.

Stankovich, vice president; Theodore R. Hatfield, secretary; and Lawrence R. Hahn, treasurer. Henry E. Carter serves as vice president for communications, and Frederic H. Smith III is vice president for membership. Hatfield and Smith have both been AFA members for 37 years.

The chapter now has just over 200 members.

Wanted: Leaders, Role Models, Mentors

Over the next year, AFA will send out applications with its various mailings to prompt AFA members to join the Civil Air Patrol. It's an opportunity for AFA members to use their military experience to lead CAP's young cadets and serve as role models and mentors. The membership application, from CAP National Commander Brig. Gen. Paul M. Bergman, who belongs to the **Lester W. Johnston (Ind.) Chapter**, will be distributed through monthly credit card statements and in AFA membership renewal notices.

This is just one way that AFA supports the humanitarian and educational work of the 56,000-member nonprofit organization.

Founded in 1941 by civilian pilots who wanted to contribute to the war effort, CAP began to include young people in its membership soon afterward. Today, more than 20,000 people between 12 and 21 years old participate in CAP cadet programs. Many

Photo by Daniel McDowell



Jennifer Kaye (left) and other Gen. E.W. Rawlings Chapter members organized a celebration of the Civil Air Patrol's 55th anniversary of its cadet program. As assistant protocol officer for the event, Kaye greeted Grace Arbogast (right), mayor of Brooklyn Park, Minn., among the many distinguished guests.

AFA chapters already work closely with this official USAF auxiliary.

CAP Anniversary

The **Gen. E.W. Rawlings (Minn.) Chapter** and President Larson helped Civil Air Patrol mark the 55th anniversary of its cadet program Oct. 12 in Crystal, Minn., site of CAP's first cadet squadron.

CAP current and historical aircraft, emergency services equipment, and vintage uniforms were on display at the celebration, which included skills demonstrations, a color guard, and a pass in review by CAP cadets. Among the speakers was Brig. Gen. James A. Jaeger, USAF (Ret.), the first Spaatz cadet to achieve Air Force flag rank.

In preparation for the celebration, the Rawlings Chapter not only donated \$1,500 toward the event but also sent out 700 invitations to guests.

Several chapter members had a direct hand in the festivities, too, including Kevin F. Sliwinski, CAP wing commander, and Clark D. Carlson, who was overall coordinator for the festivities. Jennifer L. Kaye took care of protocol and trained the CAP cadets to carry out escort duties. David Jadwin, a former CAP cadet, helped train the cadets for their parade and color guard performances. Daniel McDowell assisted with media relations.

A P-38 for the Ace

A three-year project by the 148th

Fighter Wing (ANG) at Duluth IAP, Minn., and volunteers backed by the **Richard I. Bong (Minn.) Chapter** was completed Sept. 18. They presented a restored P-38 Lightning, like the one flown by Major Bong, the leading US ace in World War II, to the Richard I. Bong Heritage Center fund-raising committee.

Marjorie Bong Drucker, Bong's widow, formally accepted the aircraft on the center's behalf. Her photo and

name graced Bong's original aircraft and are also on the replica.

The Bong Chapter served as a cosponsor, along with the ROTC detachment from the University of Minnesota at Duluth and the CAP squadron from Duluth and Superior, Wis., for the fighter aircraft's dedication ceremony at the Duluth airport.

ANG Maj. Gen. Eugene R. Andreotti, adjutant general for Minnesota and a member of the Gen. E.W. Rawlings Chapter, was a speaker at the program. Minnesota State President Coleman Rader Jr. and State Secretary James A. Armstrong were among the special guests.

USAF donated a P-38 to Bong's hometown of Poplar, Wis., where the aircraft remained on outdoor display, sustaining severe weather damage, from 1955 until 1994, when the Minnesota ANG brought it into a hangar for restoration.

Bong Chapter volunteers who were on the restoration team included Lloyd D. Paler, Albert Samsa, and William L. Bordson, who served as project officer.

The Richard I. Bong Heritage Center, to be built in Poplar, is about half way to its fund-raising goal of \$2.5 million, reported Raymond T. Klosowski, Bong Chapter president.

Golden Triangle Golf

The **Golden Triangle (Miss.) Chapter's** ninth annual POW/MIA/KIA Charity Golf Tournament raised more than \$8,600 in August, to benefit the



(L-r) Coleman Rader Jr., Minnesota state president; James Armstrong, state secretary; and ANG Brig. Gen. Raymond Klosowski, Richard Bong Chapter president, hold a photo of the USAF 50th anniversary commemorative stamp in front of a P-38 restored to look like the one flown by World War II ace Maj. Richard Bong.

chapter's Visions of Exploration program, the Jodi Callahan Memorial Graduate Scholarship, local AFROTC scholarships, and the Red River Valley Fighter Pilots' Association scholarship fund.

Thirty-four teams participated in the two-day event that took place at the Big Oaks Golf Club in Tupelo, Miss., and the Old Waverly Golf Club in West Point, Miss.

AFA Chairman of the Board Gene Smith served as tournament chairman, as he has since the annual event began in 1988.

A former POW in the Vietnam War, Smith was joined on the links by two other POWs from that war: George R. Hall from the **John C. Stennis (Miss.) Chapter**, who was shot down in August 1965, and C.S. "Smitty" Harris, who was shot down in April 1965.

Smith said the chapter is proud of the contributions it has been able to make to children of POWs and MIAs from the Vietnam War and Desert Shield and Desert Storm.

"There are still over 350 POW/MIA kids who can benefit from the scholarship dollars, and we feel very strongly that the AFA Aerospace Education Foundation Visions program is one of the best of its kind in the country," he said.



(L-r) George Hall of the John C. Stennis Chapter, C.S. Harris, Jack Catton of the Golden Triangle Chapter, and AFA Chairman of the Board Gene Smith hit the links for a POW/MIA/KIA charity golf tournament in Mississippi.

Prizes in the tournament included round-trip tickets on Delta and Atlantic Southeast Airlines, \$300 gift certificates for first place in two flights, and \$200 gift certificates for second place in four flights.

The Golden Triangle Chapter currently sponsors 40 Visions of Exploration classrooms, reported Teresa F. Miley, chapter secretary. She added that in the past nine years, this golf tournament has raised more than \$58,000.

**Give the Gift of Video!
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The newly released video, *People, Power, and Mission* commemorates the fiftieth anniversary of the United States Air Force. Its stirring, visually rich history is presented in compelling style, featuring rarely seen footage.

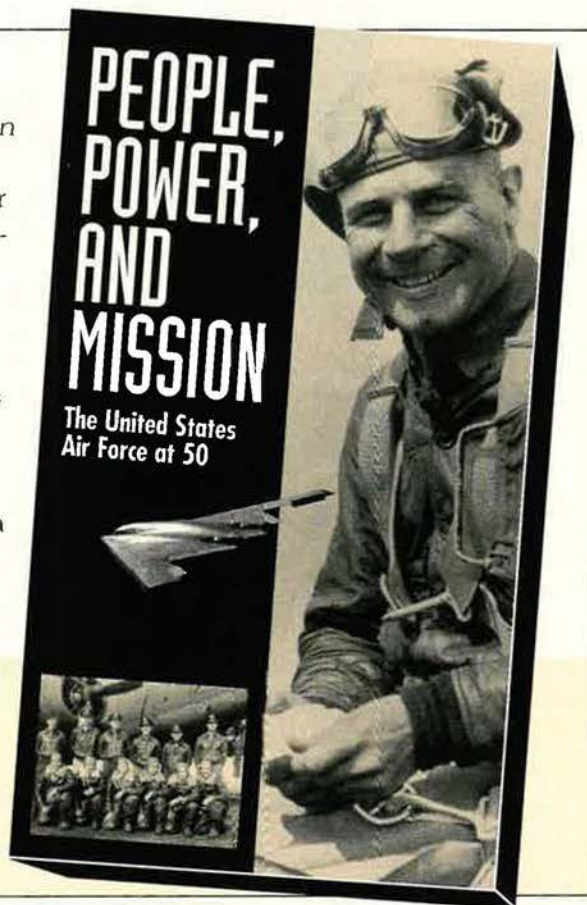
Featured are interviews with General Brent Scowcroft, Gabby Gabreski (the world's greatest living ace), General Bernard Schriever, and dozens of others who have made the USAF the best in the world.

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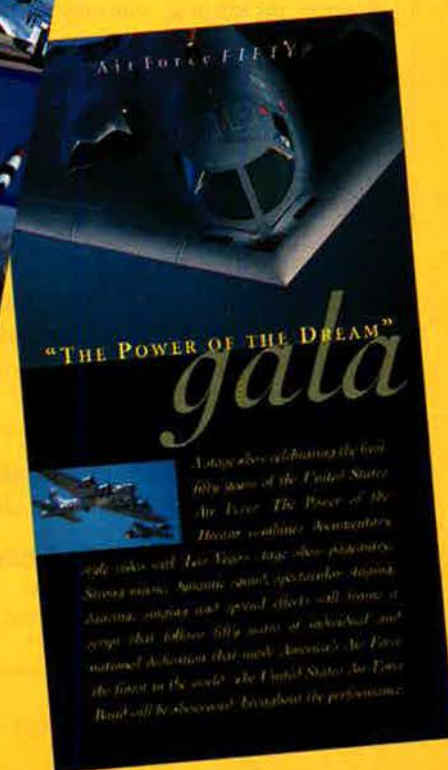
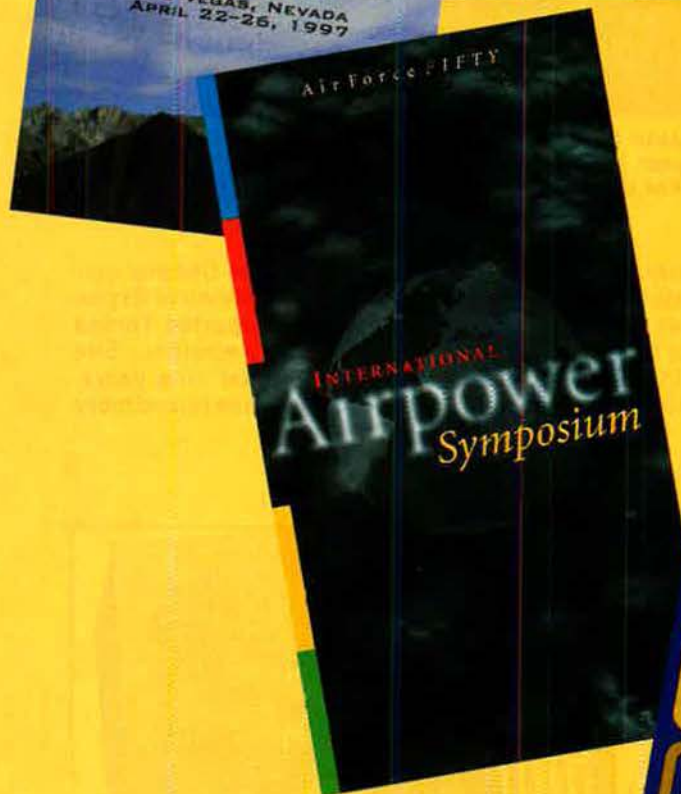
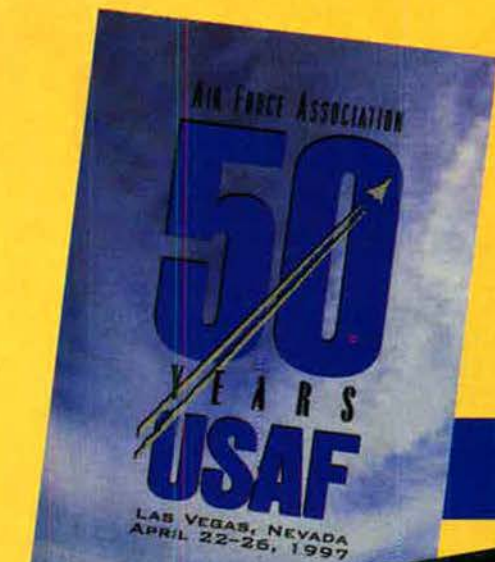
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In Defense of the Pacific Northwest

AFA chapter members in the Pacific Northwest came from as far afield as Spokane and Bellingham, Wash., and Klamath Falls, Ore., to the combined Oregon–Washington State Convention in September, hosted by the **Tacoma (Wash.) Chapter** at McChord AFB, Wash.

Keynote speaker at the evening banquet was Lt. Gen. Patrick K. Gamble, 11th Air Force commander, whose remarks capped two days crammed with activities.

The convention kicked off with a full afternoon of briefings on McChord's mission and activities and on the defense of the Pacific Northwest.

The briefings were conducted by Col. Arthur F. Diehl III, wing commander; Col. Thomas G. Walters, chief of the C-17 Program Integration Office; Creig Lingle, 62d Civil Engineering Squadron; Col. Thomas A. Blank, 446th Support Group (AFRC) commander; Col. John L. Cromwell, commander, Western Air Defense Sector; and Brig. Gen. James A. McDevitt, chief of staff, Washington ANG.

Diehl, Walters, Blank, and Cromwell are members of the Tacoma Chapter, while McDevitt belongs to the **Inland Empire (Wash.) Chapter**.

Washington State President Richard A. Seiber said every presentation was "absolutely outstanding" and that Lingle was "jumping up and down in



Robert C. Young, a lieutenant in World War II, cut the cake for a Dallas (Texas) Chapter celebration of USAF's 50th anniversary, helped by two fighter aces: Reserve Brig. Gen. Richard "Steve" Ritchie (left) of the Gen. Robert E. Huyser (Colo.) Chapter and Dallas Chapter's Maj. Gen. Charles R. Bond Jr., USAF (Ret.).

excitement" in describing how the base is undergoing changes in preparation for the C-17s that are scheduled to be based at McChord.

Along with AFA business meetings that night, convention-goers also attended the base's 50th anniversary functions, including a hangar party and mini-air show.

The *USA Today*–Aerospace Education Foundation Visions of Explo-

ration program held the spotlight on the morning of the convention's second day. Karl W. Berg, the Tacoma Chapter's vice president for aerospace education, joined Mary Ellen Walsh, director of the Visions program for *USA Today*, in the presentation.

The conventioners then headed for a luncheon barbeque at the McChord Air Museum, then back to the air show. The convention culminated with the banquet that evening.

Delaware State Convention

Col. Felix M. Grieder, commander of the 436th Airlift Wing at Dover AFB, Del., headed the list of guest speakers at the Delaware State Convention, held at the Dover AFB Museum in September. His speech included an overview of USAF's first 50 years. He also provided convention-goers with information on how the Quadrennial Defense Review affects Dover's outsourcing and privatization efforts and manpower situation.

Charles G. Durazo, then-national vice president (Central East Region), also spoke at the convention, giving an update on the region's AFA activities.

During awards presentations, Richard B. Bundy, now a **Donald W. Steele Sr. Memorial (Va.) Chapter** member, received an AFA Citation for his contributions to the Delaware state AFA organization.



Navy Capt. (sel.) Irvin G. Williams III (left), commander of US Naval Reserve Readiness Center, Oklahoma City, accepts an Extra Mile Award from Central Oklahoma (Gerrity) Chapter Member of the Year Maj. Gen. Charles H. Perez. Honored for community service, Williams is the award's first non-USAF recipient.

USAF photo by Margo Wright

George W. Chabbot of the **Delaware Galaxy Chapter** received a special AFA plaque honoring him as the state's first president. The immediate past state president, Jack G. Anderson, was honored with an AFA Recognition Certificate, as was Malvin L. Larsen, a former **Henlopen Area Chapter** president; Michael D. Leister of the Galaxy Chapter; Barry B. Newstadt, former president of the **Diamond State Chapter**; Emmett Venett, past president of the Galaxy Chapter; and Mary Skelton, a former state treasurer.

In reporting on the convention,

Stephanie M. Wright, Delaware state president, also noted that the Central East Region had matched donations from the state's three chapters, as part of the effort to raise funds for a "Military Flight" wall at the Dover AFB Museum. The exhibit will trace the history of aircraft at the base.

AFA at the Archives

A USAF 50th anniversary display at the Louisiana State Archives in Baton Rouge, La., opened in September. It spotlights, among other natives of the state, AFA members Oris B. Johnson, for whom the **Maj.**

Gen. Oris B. Johnson (La.) Chapter is named, Wiltz P. Segura, a Johnson Chapter member, and John S. Hardy of the **Ark-La-Tex (La.) Chapter**.

Lt. Gen. Phillip J. Ford, 8th Air Force commander at Barksdale AFB, La., and an Ark-La-Tex Chapter member, and Michael F. Cammarosano, Louisiana state president, spoke at the ceremony.

Ralph W. Stephenson Jr., Maj. Gen. Oris B. Johnson Chapter president, and William D. Wight, **Greater New Orleans Area Chapter** president, were among the more than 200 guests

Books

Compiled by Chanel Sartor, Editorial Associate

Ambrose, Stephen E. *Citizen Soldiers: The US Army From the Normandy Beaches to the Bulge to the Surrender of Germany, June 7, 1944–May 7, 1945.* Simon & Schuster, 1230 Avenue of the Americas, New York, NY 10020. 1997. Including photos, maps, notes, bibliography, and index, 512 pages. \$27.50.

Ball, Donald L. *Fighting Amphibs: The LCS(L) in World War II.* Mill Neck Publications, 1 Cole Ln., Williamsburg, VA 23185. 1997. Including photos, bibliography, appendix, and index, 322 pages. \$19.95.

Brion, Irene. *Lady GI: A Woman's War in the South Pacific.* Presidio Press, 505 B San Marin Dr., Ste. 300, Novato, CA 94945-1340. 1997. Including photos and glossary, 178 pages. \$18.95.

Budahn, P.J. *Veteran's Guide to Benefits.* 2d ed. Stackpole Books, 5067 Ritter Rd., Mechanicsburg, PA 17055. 1997. Including appendices and index, 254 pages. \$14.95.

Carey, Neil, ed. *Fighting the Bolsheviks: The Russian War Memoir of Private First Class Donald E. Carey, US Army, 1918–1919.* Presidio Press, 505 B San Marin Dr., Ste. 300, Novato, CA 94945-1340. 1997. Including photos, 240 pages. \$24.95.

Doyle, Robert C. *A Prisoner's Duty: Great Escapes in US Military History.* Naval Institute Press, 118 Maryland Ave., Annapolis, MD 21402-5035. 1997. Including photos, notes, references, appendices, and index, 372 pages. \$34.95.

Duffner, Robert W. *Airborne Laser: Bullets of Light.* Plenum Publishing Corp., 233 Spring St., New York, NY 10013-1578. 1997. Including photos, notes, glossary, bibliography, and index, 398 pages. \$34.95.

Engen, Donald D. *Wings and Warriors: My Life as a Naval Aviator.* Smithsonian Institution Press, PO Box 960, Herndon, VA 20172-0960. 1997. Including photos, glossary, and index, 341 pages. \$29.95.

Grossnick, Roy A. *United States Naval Aviation 1910–1995.* US Government

Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328. 1997. Including photos, glossary, appendices, and index, 819 pages. \$73.00.

Gudgin, Peter. *Armoured Firepower: The Development of Tank Armament 1939–45.* Books International, PO Box 605, Herndon, VA 20172-0605. 1997. Including glossary, photos, appendices, bibliography, and index, 262 pages. \$44.95.

Hagedorn, Dan. *North American NA-16/AT-6/SNJ.* Specialty Press Publishers and Wholesalers, 11481 Kost Dam Rd., North Branch, MN 55056. 1997. Including photos, diagrams, and chronology, 96 pages. \$16.95.

Hartinger, Gen. James V., USAF (Ret.). *General Jim Hartinger: From One Stripe to Four Stars.* Order from: Chinook Bookshop, 210 N. Tejon St., Colorado Springs, CO 80903. 1997. Including photos, 292 pages. \$19.95.

Hayes, Col. Jack W., USAF (Ret.). *Cavalry Trooper to Fighter Pilot ... and Three Wars.* Sunflower University Press, 1531 Yuma, PO Box 1009, Manhattan, KS 66505-1009. 1997. Including photos and index, 262 pages. \$23.95.

Jenkins, Dennis R. *Lockheed SR-71/YF-12 Blackbirds.* Specialty Press Publishers and Wholesalers, 11481 Kost Dam Rd., North Branch, MN 55056. 1997. Including photos, diagrams, and chronology, 100 pages. \$16.95.

Kinzy, Bert. *P-51 Mustang: Part 2. P-51D Through F-82H.* Squadron/Signal Publications, Inc., 1115 Crowley Dr., Carrollton, TX 75011. 1997. Including photos and diagrams, 72 pages. \$11.95.

Lester, Gary Robert. *Mosquitoes to Wolves: The Evolution of the Airborne Forward Air Controller.* Air University Press, CADRE/EDPB, OAS/PR, 170 W. Selfridge St., Maxwell AFB, AL 36112-6610. 1997. Including photos, bibliography, and index, 280 pages.

Masters, Peter. *Striking Back: A Jewish Commando's War Against the Nazis.* Presidio Press, 505 B San Marin Dr., Suite 300, Novato, CA 94945-1340. 1997. Including photos, bibliography, and index, 340 pages. \$24.95.

McCarthy, James R., and Robert E. Rayfield. *B-25 Over Hanoi: A Linebacker II Story.* California State Fullerton Press, PO Box 6828, Fullerton, CA 92834-6828. 1996. Including photos and bibliography, 163 pages. \$19.95.

Meilinger, Col. Phillip S., USAF, ed. *The Paths of Heaven: The Evolution of Airpower Theory.* Air University Press, OAS/PR, 170 West Selfridge, Maxwell AFB, AL 36112-6610. 1997. Including index, 650 pages.

Nalty, Bernard C., ed. *Winged Shield, Winged Sword: A History of the USAF Vols. I and II.* US Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328. 1997. Including photos, notes, references, and indices, Vol. I, 513 pages; Vol. II, 659 pages. \$77.00.

Ricks, Thomas E. *Making the Corps.* Scribner, 1230 Avenue of the Americas, New York, NY 10020. 1997. Including photos and index, 320 pages. \$24.00.

Spahr, William J. *Stalin's Lieutenants: A Study of Command Under Duress.* Presidio Press, 505 B San Marin Dr., Ste. 300, Novato, CA 94945-1340. 1997. Including photos, bibliography, and index, 322 pages. \$24.95.

Tannehill, Victor C. *The Martin Marauder B-26.* Boomerang Publishers, 6164 West 83d Way, Arvada, CO 80003. 1997. Including photos, 132 pages. \$29.95.

Trask, Roger R., and Alfred Goldberg. *The Department of Defense 1947–1997: Organization and Leaders.* US Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328. 1997. Including photos, appendices, notes, bibliography, and index, 189 pages. \$23.00.

who attended the display's opening ceremony.

Johnson retired as a major general in 1973 after a career that included serving as project officer for the development of the F-86D, F-89, and several other fighters.

Before retiring as a brigadier general in 1972, Segura, a former Flying Tiger, racked up 10,000 flying hours.

Hardy retired from active duty in 1970 as a lieutenant general, after having served as commander, 3d Air Force, and commander, Allied Air Forces Southern Europe.

The glass display cases at the archives—one for each honoree—contain photos, uniforms, flying helmets, and awards and decorations belonging to them. Johnson's display includes books that have featured him. The exhibit fills two rooms and also contains paintings depicting Johnson and Segura in action as young fighter pilots. Other displays concentrate on Air Force history.

The entire exhibit is an initiative of Louisiana's secretary of state, Fox McKeithen, and was coordinated with Cammarosano's help. It remains open through this month.

Their Civic Duty

Air National Guard wings from two



With memorabilia, art work, aircraft models, and a video, a Louisiana State Archives exhibit honors several native sons who became USAF generals, including AFA members Oris Johnson, Wiltz Segura, and John Hardy.

states and the **Richard D. Kisling (Iowa) Chapter** pitched in to conduct an orientation flight on a KC-135 tanker for 18 civic leaders in September.

The 185th Fighter Wing, Sioux Gateway Airport, Iowa, helped arrange the event, and the 155th Air

Refueling Wing, Lincoln MAP, Neb., provided the aircraft.

To catch the 8 a.m. ANG flight out of Lincoln, the civic leaders had to board a bus—chartered by the chapter with funds from an AEF grant—at 4:30 a.m. in Sioux City, Iowa.

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Richard D. Kisling Chapter members who participated in a chapter-organized orientation flight for community leaders and are among the group pictured here are Donald Persinger, Judd Lischke, George Wilen, Wendall Hefner, Jeffrey Slotsky, Kathy Jacobsen, 1st Lt. Kathryn Matol (bottom, left) and Capt. Kenneth Husted (behind Matol), both from the 155th Air Refueling Wing (ANG). Other crew members pictured are Capt. John Harris (front), MSgt. Steven Minnick, and MSgt. Mark Forster.



The chapter thoughtfully provided doughnuts and coffee for the 100-mile bus trip south into neighboring Nebraska, reported Ronald E. Lenz, the chapter's past president.

With the special guests on board, the tanker headed for Topeka, Kan., where it rendezvoused with two B-52s, refueling them in the air between Topeka and Colorado.

The tanker then headed northeast and refueled an F-16 from Minnesota and two F-16s out of Sioux City. Each guest had two opportunities to witness the aerial refuelings from the boomer compartment and also spent time in the cockpit.

The tanker orientation was the initiative of past chapter president Donald E. Persinger, Richard Fechter, and Lenz and had been done once before, in 1992.

The civic leaders on this trip came from the greater Sioux City area that encompasses parts of South Dakota and Nebraska. Several of them are Community Partners of the 198-member chapter.

Lenz pointed out that the trip was a great public relations opportunity for both AFA and the Air Force.

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Fleet of Feet

Several members of the **Donald W. Steele Sr. Memorial (Va.) Chapter** proved to have fleet feet in a 10K and a 5K road race sponsored by the **Nation's Capital (D.C.) Chapter** on Sept. 20. The races were part of USAF-wide "Air Force in Motion" sports activities held that weekend to celebrate the service's 50th anniversary.

Overall winner of the 10K event was Andrew T. Klemas of the Steele Chapter, who completed the course—through Bolling AFB and Naval Station Anacostia, D.C.—in 33 minutes, 40 seconds.

The Steele Chapter's Teresa Fitzpatrick finished 12th among the female runners in the 10K. Other chapter members in a field of nearly 200 runners included Arthur F. Huber II (in the 10K) and Peter J. Graziano, who finished 10th among men in the 5K. Graziano described the course as flat and fast but added that the humidity challenged the runners.

Participants were also allowed to walk the 5K route, and the family-oriented activities included a Kiddie Fun Run.

The Air Force Memorial Foundation, Aerospace Education Foundation, and USAF-related organizations benefited from the funds raised by these road races.

Recruiting the Young

"Membership is getting tough, so you have to get out and get them—That's all there is to it," declares Lyle W. Marschand, immediate past president of the **Lawrence D. Bell Museum (Ind.) Chapter**.

As of June 1997, his chapter counted 300 members, and over the past year 12 of them have been young people, he said.

His most recently recruited chapter member is 17-year-old Tracy R. Risner, a 1997 graduate of Kankakee Valley High School in Wheatfield, Ind., who now works in her parents' business.

Marschand had been chapter president for four years and said that during that period, he even managed to sign up two mother-daughter teams: Jennelle L. Provo, 17, and her mother Debra D. Provo and sisters Kellie D. Chorzempa, 24, and Renae D. Chorzempa, 23, and their mother Melaney A. Chorzempa.

Marschand credits his family, such as son L. Hensley Marschand, who are also chapter members, with this recruitment push for young people. He said his children and grandchildren tip him off on who at their high school or college might be interested



Photo by Micky Sarbern

Already at the front of the pack in the Air Force in Motion Classic road race was No. 79, Andrew Klemas of the Donald W. Steele Sr. Memorial Chapter. The second place winner, No. 164, Chris Carbo (third from left), finished a minute and a half behind him. The Nation's Capital Chapter sponsored the event.

in joining AFA, and Marschand then follows up. He has driven from his home in Demotte, Ind., as far as 50 miles, down to Purdue University in West Lafayette, Ind., to sign up a new AFAer.

What motivates the younger chapter members, he says, is his description of the *USA Today*-Aerospace Education Foundation's Visions of Exploration program. He tells potential members that their membership

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Air Force Association

dues help educate children in math and science.

He adds that if a young person cannot afford the dues, he pays for a year's membership for them, with the stipulation that they renew their membership for the next five years.

He also bought a computer to keep up with correspondence because he writes a letter to everyone whose membership is about to expire or has expired and sends a thank you note to everyone who joins.

Breakfast in Illinois

In August, more than 30 AFA members from Illinois' **Chicagoland-O'Hare, Lee Cordell Memorial, and Greater Rockford Chapters** attended an AFA breakfast for Lt. Gen. George K. Muellner, principal deputy assistant secretary of the Air Force for acquisition.

AFA's Great Lakes Region officers—including Anton D. Brees, national vice president (Great Lakes Region), John D. Bailey, regional treasurer (and now Illinois state president), and Mike Sheehan, regional secretary—hosted the breakfast.

The gathering took place before Muellner attended the annual Chicago Air and Water Show, which this year saluted the Air Force's 50th anniversary and featured the USAF Thunderbirds. The general spoke to the breakfast group on USAF's force structure and the F-22.

Colorado Convention

In a highlight of the Colorado State Convention in Colorado Springs, Colo., in August, Capt. Harold Rollins of the 5th Launch Squadron, Patrick AFB, Fla., and SSgt. Richard W. Stenberg, 30th Range Squadron, Vandenberg AFB, Calif., were named as recipients of the 1997 Operations Excellence Award from the **Colorado Springs/Lance Sijan Chapter**. The award honors officers and NCOs in North American Aerospace Defense Command, US Space Command, or Air Force Space Command who make significant contributions to the advancement of space or missile operations.

The Colorado Springs/Lance Sijan Chapter also recently sponsored a ball—in conjunction with USAF's 50th anniversary—attended by a lengthy roster of distinguished visitors. Gen. H.H. "Hap" Arnold's grandson, Robert Arnold; then—Secretary of the Air Force Sheila E. Widnall; Gen. Bernard Schriever, USAF (Ret.); and Gen. Howell M. Estes III headed the list. Charles P. Zimkas, chapter president, and Deborah S. Canjar, chapter executive vice president, served as hosts for the more than 900 people at the gala that included a POW/MIA remembrance ceremony and music by the Air Force Band of the Rockies.

More Chapter News

Diamond State (Del.) Chapter's William Spruance sponsored an es-

say contest for the 20 cadets whose attendance at Air Force Fifty had been sponsored by AFA. **David J. Price/Beale (Calif.) Chapter's** 2d Lt. Jessica Smith, at the time an ROTC cadet at the University of Connecticut, Storrs, won the contest on "What Air Force Fifty Meant to the Cadets." She wrote, "The Air Force is about people working together and defending together to support our nation. Having witnessed the events I saw at the 50th anniversary celebration, I am confident that we have the power of the past and the energy of the future to keep our country strong and continue to make our people proud." As the essay contest winner, Smith earned a trip to AFA's National Convention and \$500, both donated by Spruance. Smith is now stationed at Beale AFB, Calif.

The **Fort Wayne (Ind.) Chapter** manned booths at a 122d Fighter Wing (ANG) open house and air show at Fort Wayne IAP in October. Chapter stalwarts Gene Royer, vice president for communications, Theodore Huff Jr., Tom Hissem, Jeanne L. Hissem, and Everitt Padgett sold AFA T-shirts and caps during the two-day event.

Have AFA/AEF News?

Contributions to "AFA/AEF National Report" should be sent to *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 22209-1198. Phone: (703) 247-5828. Fax: (703) 247-5855. ■

Unit Reunions

2d Air Division Assn, 8th AF (WWII), March 26-29, 1998, at the Sheraton Harbor Place Hotel in Fort Myers, FL. **Contact:** Fred K. McConnell, PO Box 482, Cape Coral, FL 33910. 941-549-2747.

17th Troop Carrier Sq/Tactical Airlift Sq (C-130D aircrew), March 12-15, 1998, in Biloxi, MS. **Contact:** Bernard Warren, PO Box 1164, Slidell, LA 70459-1164. 504-643-7323.

77th Fighter Sq, Jan. 8-10, 1998, at Shaw AFB, SC. **Contact:** Capt. Kevin Aunapu, 750 Fighting Falcon St., Shaw AFB, SC 29152. 803-668-3884 (FALCON@OG20.shaw.af.mil).

117th Aircraft Control and Warning Sq, 117th Tactical Control Sq, 117th Air Control Sq. May 15-17, 1998, in Savannah, GA. **Contact:** CMSgt. Charles Lash or MSgt. Ron Brown, PO Box 13869, Savannah, GA 31416-0869. 912-355-0808 or 912-963-6103.

394th BS and 4th Recon. Sq, 13th AF, Pacific (WWII). April 30-May 3, 1998, at the Best Western Le Baron Hotel in Colorado Springs, CO.

Mall unit reunion notices well in advance of the event to "Unit Reunions," Air Force Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information.

Contact: Dag Larsen, 410 Church Rd., Unit 43, Ojai, CA 93023. 805-646-8761.

446th BG Assn, 8th AF (WWII), April 30-May 3, 1998, at the Marriott Riverfront Hotel in Savannah, GA. **Contact:** Link Veazey, 1938 Harbour Oaks Dr., Snellville, GA 30278. 770-972-5883.

556th Recon. Sq, April 3-4, 1998, in Las Vegas. **Contact:** Donald J. Chase, 3923 N. 111th Plaza, Omaha, NE 68164-2858. 402-493-5612.

636th AC&W Radar Sq (SAGE), Condon AFS, OR, 1951-70. Seeking former civilian and military personnel for a reunion in 1998. **Contact:** David E. Klein, 65801 Gerking Market Rd., Bend, OR 97701. 541-385-6276.

820th BS, 41st BG, 7th AF (WWII). April 16-19, 1998, at the Holiday Inn Northwest in San Antonio. **Contact:** William W. Childs, 3637 Patsy Ann Dr., Richmond, VA 23234-2951. 804-275-6012.

6555th Guided Missile Sq, B-61 Matador project, 1951-53, Patrick AFB, FL. Seeking former members for the purpose of compiling a reunion roster. **Contact:** Richard Gross, 6468 Safford Terr., North Port, FL 34287. 941-423-8314.

Air Weather Assn. Current and former USAF/USAAF personnel, recon, meteorology cadets, and instructors assigned to Chanute AFB, IL, and Keesler AFB, MS. June 24-28, 1998, in St. Louis. **Contact:** Clifford D. Kern, 1879 Cole Rd., Aromas, CA 95004-9681. 408-726-1660 (CKern@CompuServe.com).

Military Assistance Command Vietnam Coun-

terparts. Seeking former members for a reunion in 1998. **Contact:** Robert Cunningham, PO Box 56, Pratts, VA 22731. 703-948-6542.

P-61 Night Fighter, Black Widow, Salinas AAB and Hammer Field, CA, 1943-45 (WWII). Seeking members to plan a reunion. **Contact:** Bob

Curry, 4805 Fond Du Lac Trl., Madison, WI 53705.

Pilot Training Class 61-F. April 24-26, 1998, at the Victorian Condo-Hotel and Conference Center in Galveston, TX. **Contact:** David Heller, 220 Ponderosa Dr., Fayetteville, GA 30214. 770-461-9329 (110224.1334@CompuServe.com). AI

Ballinger, 46 Chapparral Ct., Missouri City, TX 77459-1907. 281-499-4729 (aballinger@uh.edu).

Class 65-C, Moody AFB, GA. Jan. 15-18, 1998, a cruise to the Bahamas from Florida. **Contact:** R.D. Truitt, 103 Park Ave., A5, Summit, NJ 07901. 908-273-4955 (rdtruitt@CompuServe.com). ■

Bulletin Board

Seeking **John Patterson or Paterson**, possibly born in 1929, stationed at Drexel AB, France, in 1950, and Korea, 1951. **Contact:** Johnny Deslandes, 51 Blvd. St. Michel, 75005 Paris, France.

Seeking **Keith Bartlett**, who lived in Bangor, ME, in 1963, with wife and two children. **Contact:** Gary G. Brosig, 13171 Parkway Rd., Pound, WI 54161.

Seeking **officer's cap** with lightning and clouds on peak, preferably 1950s or 60s issue, but interested in more recent one as well. **Contact:** Mark Ellis, 20019 Gilbert Dr., Canyon Country, CA 91351-4811.

Seeking **pilots** who flew **enlisted forward air controllers** in Laos, 1960-66. **Contact:** Jan Churchill, PO Box 32, New Castle, DE 19720-0032 (janc@ssnet.com).

Seeking photos of, books, patches, manuals, and information on **Westover AFB, MA**, and SAC-era **B-47 Stratojets**. **Contact:** Joe Clark IV, 1043 Burt Hill Rd., Tolland, MA 01034-9566.

Seeking **Sgt. Pauline Ritter**, Special Service Office, Davis-Monthan Field, Tucson, AZ, 1942-45. **Contact:** Charles Jacob, 3408 Tibbett Ave., Bronx, NY 10463.

Seeking crew members of B-29 #9800, **Beetle Bomber**, Yokota AB, Japan, 1951. **Contact:** Joseph F. Catrambone, 14423 E. Cambridge St., Moorpark, CA 93021-1340.

Seeking information about **MSgt. Jesse M. Critchfield**, 10th TCS, 60th TCG, and 12th TCC Force Hq. Flight Section, North Africa and Sicily, 1942-43. **Contact:** Linda Critchfield, 7020 Firmament Ave., Van Nuys, CA 91406.

Seeking June 1947 issue of **Air Force Magazine**. **Contact:** George Chapman, 8372 Bennett Ave., Fontana, CA 92335.

Seeking a blue **USAF cap**, with "Aim High" on the front, and other surplus USAF items. **Contact:** Lynn McMahon, PO Box 1643, Andover, OH 44003.

Seeking crew members of **Capt. Milton Campbell's** B-29, 463d BS, 316th BW, 2d AF (later 8th AF), Tinian and Okinawa, 1945-46. **Contact:** Carl M. Jacobs, 1455 Meadowview Dr., Decatur, IL 62526.

Seeking **navigator aviation cadet** shoulder boards, 1960-61. **Contact:** Lee Wilson, 8381 N. Sage Pl., Tucson, AZ 85704.

Seeking information on the **581st Psychological Warfare Sq**, Clark AB, Philippines, which flew missions in Korea from Tachikawa, Japan, in 1953. **Contact:** Arthur L. Snyder, 429 Manor Ave., Cranford, NJ 07016.

Seeking information on and contact with crew members of WWII B-25 **Baby Shoes**, including **Lts. J.J. Blaia and J.L. Moor**, **Sgts. C.C. Cook, J. Whitehead, and J.C. Whitman**, and **R. Brewster**, that crashed in Greenland, February

If you need information on an individual, unit, or aircraft or want to collect, donate, or trade USAF-related items, write to "Bulletin Board," *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 22209-1198. Items submitted by AFA members have first priority; others will run on a space-available basis. If an item has not run within six months, the sender should resubmit an updated version. Letters must be signed. Items or services for sale, or otherwise intended to bring in money, and photographs will not be used or returned.—THE EDITORS

or May 1943. **Contact:** Lasse Rungholm, The Nordic Aviation Historical Association, Bane-gaardsgade 16, DK-8000 Arrhus C, Denmark (rungholm@po.ia.dk).

Seeking information on WWII B-24D **The Spirit of Beale Street**, possibly dedicated in April 1943, in Memphis, TN, area. **Contact:** John David White, 8675 Magnolia Bloom Cv., Cordova, TN 38018.

Seeking information on or photos of 8th AF **P-51D Mustangs**, especially #44-64034, flown to Uppland AB, Sweden, April 18-21, 1945. **Contact:** Alan Sernholt, 4910 Priscilla Ln., Sacramento, CA 95820.

Seeking information on or contact with **1st Lt. Shirley V. Casey**, 407th BS, 92d BG, shot down over southern France on Dec. 31, 1943. **Contact:** D.F. Harrington, HQ USAF/HO, Unit 3050, Box 55, APO AE 09094-5055, or Randy Richardson, 52FW/HO, Unit 3680, Box 200, APO AE 09126-0200.

Seeking information on **Capt. Frederick D. Pogue**, 8th AF, of Camden, NJ, stationed near Norwich, UK, WWII. **Contact:** John H. Duddy, 1700 Painted Sky, Santa Fe, NM 87501-9624 (duddy@nets.com).

Seeking **Ann. Dan Jackson** of Clarksdale, MS, and others stationed at Galena Airport, AK, 1959-60. **Contact:** Jon P. Jehl, 5861 3d Cv., Apt. 7, Memphis, TN 38134-9333.

Seeking 494th FS (or FBS), 48th FBG, **patch**. **Contact:** John E. Benbow, 1360 Continental Ave., Melbourne, FL 32940-6702.

Seeking US servicemen who were members of **RAF 149th BS** during WWII. **Contact:** John Johnston, 7600 Compton Ct., Charlotte, NC 28270-0344.

Seeking **Dr. John Marberry**, who graduated from Johns Hopkins University Medical School, 1945, and was a flight surgeon at Melaha AB, Tripoli, Libya, 1946-47. **Contact:** Don C. Hawkins, PO Box 430, Argyle, TX 76226.

Seeking information on **Pfc. Ellis Peters**, stationed near Stowmarket, UK, 1944. **Contact:** John C. Brooks, 27 Lawrence Grove, Henleaze, Bristol BS9 4EL, UK.

Seeking historical information on **45th Airlift Sq**, including the 45th AS, 45th ALS, 45th MAS, 45th TCS, and 45th TS. **Contact:** Scott E. Van Gorder, 45 AS/DOV, 706 Chappie James Ave., Rm. 121, Keesler AFB, MS 39534-2608 (vangorder@45as.kee.aet.af.mil).

Seeking photos of B-24 **Starduster**, 370th BS, and **B-24 #44-40933**, both assigned to the 307th BG, stationed at Noemfoor/Morotai, Indonesia, September-November 1944. **Contact:** Mike Capito, 645 Anita Dr., Melbourne, FL 32935-6401.

Seeking personnel from **2d Air Refueling Sq**, 2d BW, Hunter AFB, GA, 1950-60. **Contact:** Kyle D. Barnes, 2440 Foxhead Way, Clearwater, FL 34619 (kdbarnes1@juno.com).

Seeking information on missions of RF-100A **Slick Chick**, RB-36 **Featherweight**, and on RB-69 recon programs, 1950s. **Contact:** Barry A. Miller, 200 Hunts Neck Rd., Poquoson, VA 23662.

Seeking **Sgt. James Peterson**, 458th BS, Horsham St. Faith, UK, 1944-45. **Contact:** Christine P. Armes, 192 Plumstead Rd. East, Thorpe St. Andrew, Norwich, Norfolk, NR7 9NQ, UK.

Seeking relatives of Illinois native **1st Lt. Kenneth N. Okeson**, 81st TCS, 436th TCG, KIA Sept. 19, 1944, in the Netherlands and Iowa native **2d Lt. Glenn W. Poulson**, 599th BS, 397th BG, KIA April 18, 1945. **Contact:** Peter J.M. Joosten, Stationsdwarstraat 10A, 6131 BA, Sittard, Netherlands.

Seeking information on P-51D pilot **Clark Williams**, 354th FS, 355th FG, 8th AF, who crashed near Faverayes Machelles, France, about Aug. 27, 1944. **Contact:** Mickael Bonneau, 23 rue des galles val de maine, 49080 Bouchemaine, France.

Seeking **Mervin Frisby**, stationed at Deopham Green AF, UK, 1944-45. **Contact:** W.J.R. Paul, The Orchard, Mill Ln., Rocklands, Attleborough, Norfolk, NR17 1XR, UK.

Seeking contact with **15th AF** bomber crews who were escorted by **Tuskegee Airmen** during the Ramitelli to Berlin mission or the Ploesti raids, WWII. **Contact:** John E. Adlemann Jr., Central High School, 39 Bluff St., Dubuque, IA 52001.

Seeking **Cambodian and Laotian pilot wings**. **Contact:** Tom Malloy, PO Box 46, Green Village, NJ 07935.

Seeking information on take-off crash of **BT-13**, piloted by aviation cadet **Cletus Miller**, in Newport, AR, June 24, 1943. **Contact:** Clete L. Miller, 315 Quail Hollow Dr., Sedona, AZ 86351-7277.

Seeking information on or photos of the **421st TFS**, Hill AFB, Utah, 1962-present. **Contact:** Jeff L. Kclln, 15946 86th Ave. SE, Yelm, WA 98597. ■

Pieces of History

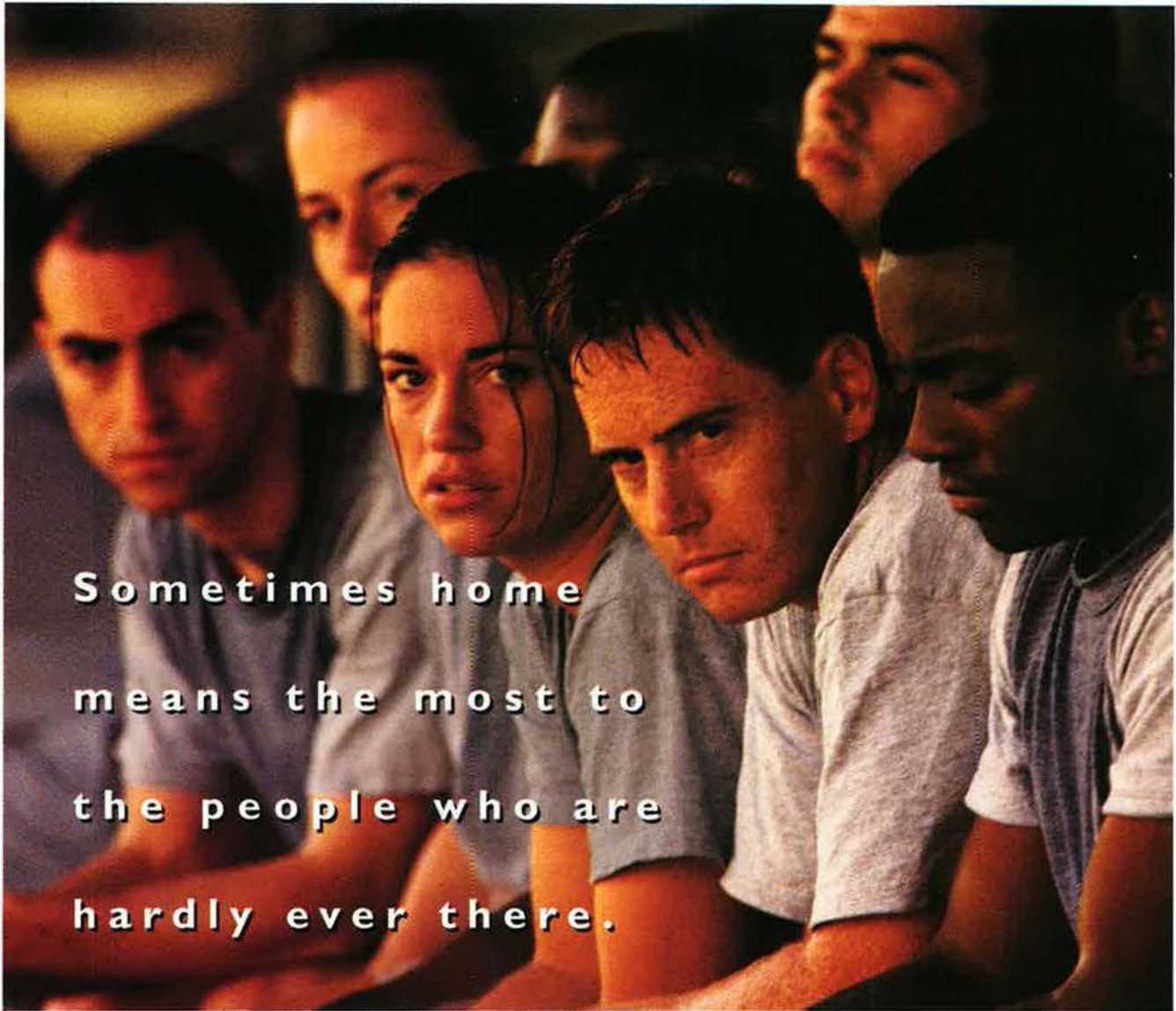
Photography by Paul Kennedy

Blueing



After the Air Force became a separate service in 1947, one of the early changes included “blueing” literally everything from parkas to flight suits as shown here. These 1950s-era uniforms, though, testify to one of the problems created in the attempt to provide a different look for the new service—no two blues seemed to be the same shade. Another issue was

economics, especially when it came to utility clothing. For example, it was simply more expensive to garb USAF fliers in a color different than that worn by other US military aviators. Today flight suits and other universal utility clothing, such as fatigues, are multiservice—only the accoutrements vary.



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A silhouette of an F-15 Eagle fighter jet is shown on a runway at sunset. The sky is a gradient of orange and red, with the sun low on the horizon. The jet's canards and wings are clearly visible against the bright background. The text is overlaid on the image in a clean, sans-serif font.

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